

Film Capacitors

Data Handbook BC05 2001/2002



BC COMPONENTS

PROVIDING KNOWLEDGE. CREATING SOLUTIONS.

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 in accordance with 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.

BCcomponents

Film Capacitors

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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. Customers of BCcomponents who are using or selling these products for use in such applications do so at their own risk and agree to fully indemnify BCcomponents for any damages resulting from such improper use or sale.

INTRODUCTION

FILM DIELECTRICS USED IN FILM CAPACITOR PRODUCTS

Overview

PARAMETER	DIELECTRIC ⁽¹⁾				UNIT
	KT	KN	KI	KP	
Dielectric constant: at 1 kHz	3.3	3.0	3.0	2.2	–
Dissipation factor					
at 1 kHz	50	40	3	1	10 ⁻⁴
at 10 kHz	110	–	6	2	10 ⁻⁴
at 100 kHz	170	–	12	2	10 ⁻⁴
at 1 MHz	200	–	18	4	10 ⁻⁴
Volume resistivity	10 ⁺¹⁷	10 ⁺¹⁷	10 ⁺¹⁷	10 ⁺¹⁸	Ωcm
Dielectric strength	400	300	250	600	V/μm
Maximum application temperature	125	125	150	105	°C
Power density:					
at 10 kHz	50	40	2.5	0.6	W/cm ³
Dielectric absorption	0.2	1.2	0.05	0.01	%

Note

- In accordance with "IEC 60062": KT = polyethylene terephthalate (PETP); KN = polyethylene naphthalate (PEN); KI = polyphenylene sulfide (PPS); KP = polypropylene (PP).

Polyethylene terephthalate (PETP) and polyethylene naphthalate (PEN) films are mostly used in general purpose capacitors. These capacitors are used in applications typically with small bias DC voltages and/or small AC voltages at low frequencies.

Polyethylene terephthalate (PETP) has as most important property high capacitance per volume due to his high dielectric constant and availability in thin gauges.

Polyethylene naphthalate (PEN) is used when high temperature resistance is required compared to PET.

Polyphenylene sulfide (KI) film can be used in applications where high temperature is needed eventually in combination with low dissipation factor.

Polypropylene (KP) films are used in high frequency or high voltage applications due to their very low dissipation factor and high dielectric strength. It is used in AC and pulse capacitors and interference suppression capacitors for mains applications.

Typical properties as functions of temperature or frequency are illustrated in Figs 1 to 5.

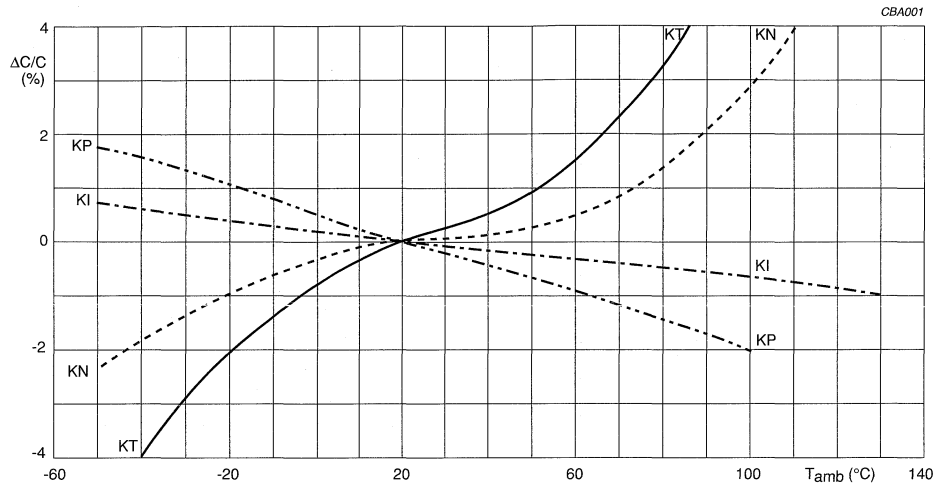


Fig.1 Capacitance change as a function of ambient free air temperature at 1 kHz; typical curves.

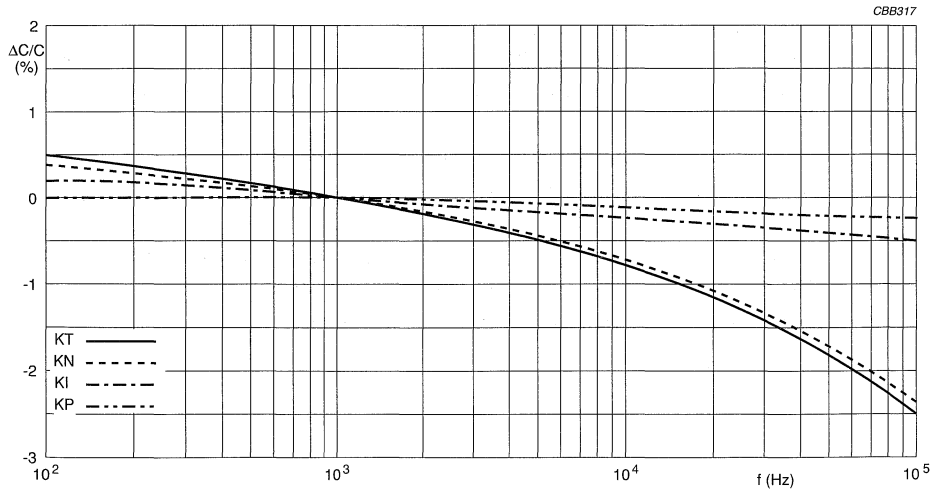


Fig.2 Capacitance change as a function of frequency; typical curves.

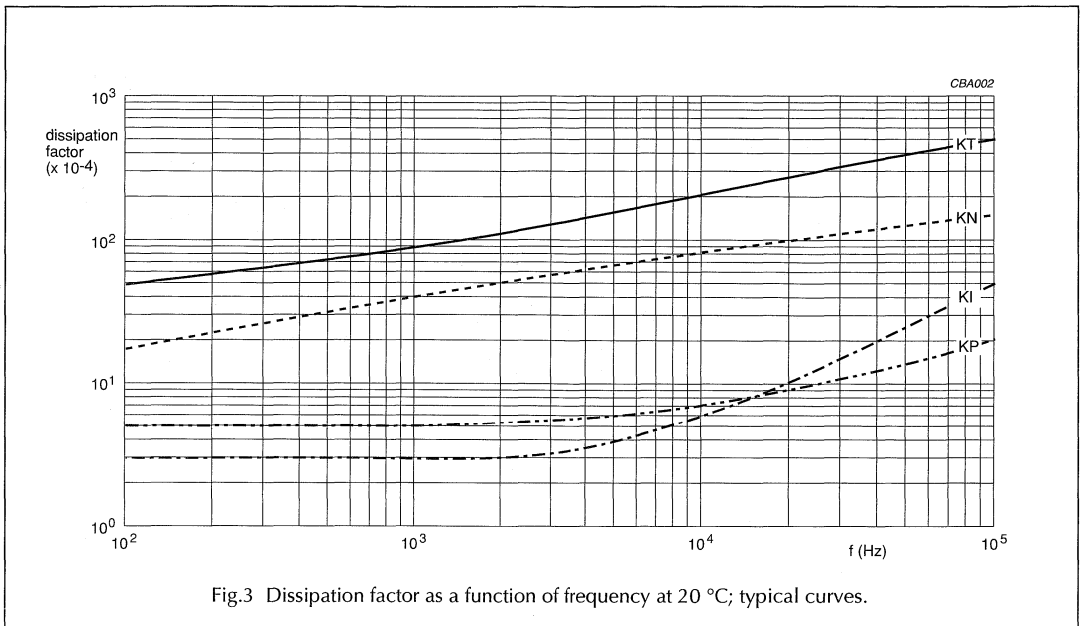


Fig.3 Dissipation factor as a function of frequency at 20 °C; typical curves.

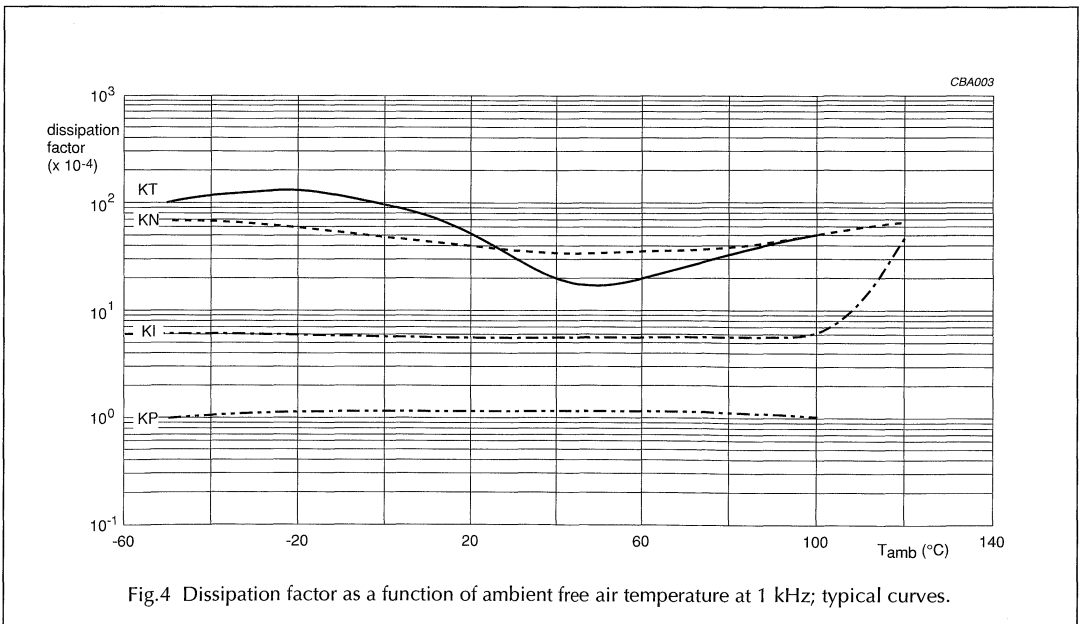
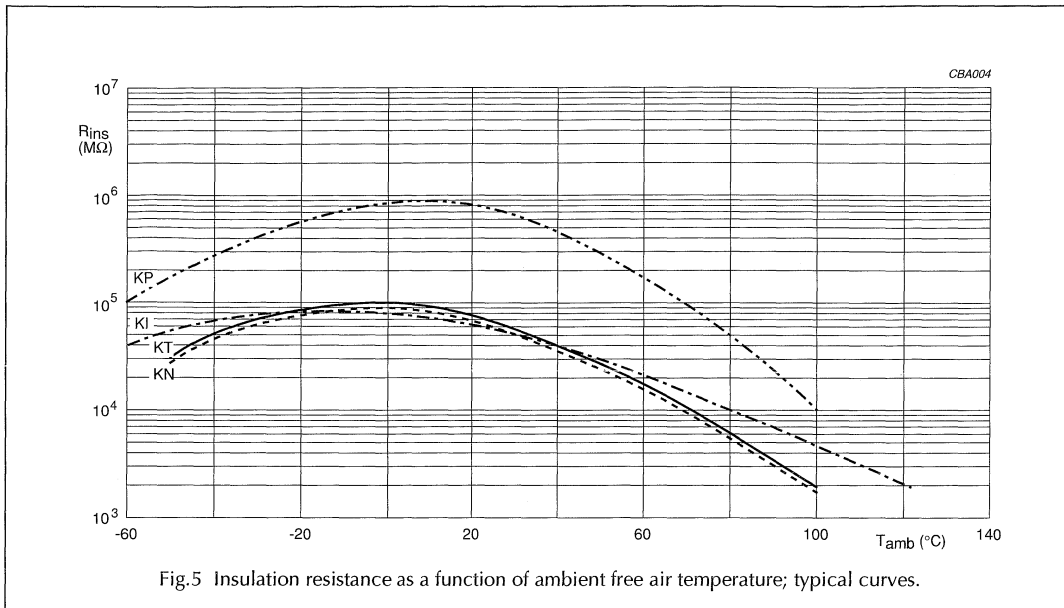


Fig.4 Dissipation factor as a function of ambient free air temperature at 1 kHz; typical curves.



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 nm. The electrodes of film/foil capacitors have discrete metal foils with thicknesses of approximately 5 to 10 μm .

In some programs a double side metallized plastic film is used as electrode.

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.

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 DC 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) at 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.

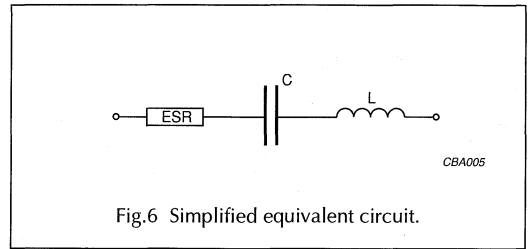


Fig.6 Simplified equivalent circuit.

Rated capacitance

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

Capacitance tolerance

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

Tolerance coding in accordance with "IEC 60062"

PERCENTAGE OF DEVIATION	LETTER CODE
$\pm 1.0\%$	F
$\pm 2.0\%$	G
$\pm 5.0\%$	J
$\pm 10.0\%$	K
$\pm 20.0\%$	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 ($10^{-6}/\text{K}$).

Film capacitors

Introduction

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.

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.

Dissipation factor and equivalent series resistance

The dissipation factor or tangent of loss angle ($\tan \delta$) 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.

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.

Film capacitors

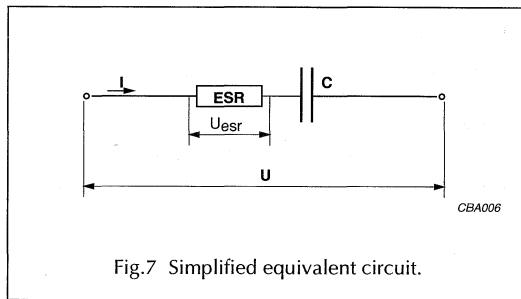
Introduction

Maximum power dissipation

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

$$P = \frac{U_{\text{esr}}^2}{\text{ESR}}$$

$$P = \text{ESR} \times I^2$$



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

Given that for film capacitors $\tan \delta = \omega \times C \times \text{ESR} \ll 0.1$ the formula can be simplified to:

$$U_{\text{esr}}^2 = \text{ESR}^2 \times \omega^2 \times C^2 \times U^2$$

or with $\text{ESR} = \tan \delta / \omega C$

the formula becomes:

$$P = \omega \times C \times \tan \delta \times U^2$$

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

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

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:

$$U = U_0 + \sum_{k=1}^{\infty} U_k \times \sin(k\omega t + \Phi_k)$$

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

with U_0 the DC voltage, U_k and I_k (the voltage and current of the k -th harmonic respectively) the formula for the dissipated power becomes:

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

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

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

Film capacitors

Introduction

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.

BENDING (Ub)

Lead diameter 0.5, 0.6 and 0.8 mm: load 5 N, $4 \times 90^\circ$.

Lead diameter 1.0 mm: load 10 N, $4 \times 90^\circ$.

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.

The test is primarily intended to permit observation 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 60384-1" 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 be used, as they may attack the capacitor or the encapsulation.

After cleaning it is always recommended to dry the components carefully.

CAPABILITIES

This data handbook BC05, dated 2001/2002, gives an extensive overview of all the preferred code numbers which are available for film capacitors.

Due to our technical capabilities we can offer on short notice, the following non-standard products.

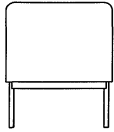
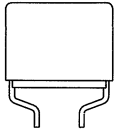
Overview

AVAILABLE ON REQUEST	DESCRIPTION	SERIES	
Intermediate C-values	E24 series with $\pm 5\%$ tolerance	MKT 303/304	
		MKT 365/366/367	
		MKT 467/468/469	
		MKT/MKT 468	
		MKT 370/371/372/373	
		MKT 470	
	E12 series with $\pm 10\%$ tolerance	interference suppression	
	E24 series with $\pm 5\%$ tolerance		
		E48 series with $\pm 1\%$ or $\pm 2\%$ tolerance	KP 460 to 464
		E96 series with $\pm 1\%$ tolerance	
	E96 series with $\pm 2\%$ tolerance	MKP 416 to 420	
Asymmetrical tolerances		all series	
Other lead lengths	for loose products	all series	
Small reels	for <250 pieces	all radial series	
Lead free wire		all series	

SELECTION GUIDE

Film capacitors

Selection guide

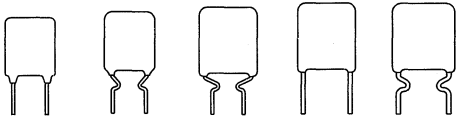
	MKT 303 (NEW)			MKT 304 (NEW)		
	Page 67			Page 67		
	 CBB336			 CBB337		
Dielectric	Metallized polyester			Metallized polyester		
Encapsulation	epoxy lacquered			epoxy lacquered		
Qualified to	IEC 60384-2			IEC 60384-2		
Climatic category	55/105/56			55/105/56		
Packaging ⁽¹⁾	loose			taped		
Tolerance	±10%, ±5%			±10%, ±5%		
C (μ F) ⁽²⁾	U _{Rdc} (V)					
	250	400	630	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						
0.022						
0.033						
0.047						
0.068						
0.1						
0.15						
0.22						
0.33						
0.47						
0.68						
1.0						
1.5						
2.2						
3.3						
4.7						
6.8						
10						
15						

Notes

1. Pitch size in shaded cells: C = 7.5 mm (bent back 10/7.5); D = 7.5 mm (bent back 15/7.5); E = 10.0 mm; F = 15.0 mm; G = 22.5 mm; H = 27.5 mm.
2. Intermediate values of E12-series are also available.

Film capacitors

Selection guide

MKT 365/366/367				
Page 101				
				
<i>CBA007</i>				
Metallized polyester epoxy lacquered				Dielectric
IEC 60384-2				Encapsulation
55/105/56				Qualified to
loose; taped				Climatic category
±10%, ±5%				Packaging ⁽¹⁾
U_{Rdc} (V)				Tolerance
63	100	250	400	C (μ F) ⁽²⁾
				0.00022
				0.00033
				0.00047
				0.00068
				0.001
				0.0015
				0.0022
				0.0033
				0.0047
				0.0068
				0.01
			B L	0.015
				0.022
				0.033
				0.047
			B L	0.068
				0.1
				0.15
				0.22
				0.33
				0.47
				0.68
				1.0
				1.5
				2.2
				3.3
				4.7
				6.8
				10
				15

Notes

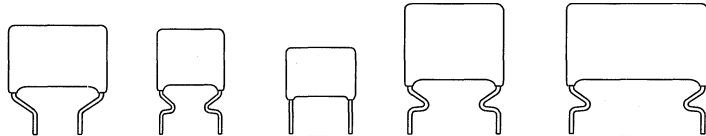
1. Pitch size in shaded cells: A = 5.0 mm; B = 7.5 mm; L = 5.0 mm (bent back 7.5/5).
2. Intermediate values of E12-series are also available.

Film capacitors

Selection guide

MKT 467/468/469 and MKT/MKT 468

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CBA008

Dielectric	Metallized polyester
Encapsulation	epoxy lacquered
Qualified to	IEC 60384-2
Climatic category	55/105/56
Packaging ⁽¹⁾	loose; taped
Tolerance	±10%, ±5%

C (μF) ⁽²⁾	U_{Rdc} (V)				
	100	250	400	630	1000
0.00022					
0.00033					
0.00047					
0.00068					
0.001					
0.0015					
0.0022					
0.0033					
0.0047					
0.0068					
0.01					
0.015					
0.022					
0.033					
0.047					
0.068					
0.1					
0.15					
0.22					
0.33					
0.47					
0.68					
1.0					
1.5					
2.2					
3.3					
4.7					
6.8					
10					
15					

Notes

1. Pitch size in shaded cells: D = 7.5 mm (bent back 15/7.5); E = 10.0 mm; F = 15.0 mm; G = 22.5 mm and H = 27.5 mm.
2. Intermediate values of E12-series, are also available.
3. Only 5.6 μF is available for 250 V and only 0.82 μF is available for 630 V.

Film capacitors

Selection guide

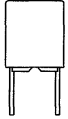
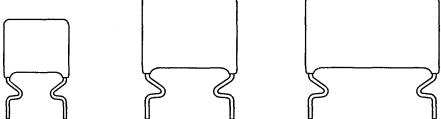
MKT 370/371/372/373					
Page 175					
					CB8A009
Metallized polyester potted with epoxy resin					Dielectric Encapsulation
IEC 60384-2					Qualified to
55/105/56					Climatic category
loose; taped					Packaging ⁽¹⁾
±10%, ±5%					Tolerance
U_{Rdc} (V)					C (µF) ⁽²⁾
63	100	250	400	630	
					0.00022
					0.00033
					0.00047
					0.00068
					0.001
					0.0015
					0.0022
					0.0033
					0.0047
					0.0068
					0.01
					0.015
					0.022
					0.033
					0.047
					0.068
					0.1
					0.15
					0.22
					0.33
					0.47
					0.68
					1.0
					1.5
					2.2
					3.3
					4.7
					6.8
					10
					15

Notes

1. Pitch size in shaded cells: A = 5.08 mm; B = 7.62 mm; E = 10.0 mm; F = 15.0 mm; G = 22.5 mm and H = 27.5 mm.
2. Intermediate values of E12-series are also available.
3. Compact size
4. Standard size

Film capacitors

Selection guide

	MKT 470				KT 347			
	Page 247				Page 271			
	 CBA010				 CBA969			
Dielectric	metallized polyester				polyester			
Encapsulation	potted with epoxy resin				epoxy lacquered			
Qualified to	IEC 60384-2				IEC 60384-11			
Climatic category	55/125/56				40/100/21			
Packaging ⁽¹⁾	loose; taped				loose			
Tolerance	±10%, ±5%				±20%, ±10%			
C (μF) ⁽²⁾	U _{Rdc} (V)				U _{Rdc} (V)			
	63	100	250	400	100	250	400	630
0.00022								
0.00033								
0.00047								
0.00068								
0.001								
0.0015								
0.0022								
0.0033								E
0.0047								
0.0068				A			E	
0.01								
0.015					E			
0.022						E		
0.033			A		E			
0.047							F	
0.068								F
0.1		A				F		
0.15								G
0.22	A							
0.33						G		
0.47								
0.68								
1.0								
1.5								
2.2								
3.3								
4.7								
6.8								
10								
15								

Notes

1. Pitch size in shaded cells: A = 5.0 mm; E = 10.0 mm; F = 15.0 mm; G = 22.5 mm.
2. Intermediate values of E12-series are also available.

Film capacitors

Selection guide

MKP 338 6 (NEW)	MKP 336 6	MKP 338 1 (NEW)	MKP 336 1	
Page 293	Page 308	Page 321	Page 335	
Y2	Y2	X1	X1	Class
metallized polypropylene				Dielectric
potted with epoxy resin				Encapsulation
IEC 60384-14, 2nd edition; EN 132400				Qualified to
				Approvals
55/105/56/B	55/100/21/B	55/105/56/B	55/100/21/C	Climatic category
$\leq 20 \times 10^{-4}$	$\leq 10 \times 10^{-4}$	$\leq 70 \times 10^{-4}$	$\leq 70 \times 10^{-4}$	Tan δ (10 kHz)
>15000 M Ω	>15000 M Ω	>15000 M Ω	>15000 M Ω	R _{ins} for C \leq 330 nF
–	–	>5000 s	>5000 s	RC for C > 330 nF
100 V/ μ s	200 V/ μ s	100 V/ μ s	200 V/ μ s	Pulse slope at U _R
loose; taped				Packaging ⁽¹⁾
$\pm 20\%$, $\pm 10\%$, $\pm 5\%$				Tolerance
U _{Rac} (V) 300	U _{Rac} (V) 250	U _{Rac} (V) 440	U _{Rac} (V) 275	C (μ F) (E6-series)
B	E		E	0.001
				0.0015
				0.0022
				0.0033
				0.0047
				0.0068
D	F		F	0.01
				0.015
				0.022
				0.033
				0.047
				0.068
	G		G	0.1
				0.15
				0.22
				0.33
	H		H	0.47
				0.68
				1.0
				1.5
				2.2

Note

- Pitch size in shaded cells: B = 7.5 mm; D = 7.5 mm (bent back 15/7.5); E = 10.0 mm; F = 15.0 mm; G = 22.5 mm; H = 27.5 mm.

Film capacitors

Selection guide

	MKP 338 4 (NEW)	MKP 338 2				
	Page 351	Page 367				
Class	X2	X2				
Dielectric	metallized polypropylene					
Encapsulation	potted with epoxy resin					
Qualified to	IEC 60384-14, 2nd edition; EN 132400					
Approvals	PENDING <small>CBB339</small>	 <small>CBA968</small>				
Climatic category	55/105/56/B	55/105/56/B				
Tan δ (10 kHz)	$\leq 70 \times 10^{-4}$	$\leq 70 \times 10^{-4}$				
R_{jns} for $C \leq 330$ nF	> 15000 MΩ	> 15000 MΩ				
RC for $C > 330$ nF	> 5000 s	> 5000 s				
Pulse slope at U_R	100 V/μs	100 V/μs				
Packaging ⁽¹⁾	loose; taped	loose; taped				
Tolerance	±20%, ±10%	±20%, ±10%, ±5%				
C (μF)	U_{Rac} (V)	U_{Rac} (V)				
(E6-series)	275	275				
0.001		B				
0.0015						
0.0022						
0.0033						
0.0047						
0.0068						
0.01						
0.015						
0.022						
0.033						
0.047						
0.068	D	F				
0.1			C		E	
0.15				D		F
0.22						
0.33						
0.47						
0.68			G			G
1.0						
1.5						
2.2			H			
3.3						
4.7						
6.8			L			
10.0						M

Note
 1. Pitch size in shaded cells: D = 7.5 mm (bent back 15/7.5); F = 15.0 mm; G = 22.5 mm; H = 27.5 mm; L = 37.5 mm; M = 55.0 mm.

Film capacitors

Selection guide

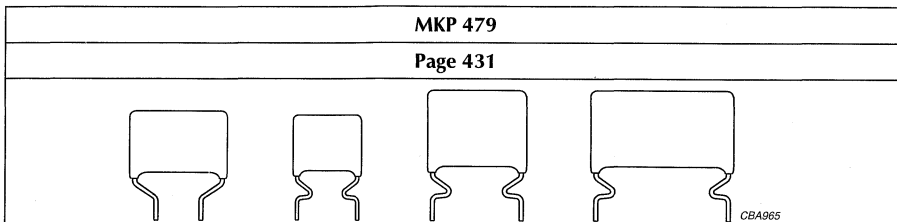
MKP 336 2	MKP 335 5	MKP 435 (NEW)	
Page 383	Page 399	Page 413	
X2	X2	X2	Class
metallized polypropylene potted with epoxy resin			Dielectric
IEC 60384-14, 2nd edition; EN 132400			Encapsulation
			Qualified to Approvals
55/100/21/C	55/100/56/B	40/100/56/C and 40/085/56/C	Climatic category
$\leq 70 \times 10^{-4}$	$\leq 70 \times 10^{-4}$	$\leq 70 \times 10^{-4}$	Tan δ (10 kHz)
>15000 M Ω	>15000 M Ω	>15000 M Ω	R _{ins} for C \leq 330 nF
>5000 s	>5000 s	>5000 s	RC for C > 330 nF
100 V/ μ s	100 V/ μ s	100 V/ μ s	Pulse slope at U _R
loose; taped	loose; taped	loose; taped	Packaging ⁽¹⁾
$\pm 20\%$, $\pm 10\%$, $\pm 5\%$	$\pm 20\%$, $\pm 10\%$, $\pm 5\%$	$\pm 20\%$, $\pm 10\%$	Tolerance
U _{Rac} (V)	U _{Rac} (V)	U _{Rac} (V)	C (μ F)
275	275	275	(E6-series)
			0.001
			0.0015
			0.0022
			0.0033
			0.0047
			0.0068
			0.01
			0.015
			0.022
			0.033
		0.047	
		0.068	
		0.1	
		0.15	
		0.22	
		0.33	
		0.47	
		0.68	
		1.0	
		1.5	
		2.2	
		3.3	
		4.7	
		6.8	
		10.0	

Note

1. Pitch size in shaded cells: E = 10.0 mm; F = 15.0 mm; G = 22.5 mm; H = 27.5 mm.

Film capacitors

Selection guide



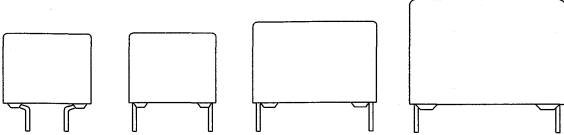
Dielectric	metallized polypropylene			
Encapsulation	epoxy lacquered			
Qualified to	IEC 60384-17			
Climatic category	55/105/56			
Packaging ⁽¹⁾	loose; taped			
Tolerance	±5%			
C (μF) ⁽²⁾	U_{Rdc} (V)			
	160	250	400	630
0.001				
0.0015				
0.0022				
0.0033				
0.0047				
0.0068				
0.01				
0.015				
0.022				E
0.033			E	
0.047		E		
0.068		E		
0.1	E			
0.15		E		
0.22	D			
0.33	D	F		
0.47	D	F		
0.68	D	F		
1.0			G	
1.5		G		
2.2			G	
3.3		H		
4.7				
6.8				

Notes

1. Pitch size in shaded cells: D = 7.5 mm (bent back 15/7.5); E = 10.0 mm; F = 15.0 mm; G = 22.5 mm; H = 27.5 mm.
2. Intermediate values of E24-series are also available.

Film capacitors

Selection guide

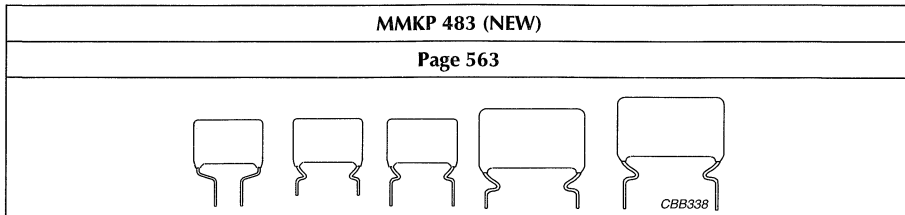
MMKP 383								Dielectric Encapsulation Qualified to Climatic category Packaging ⁽¹⁾ Tolerance C (μF) ⁽²⁾
Page 501								
								
double side polyester carrier and polypropylene								
potted with epoxy resin								
IEC 60384-17								
55/105/56								
loose; taped								
$\pm 5\%$								
U_{Rdc} (V)								
250	400	630	1000	1400	1600	2000	2500	
								0.001
								0.0015
								0.0022
								0.0033
								0.0047
								0.0068
								0.01
								0.015
								0.022
								0.033
								0.047
								0.068
								0.1
								0.15
								0.22
								0.33
								0.47
								0.68
								1.0
								1.5
								2.2
								3.3
								4.7
								6.8

Notes

1. Pitch size in shaded cells: D = 7.5 mm (bent back 15/7.5); F = 15.0 mm; G = 22.5 mm; H = 27.5 mm.
2. Intermediate values of E24-series are also available.

Film capacitors

Selection guide



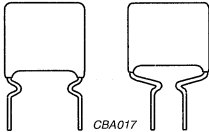
Dielectric	double side polyester carrier and polypropylene						
Encapsulation	epoxy lacquered						
Qualified to	IEC 60384-17						
Climatic category	55/105/56						
Packaging ⁽¹⁾	loose; taped						
Tolerance	±3%; ±5%						
C (µF) ⁽²⁾	U_{Rdc} (V)						
	250	400	630	1000	1400	1600	2000
0.001							D F
0.0015							
0.0022					D F	D F	D F
0.0033					D F	D F	D F
0.0047				D F	D F	D F	D F
0.0068				D F	D F	D F	D F
0.01				D F	D F	D F	D F
0.015				D F	D F	D F	D F
0.022				D F	D F	D F	D F
0.033				D F	D F	D F	D F
0.047		D F	D F	D F	D F	D F	D F
0.068		D F	D F	D F	D F	D F	D F
0.1	D F	D F	D F	D F	D F	D F	D F
0.15	D F	D F	D F	D F	D F	D F	D F
0.22	D F	D F	D F	D F	D F	D F	D F
0.33	D F	D F	D F	D F	D F	D F	D F
0.47		G		G		G	
0.68		G		G		G	
1.0		H		H		H	
1.5		H		H		H	
2.2		H		H		H	
3.3							
4.7							
6.8							

Notes

1. Pitch size in shaded cells: D = 7.5 mm (bent back 15/7.5); F = 15.0 mm; G = 22.5 mm; H = 27.5 mm.
2. Intermediate values of E24-series are also available.

Film capacitors

Selection guide

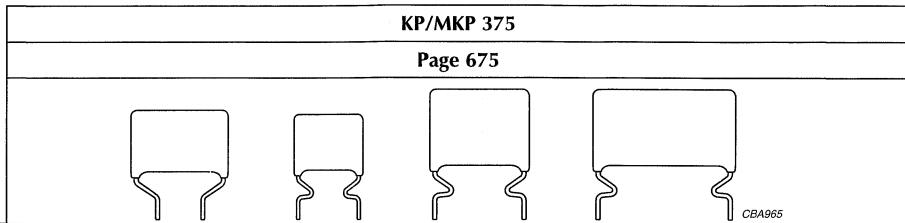
KP 374			
Page 639			
			
polypropylene			Dielectric
epoxy lacquered			Encapsulation
IEC 384-13			Qualified to
55/100/56			Climatic category
loose; taped			Packaging ⁽¹⁾
±10%, ±5%			Tolerance
U_{Rdc} (V)	U_{Rdc} (V)	U_{Rdc} (V)	C (μ F) ⁽²⁾
250	400	630	
			0.0001
			0.00015
			0.00022
			0.00033
			0.00047
			0.00068
			0.001
			0.0015
			0.0022
			0.0033
			0.0047
			0.0068
			0.01
			0.015
			0.022
			0.033
			0.047
			0.068
			0.1
			0.15
			0.22
			0.33
			0.47
			0.68

Notes

1. Pitch size in shaded cells: B = 7.5 mm; C = 7.5 mm (bent back 10/7.5); E = 10.0 mm; F = 15.0 mm; L = 5.0 mm (bent back 7.5/5); N = 5.0 mm (bent back 10/5)
2. Intermediate values of E24-series are also available.

Film capacitors

Selection guide



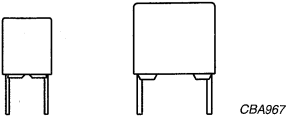
Dielectric	metallized polypropylene				
Encapsulation	epoxy lacquered				
Qualified to	IEC 60384-17				
Climatic category	55/105/56				
Packaging ⁽¹⁾	loose; taped				
Tolerance	±5%, ±3.5%				
C (μF) ⁽²⁾	U_{Rdc} (V)				
	630	1000	1600	2000	2500
0.0001					
0.00015					
0.00022					
0.00033					
0.00047					
0.00068					
0.001					
0.0015					
0.0022					
0.0033					
0.0047					
0.0068					
0.01					
0.015					
0.022					
0.033					
0.047					
0.068					
0.1					
0.15					
0.22					
0.33					
0.47					
0.68					

Notes

1. Pitch size in shaded cells: B = 7.5 mm; D = 7.5 mm (bent back 15/7.5); E = 10.0 mm; F = 15.0 mm; G = 22.5 mm; H = 27.5 mm.
2. Intermediate values of E24-series are also available.

Film capacitors

Selection guide

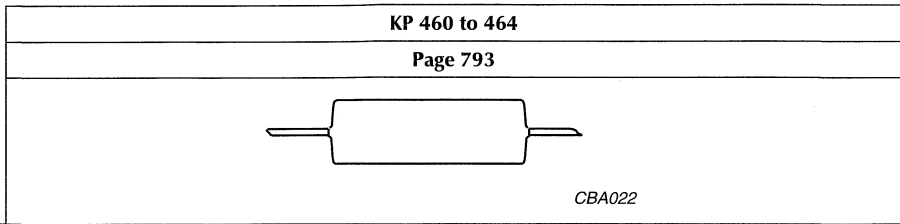
MKP 416 to 420					
Page 755					
					
metallized polypropylene					Dielectric
potted with epoxy resin					Encapsulation
IEC 60384-16					Qualified to
55/085/56					Climatic category
loose; taped					Packaging ⁽¹⁾
±5%, ±2%					Tolerance
U_{Rdc} (V)					C (μ F) ⁽²⁾
63	160	250	400	630	
					0.0001
					0.00015
					0.00022
					0.00033
					0.00047
					0.00068
					0.001
					0.0015
					0.0022
					0.0033
					0.0047
					0.0068
					0.01
					0.015
					0.022
					0.033
					0.047
					0.068
					0.1
					0.15
					0.22
					0.33
					0.47
					0.68
					1.0

Notes

1. Pitch size in shaded cells: A = 5.0 mm; E = 10 mm; F = 15.0 mm.
2. Intermediate values of E96-series are also available.

Film capacitors

Selection guide



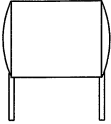
Dielectric	polypropylene				
Encapsulation	epoxy lacquered				
Qualified to	IEC 60384-13				
Climatic category	40/100/56				
Packaging ⁽¹⁾	loose; taped				
Tolerance	±5%, ±2%, ±1%				
C (pF)⁽²⁾	U_{Rdc} (V)				
	63	160	250	400	630
47					
68					
100					
150					J
220					
330					
470					
680				J	
1000					
1500			J		
2200					K
3300					K
4700		J			
6800	J				
10000				K	
15000			K		
22000		K			
33000					
47000					
68000					
100000					
150000					
162000					

Notes

1. Body length in shaded cells: J = 11.0 mm; K = 15.0 mm
2. 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.

Film capacitors

Selection guide

KT 311 90028		KT 311 90045/46/49/51/52 (NEW)	
Page 823		Page 829	
 CBA024			
polyester			Dielectric
			Encapsulation
IEC 60155		IEC 1199	
40/100/21		40/125/21	
loose; taped			Packaging ⁽¹⁾
			Tolerance
U_{Rac} (V)			C
250			(μF)⁽²⁾
		7.5	
11.5			
		0.0012	
		0.0030	
		0.0056	

Notes

1. Pitch size in shaded cells.
2. Intermediate values of E12-series are also available.

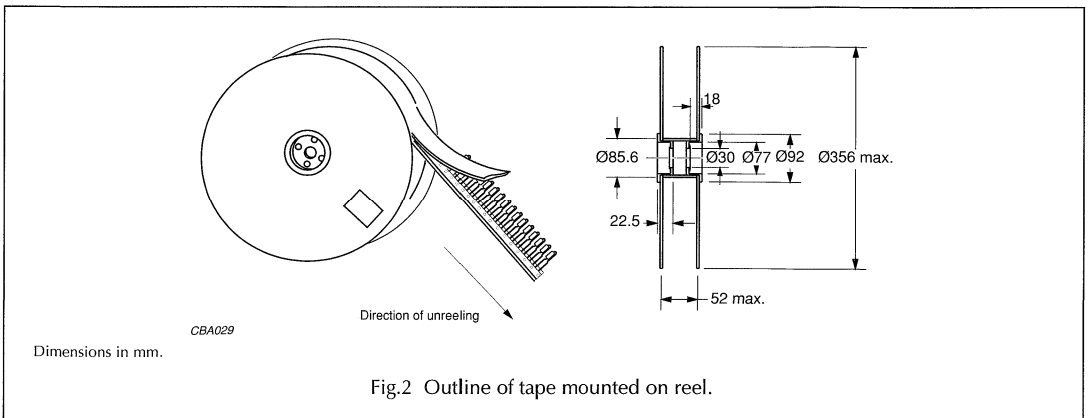
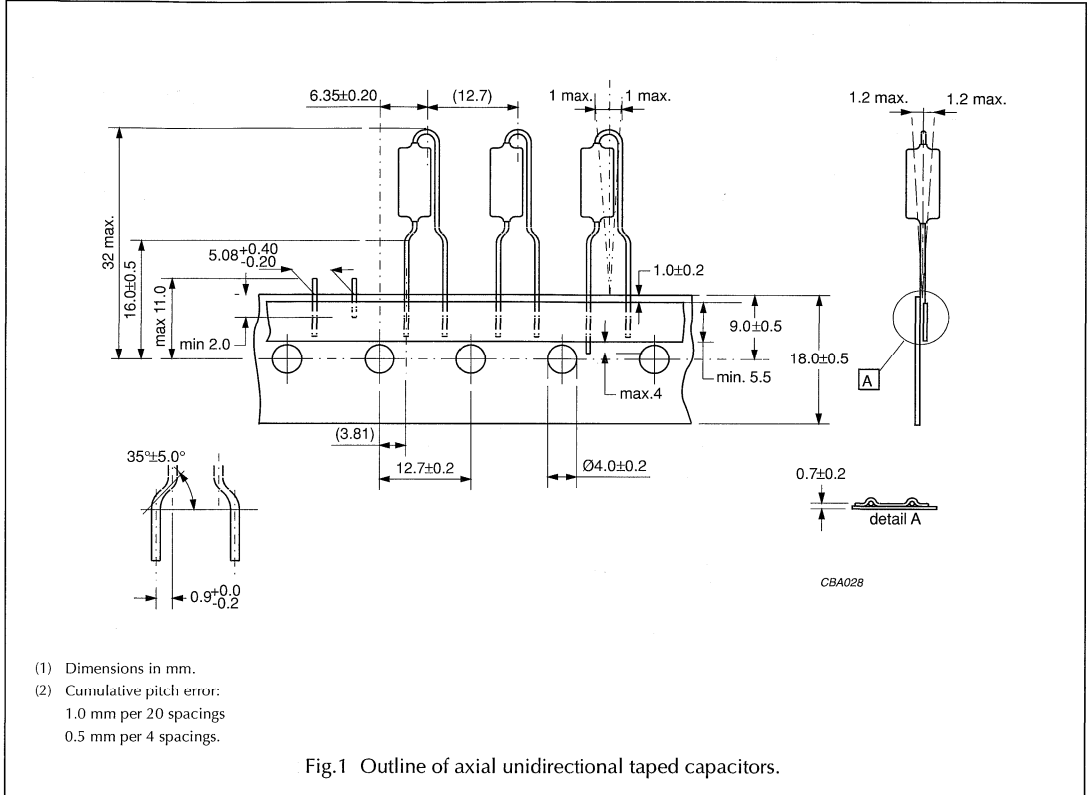
PACKAGING

Film capacitors

Taping information

AXIAL UNIDIRECTIONAL FILM CAPACITORS

Series: 460 to 464



Film capacitors

Taping information

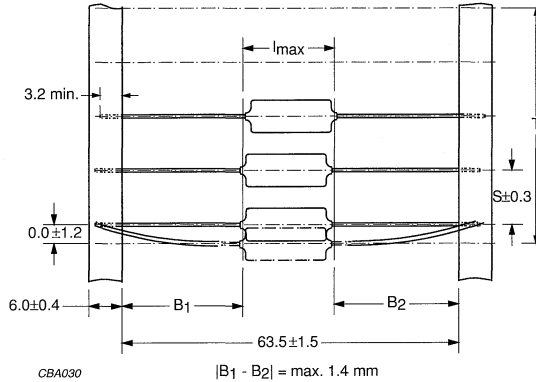
AXIAL FILM CAPACITORS

Series 460 to 464

TAPE DISTANCE: 63.5 ± 1.5 mm

Distance T for number (n) of capacitors

d_{max} (mm)	S (mm)	T FOR NUMBER (n) OF CAPACITORS	
		$n < 50$	$50 \leq n < 100$
≤ 5	5	$5(n-1) \pm 2$	$5(n-1) \pm 4$
> 5	10	$10(n-1) \pm 2$	$10(n-1) \pm 4$



Dimensions in mm.

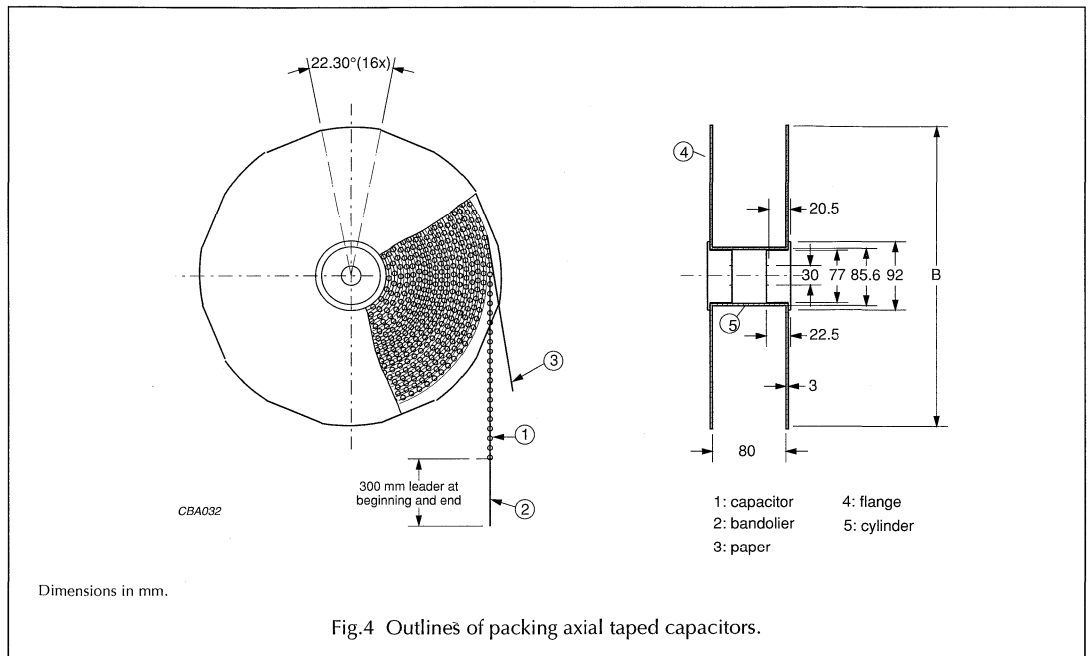
Fig.3 Outline of axial taped capacitors. Tape distance: 63.5 ± 1.5 mm.

Film capacitors

Taping information

Reel diameter B as a function of maximum product body thickness d_{max}

PRODUCT BODY THICKNESS d_{max} (mm)	REEL DIAMETER B (mm)
≤5.0	305
>5.0	356



Characteristics of tape

DESCRIPTION	VALUE
Pull-out force of the component	≥2 N
Peel-off force of adhesive tape	≥6 N
Tearing force of tape	≥10 N
Storage conditions	
Storage temperature	-25 to +40 °C
Relative humidity	maximum 80% without condensation

Film capacitors

Taping information

TAPE DISTANCE: 52.5 ± 1.5 mm

Distance T for number (n) of capacitors

d_{max} (mm)	S (mm)	T FOR NUMBER (n) OF CAPACITORS	
		$n < 50$	$50 \leq n < 100$
≤ 5	5	$5(n-1) \pm 2$	$5(n-1) \pm 4$
> 5	10	$10(n-1) \pm 2$	$10(n-1) \pm 4$

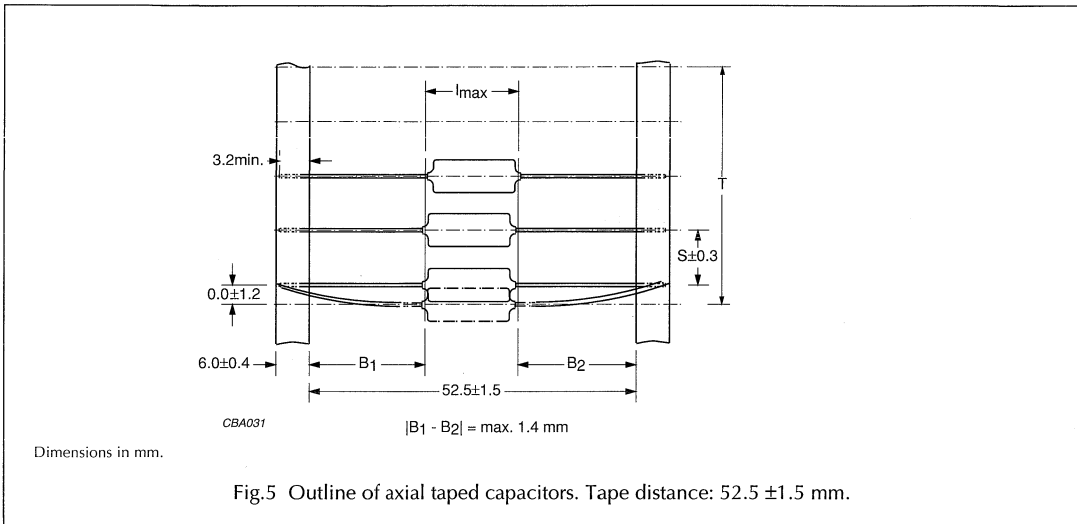


Fig.5 Outline of axial taped capacitors. Tape distance: 52.5 ± 1.5 mm.

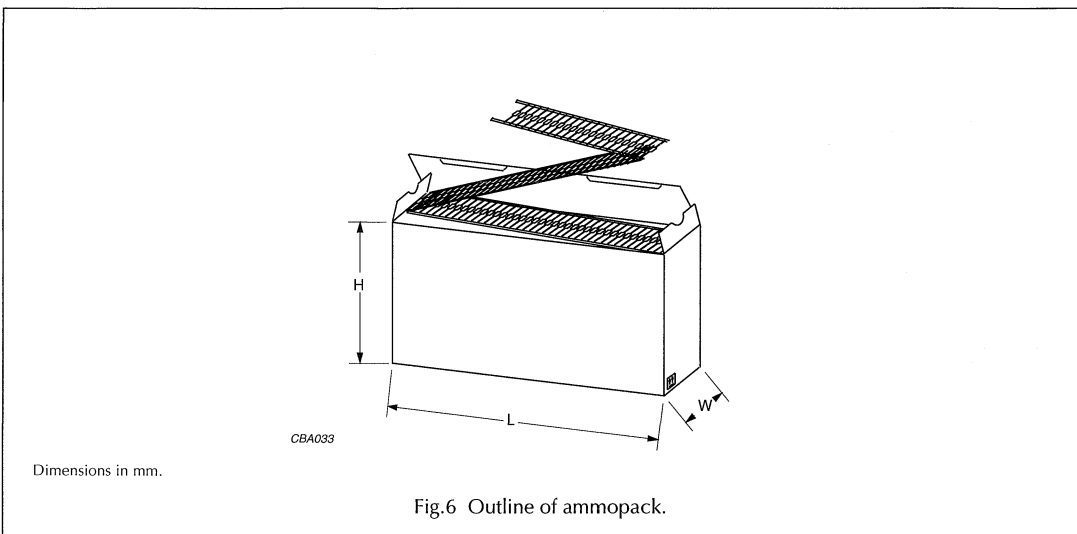


Fig.6 Outline of ammpack.

Film capacitors**Taping information****Characteristics of tape**

DESCRIPTION	VALUE
Pull-out force of the component	≥ 2 N
Peel-off force of adhesive tape	≥ 6 N
Tearing force of tape	≥ 10 N
Storage conditions	
Storage temperature	-25 to +40 °C
Relative humidity	maximum 80% without condensation

Box dimensions and packing quantities as a function of body thickness (d_{\max})

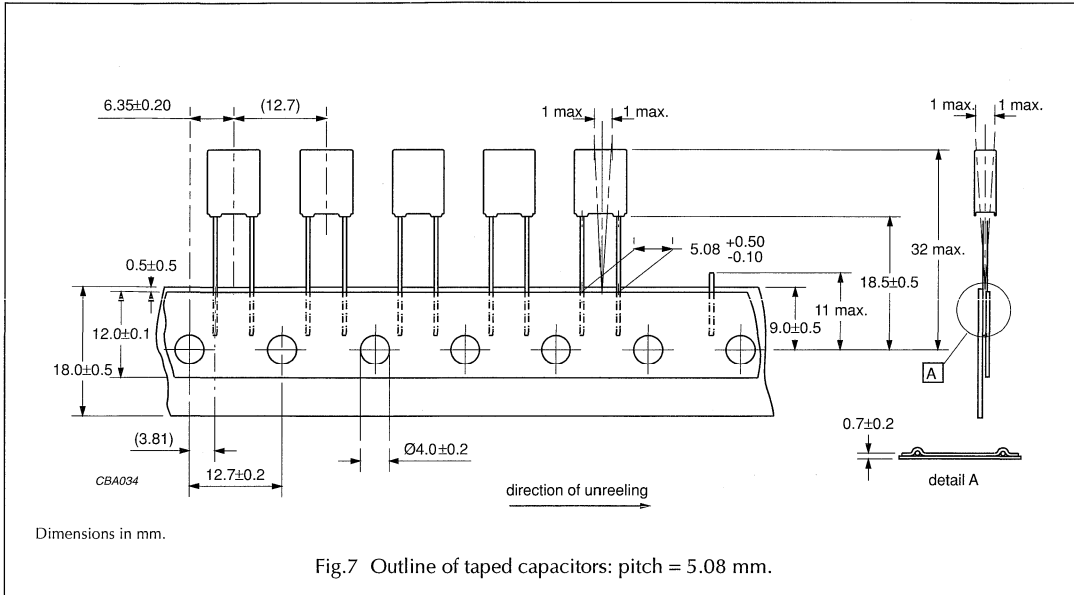
BODY THICKNESS d_{\max} (mm)	SMALLEST PACKING QUANTITIES (SPQ)	EXTERNAL BOX DIMENSIONS L × W × H (mm)
5.0	1750	345 × 80 × 147
5.5	1550	345 × 80 × 147
6.0	1300	345 × 80 × 147
7.0	1000	345 × 80 × 147
7.5	850	345 × 80 × 147
8.0	750	345 × 80 × 147
8.5	650	345 × 80 × 147

Film capacitors

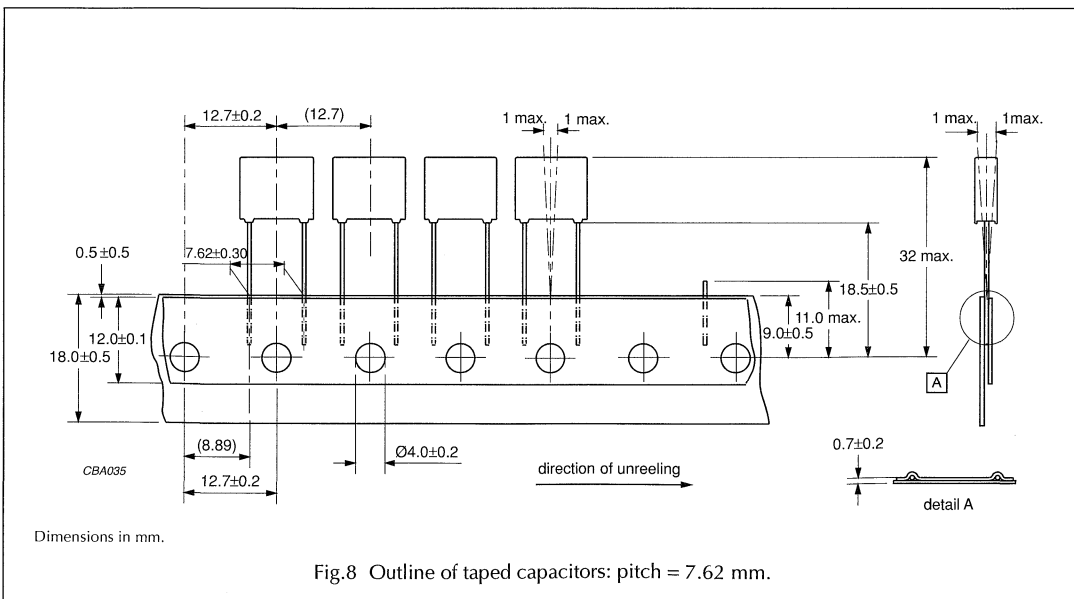
Taping information

RADIAL POTTED FILM CAPACITORS

Series: 370; pitch = 5.08 mm



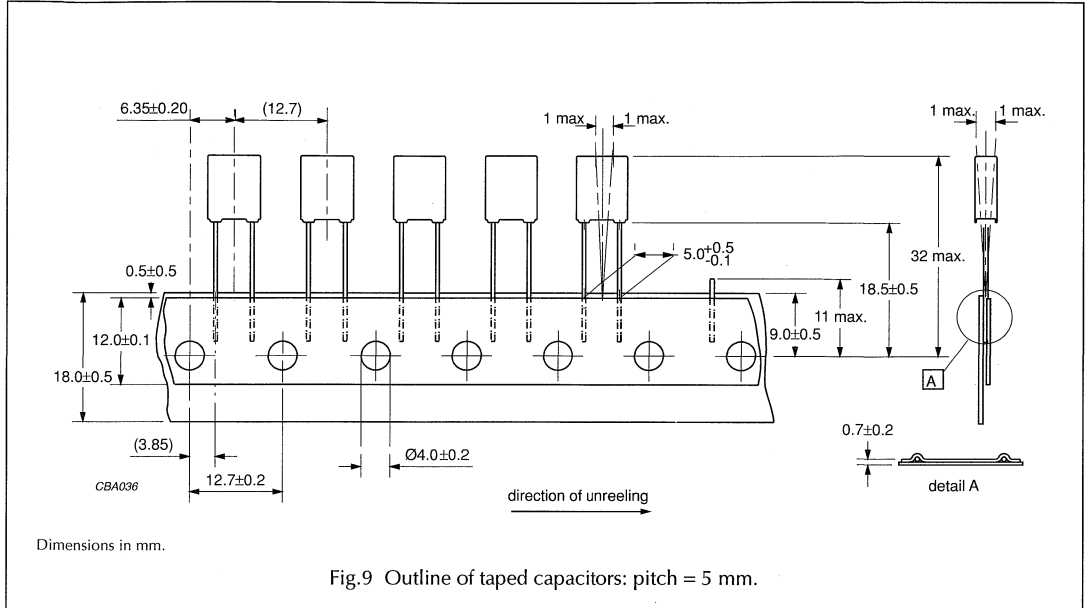
Series: 371; pitch = 7.62 mm



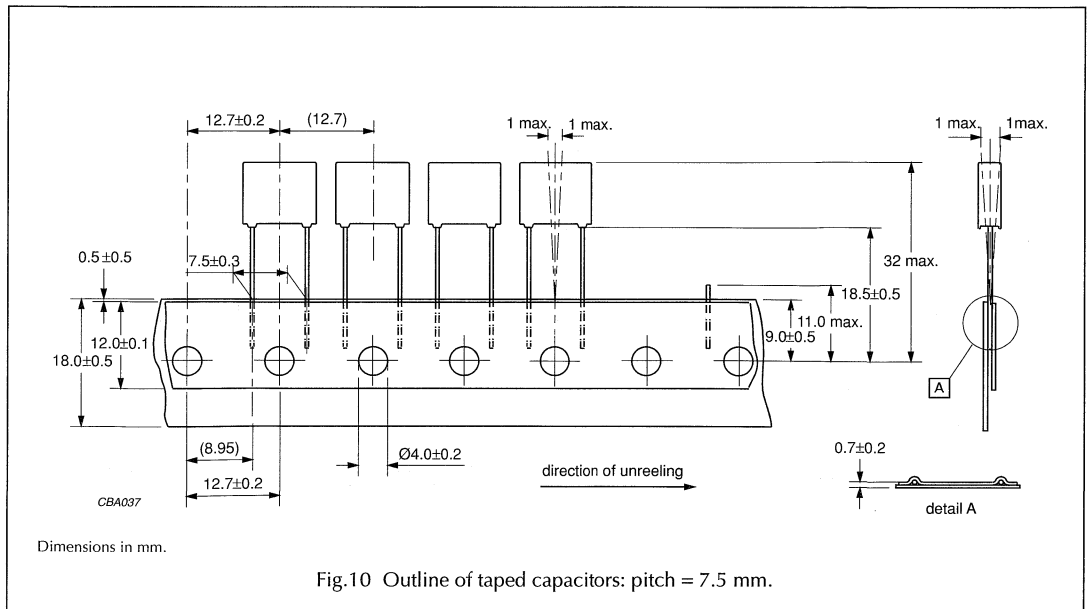
Film capacitors

Taping information

Series: 380, 416 to 420 and 470; pitch = 5 mm



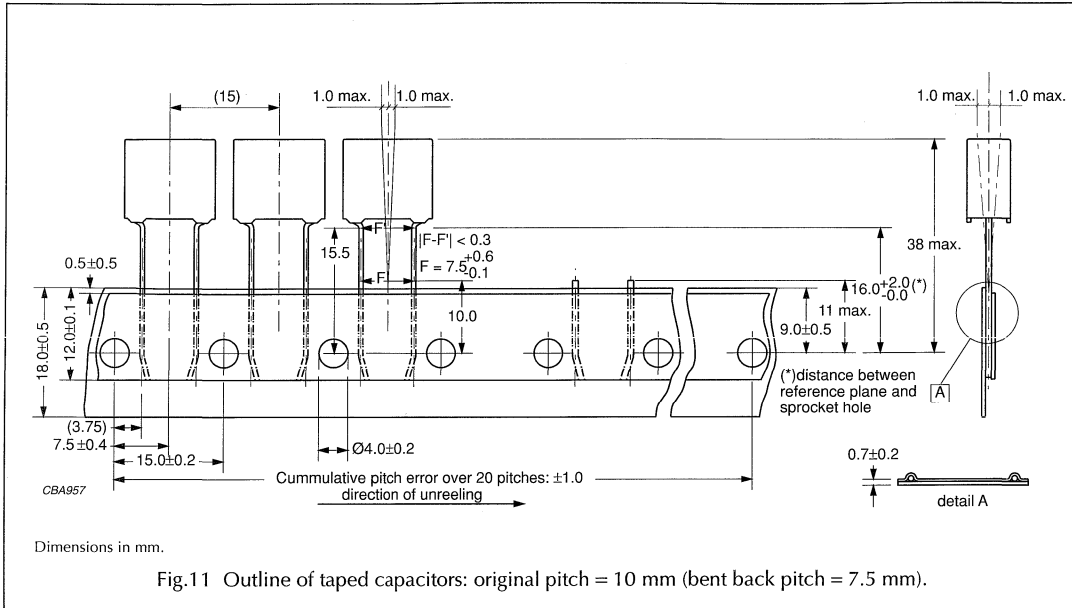
Series: 338 and 379; pitch = 7.5 mm



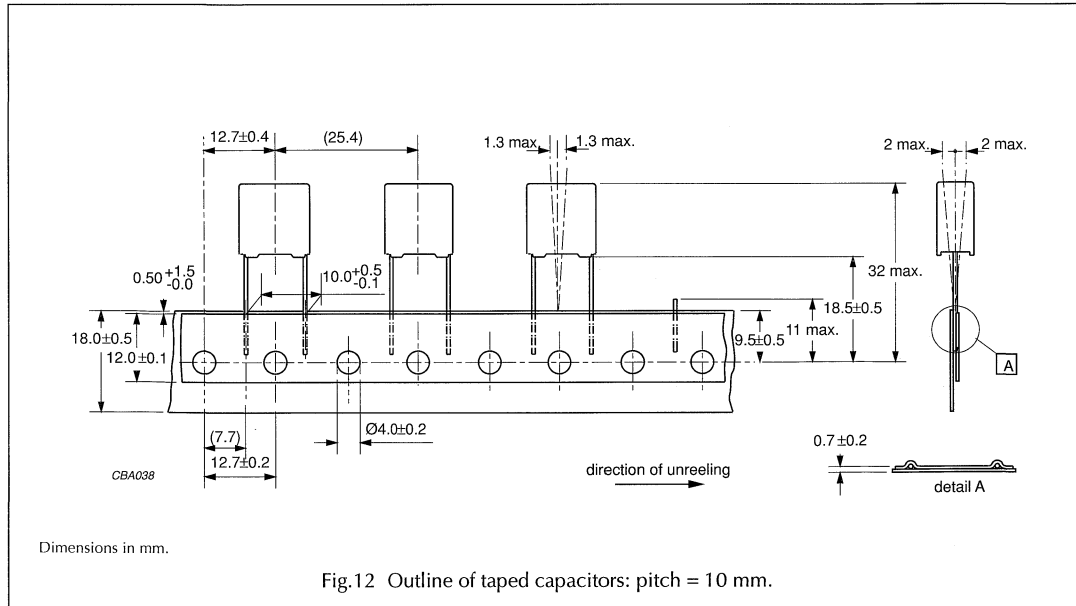
Film capacitors

Taping information

Series: 338; original pitch = 10 mm (bent back pitch = 7.5 mm)



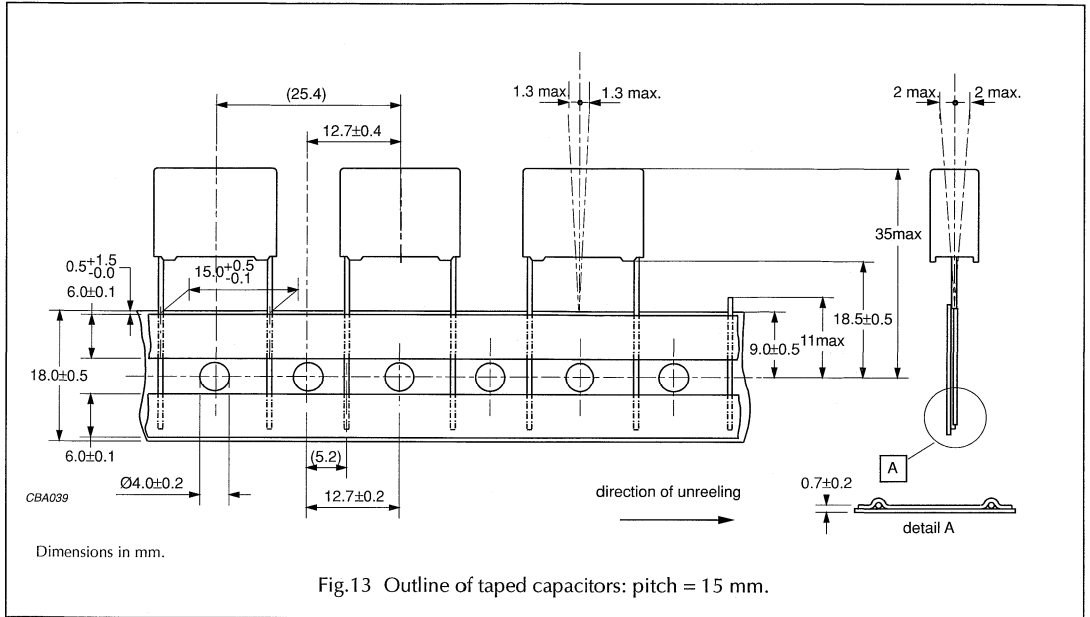
Series: 336, 338, 372, 379 and 416 to 420; pitch = 10 mm



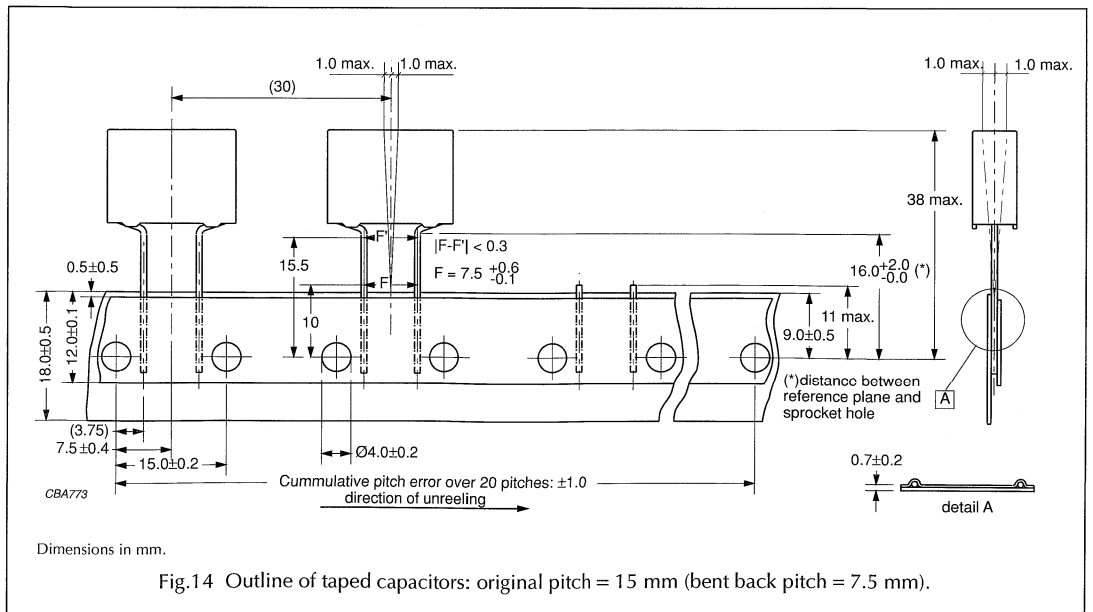
Film capacitors

Taping information

Series: 336, 338, 373, 378, 379 and 383; pitch = 15 mm



Series: 338 and 383; original pitch = 15 mm (bent back pitch = 7.5 mm)



Film capacitors

Taping information

Series: 336, 338, 373, 378, 379 and 383; pitch = 22.5 mm

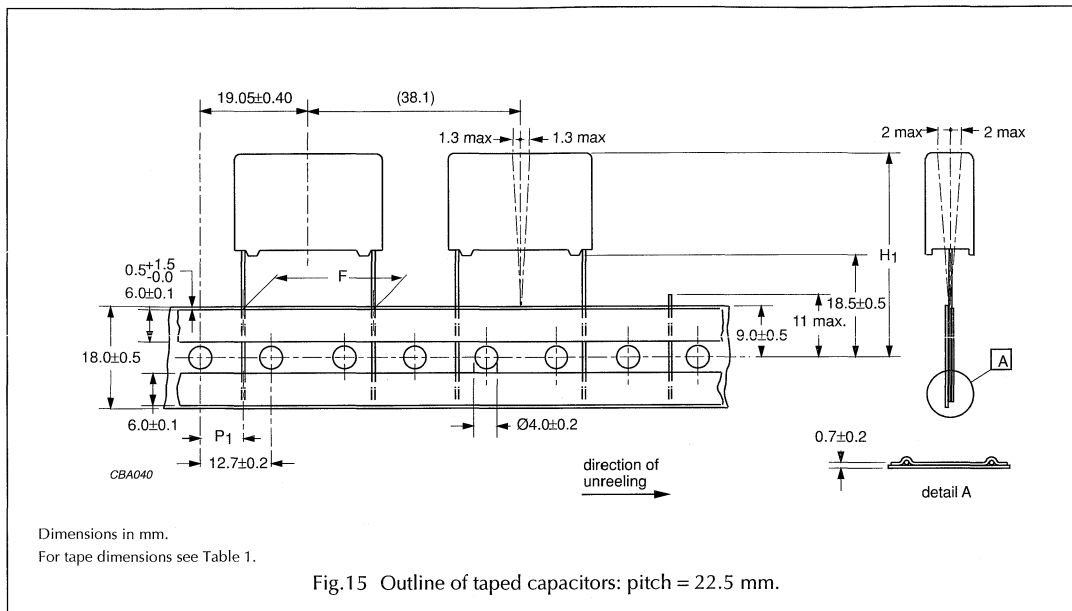


Table 1 Tape dimensions; see Fig.15

SYMBOL	PARAMETER	VALUE	TOL.	UNIT
F	lead to lead distance	22.5	+0.5/-0.1	mm
H ₁	component height from tape centre	40 max.	-	mm
P ₁	feed hole to lead centre	(7.8)	-	mm

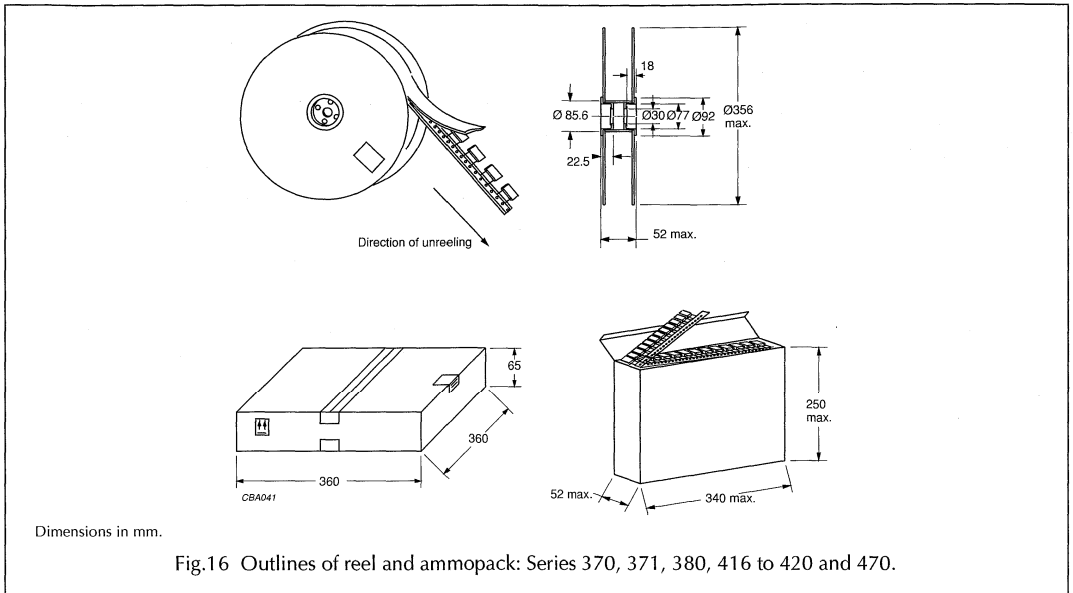
Characteristics of tape for radial potted film capacitors

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

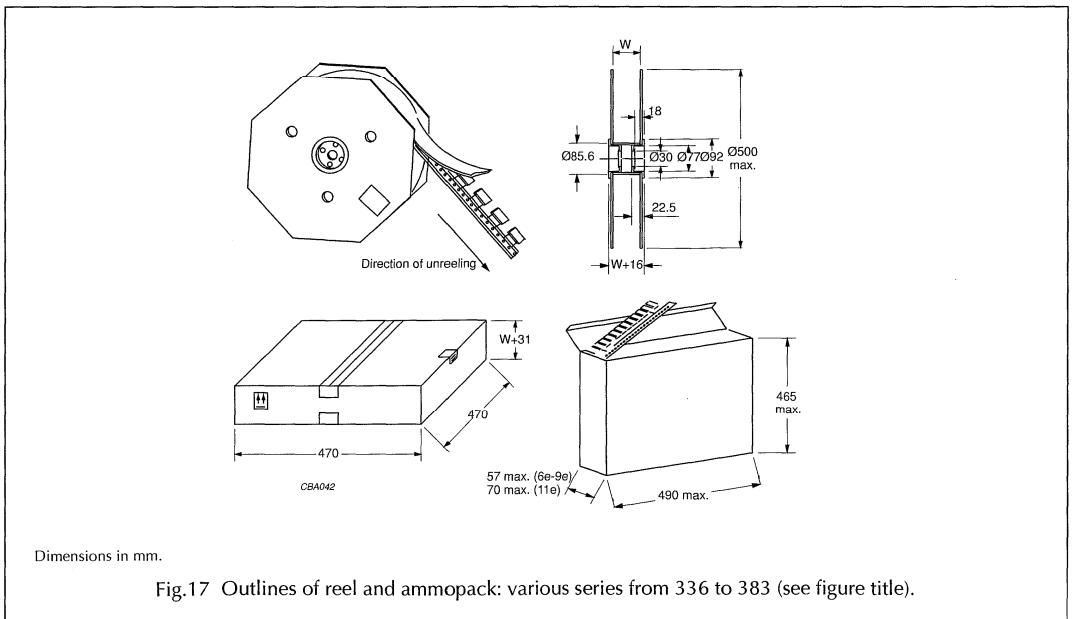
Film capacitors

Taping information

Series: 370, 371, 380, 416 to 420 and 470



Series: 336, 338, 372, 373, 378, 379 and 383



Film capacitors**Taping information****W as a function of product height**

h (mm)	W ±2 mm
9.0	40
10.0 up to and including 15.0	45
15.5 up to and including 19.5	50
21.0 up to and including 23.0	55
25.0 up to and including 28.0	60
31.0	65

The cumulative pitch error is: 1.0 mm per 20 pitches.

The maximum number of empty positions per reel shall not exceed 0.5%⁽¹⁾ 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.

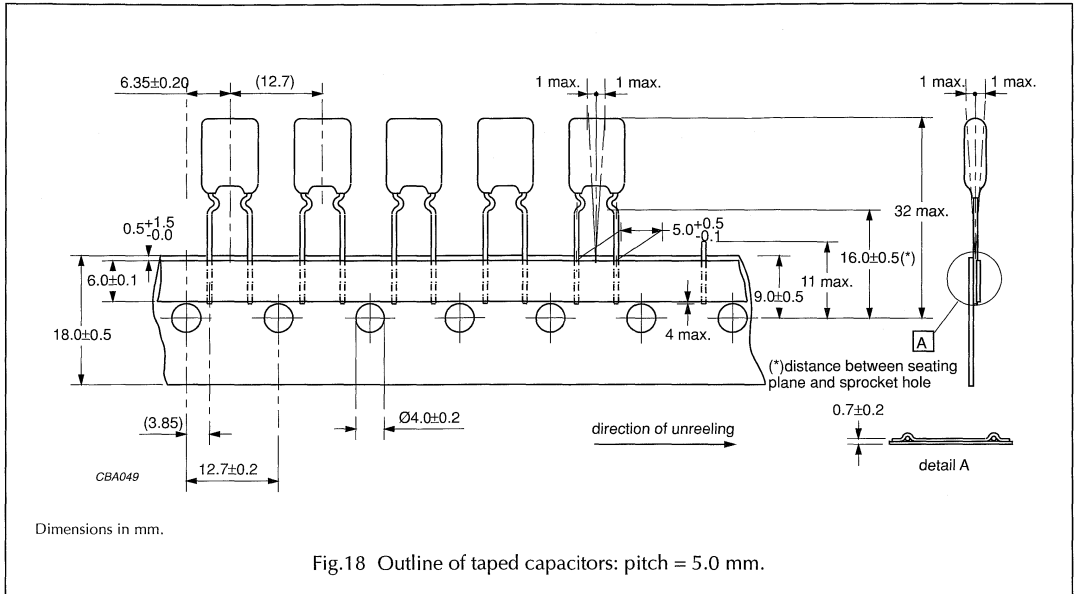
(1) This is 5% for capacitors in ammpack (except for capacitors with b = 2.5 or 3.5 mm and l = 7.2 mm).

Film capacitors

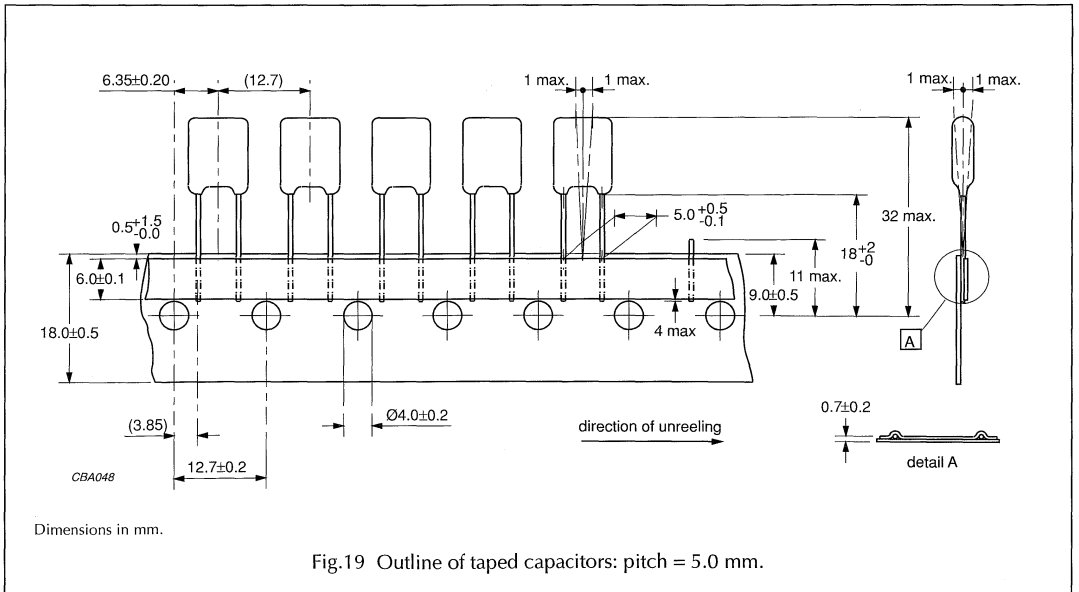
Taping information

RADIAL LACQUERED FILM CAPACITORS

Series: 365; pitch = 5.0 mm (kinked leads)



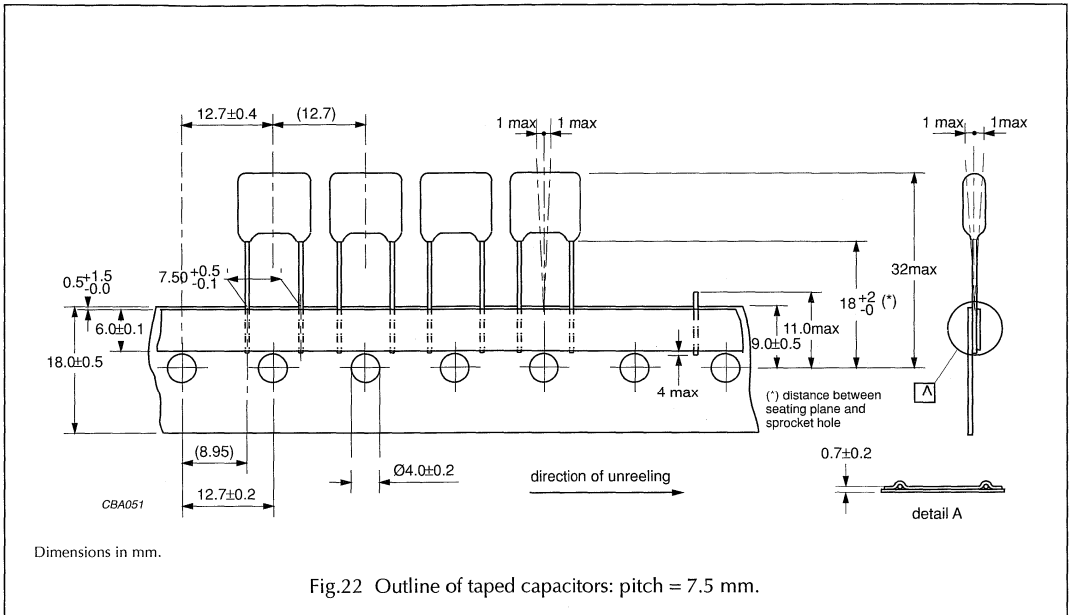
Series: 367; pitch = 5.0 mm (straight leads)



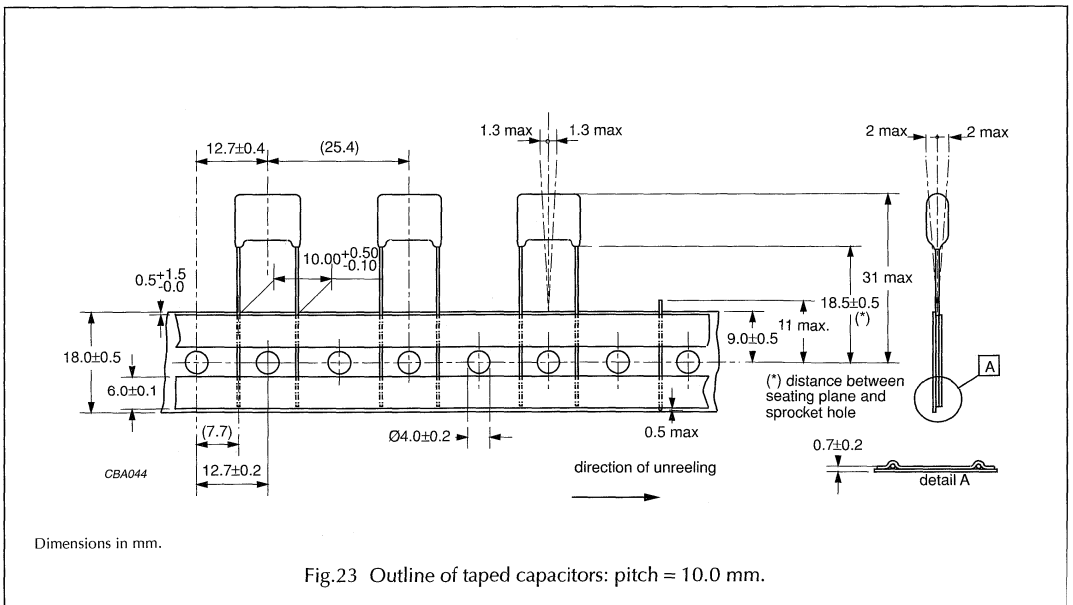
Film capacitors

Taping information

Series: 367; pitch = 7.5 mm (straight leads)



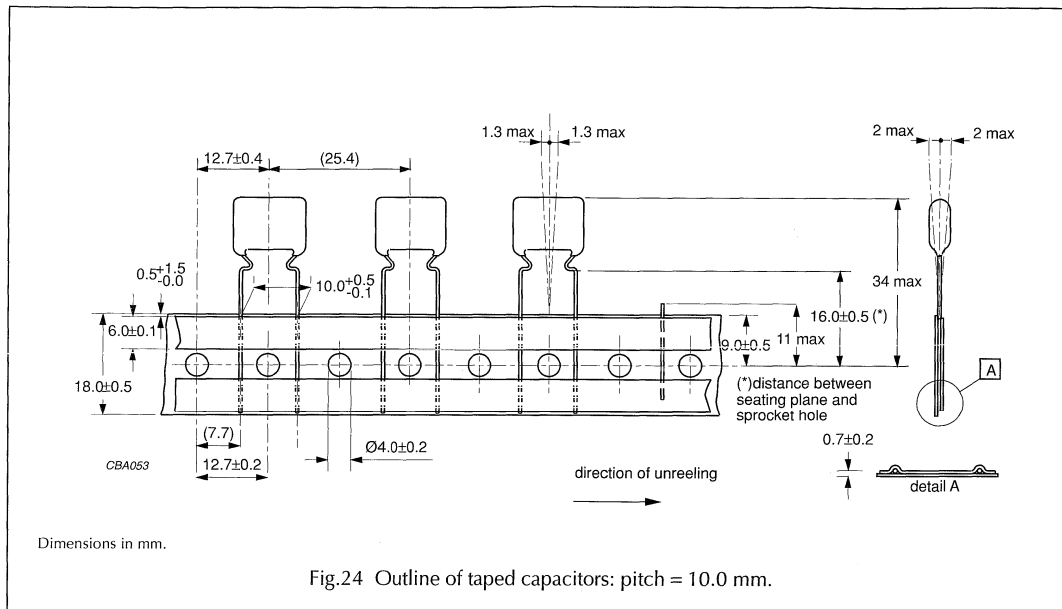
Series: 369 and 469; pitch = 10.0 mm



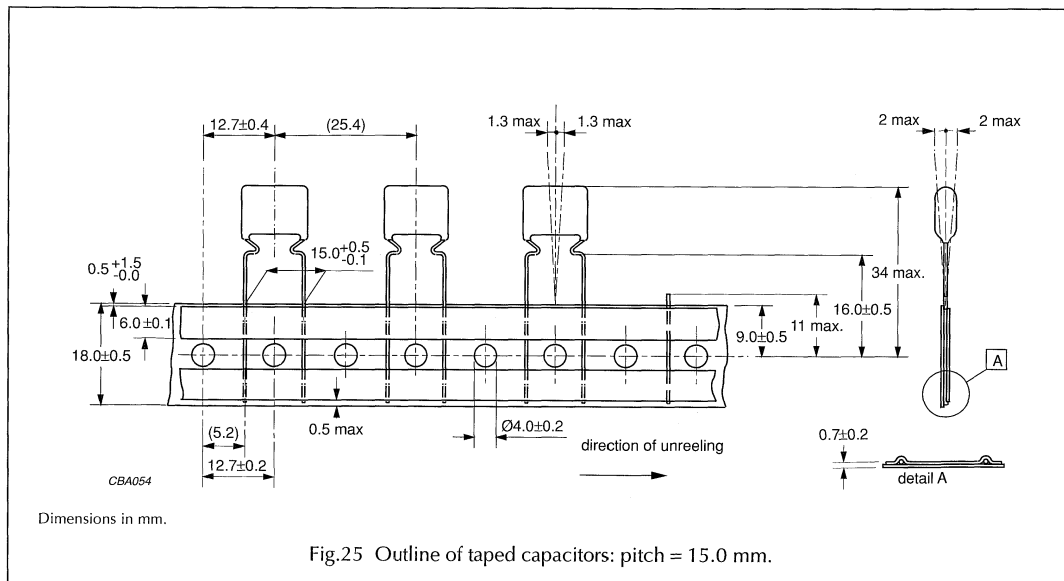
Film capacitors

Taping information

Series: 368, 375, 395, 467 and 479; pitch = 10.0 mm



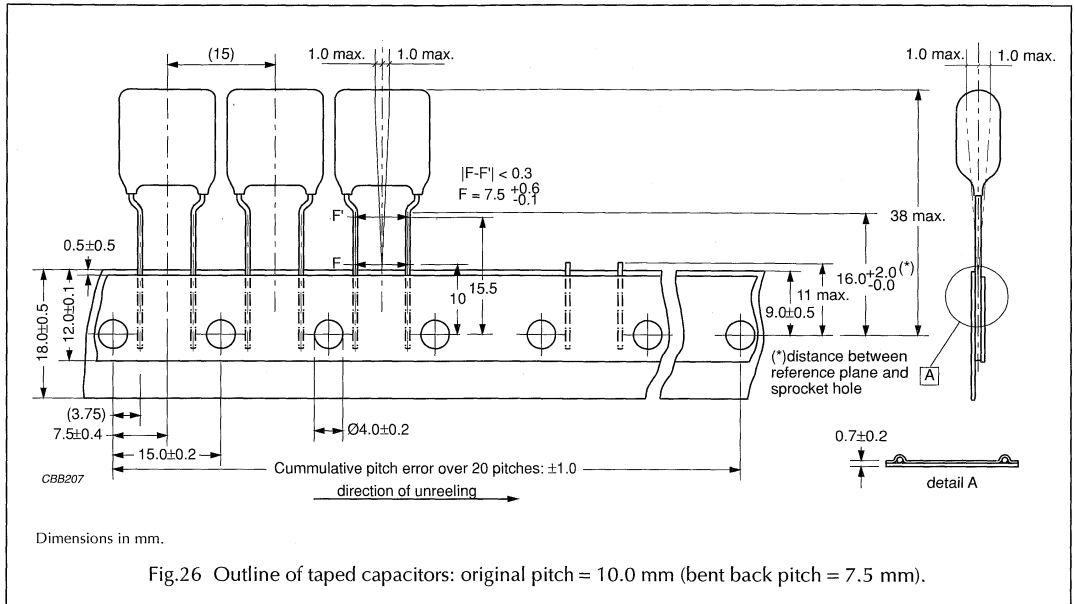
Series: 368, 375, 468, 479 and 483; pitch = 15.0 mm



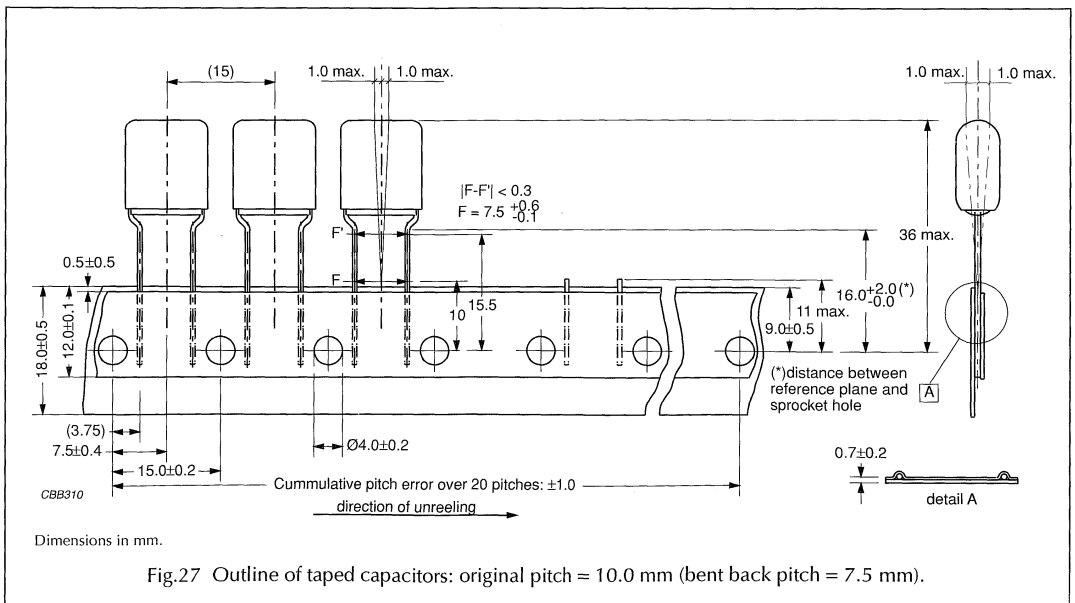
Film capacitors

Taping information

Series: 375; original pitch = 10.0 mm (bent back pitch = 7.5 mm)



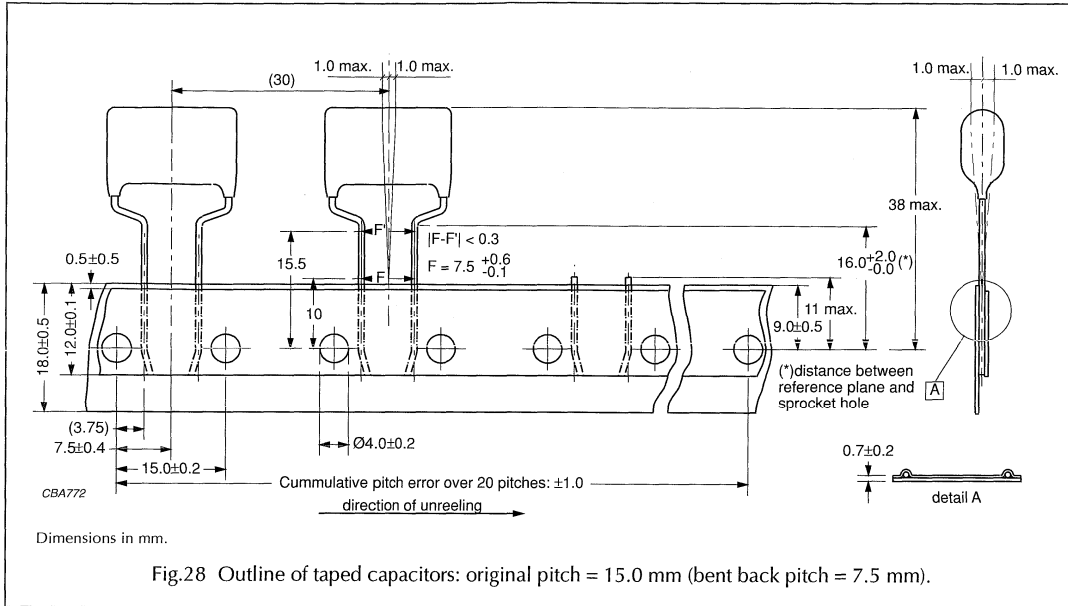
Series: 304; original pitch = 10.0 mm (bent back pitch = 7.5 mm)



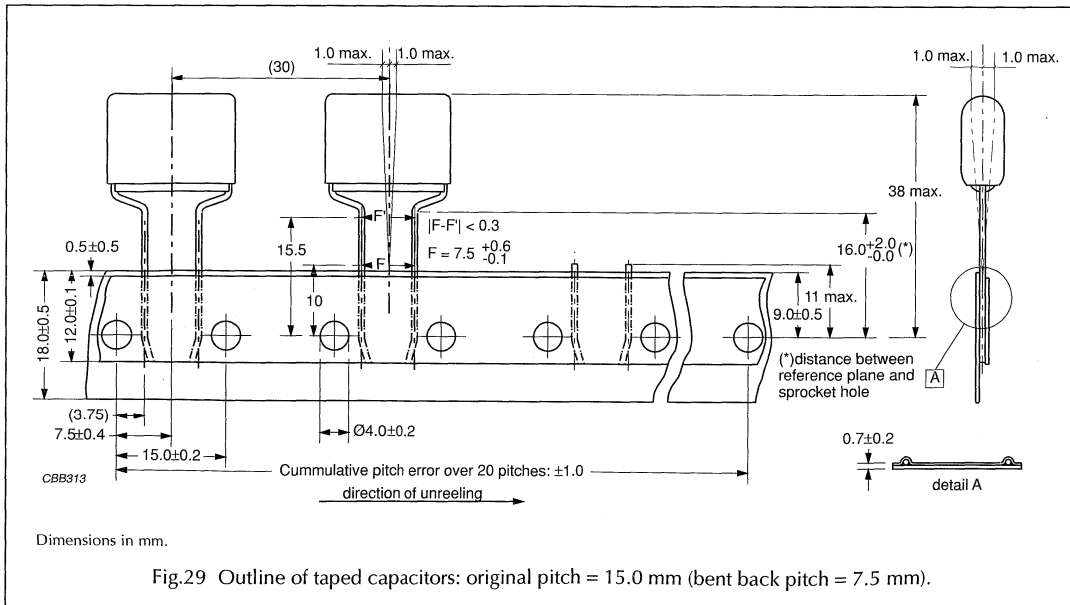
Film capacitors

Taping information

Series: 375, 468, 479 and 483; original pitch = 15.0 mm (bent back pitch = 7.5 mm)



Series: 304; original pitch = 15.0 mm (bent back pitch = 7.5 mm)



Film capacitors

Taping information

Series: 368, 375, 468 and 479; pitch = 22.5 mm

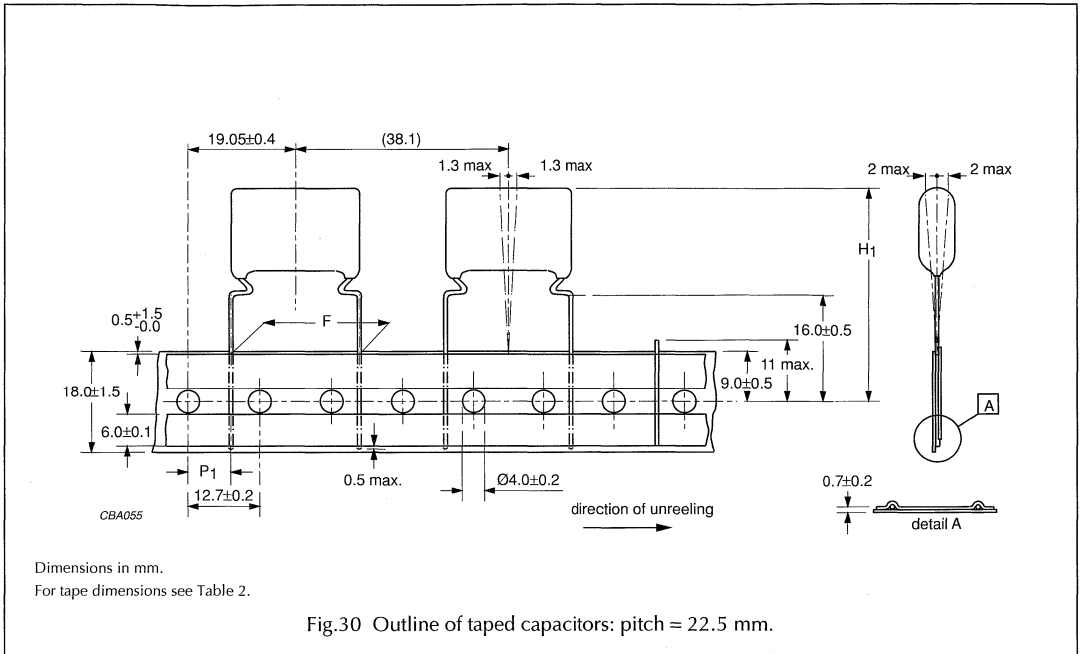


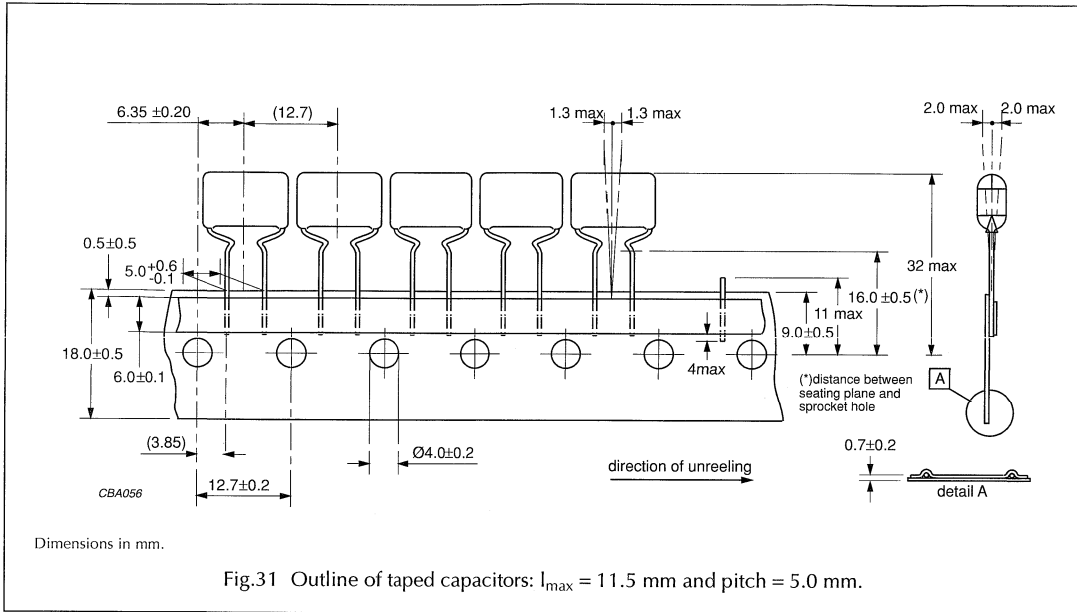
Table 2 Tape dimensions; see Fig.30

SYMBOL	PARAMETER	VALUE	TOL.	UNIT
F	lead to lead distance	22.5	+0.5/-0.1	mm
H ₁	component height from tape centre	38.0 max.	-	mm
P ₁	feed hole to lead centre	(7.8)	-	mm

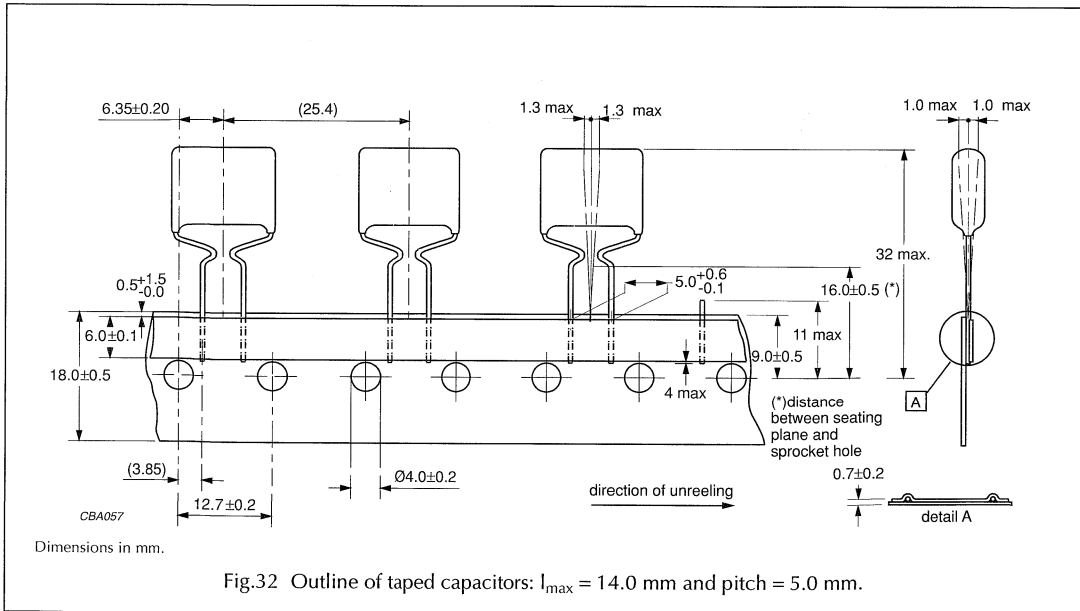
Film capacitors

Taping information

Series: 374; $l_{max} = 11.0$ mm and pitch = 5.0 mm



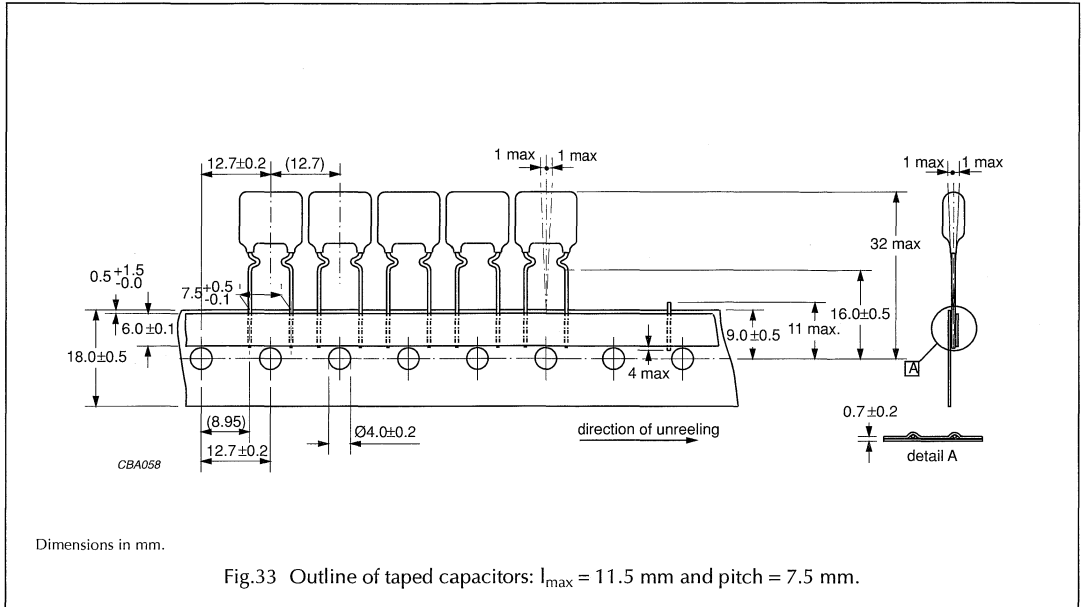
Series: 374; $l_{max} = 13.5$ mm and pitch = 5.0 mm



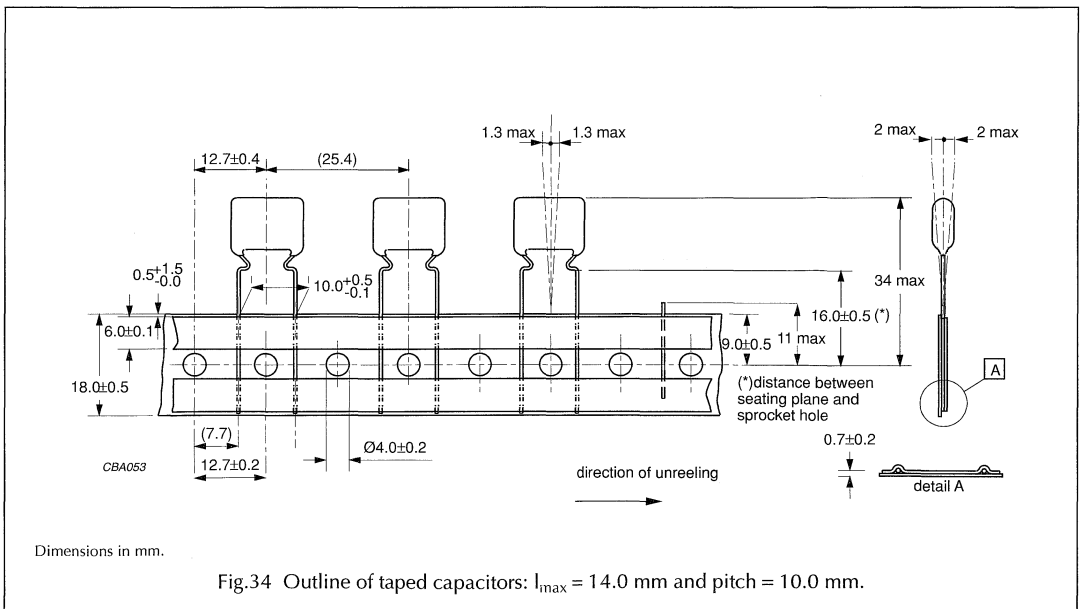
Film capacitors

Taping information

Series: 374; $l_{max} = 11.0$ mm and pitch = 7.5 mm



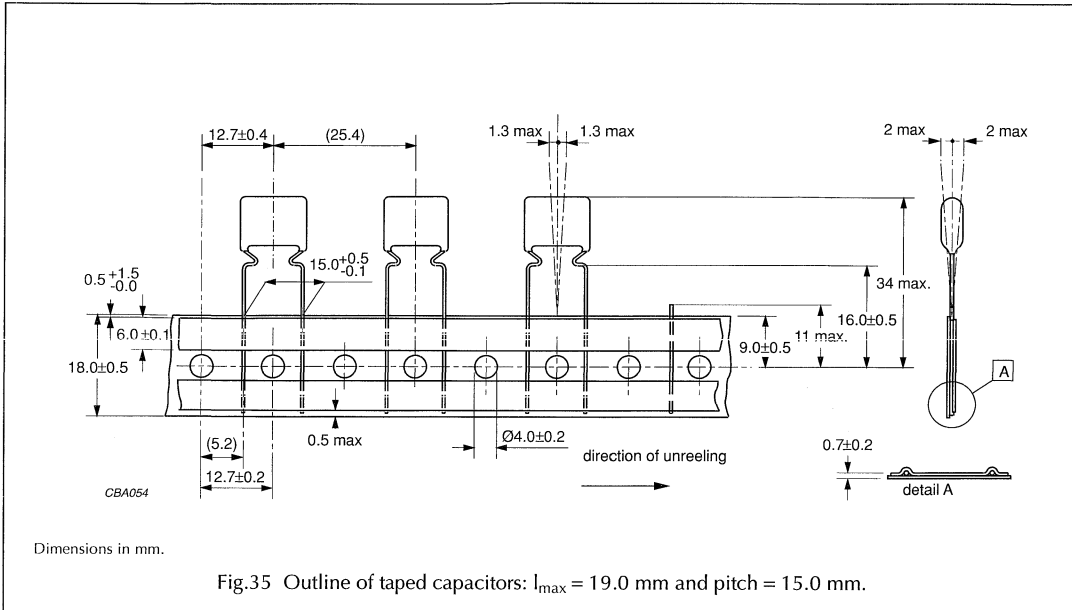
Series: 374; $l_{max} = 13.5$ mm and pitch = 10.0 mm



Film capacitors

Taping information

Series: 374; $l_{max} = 19.0$ mm and pitch = 15.0 mm



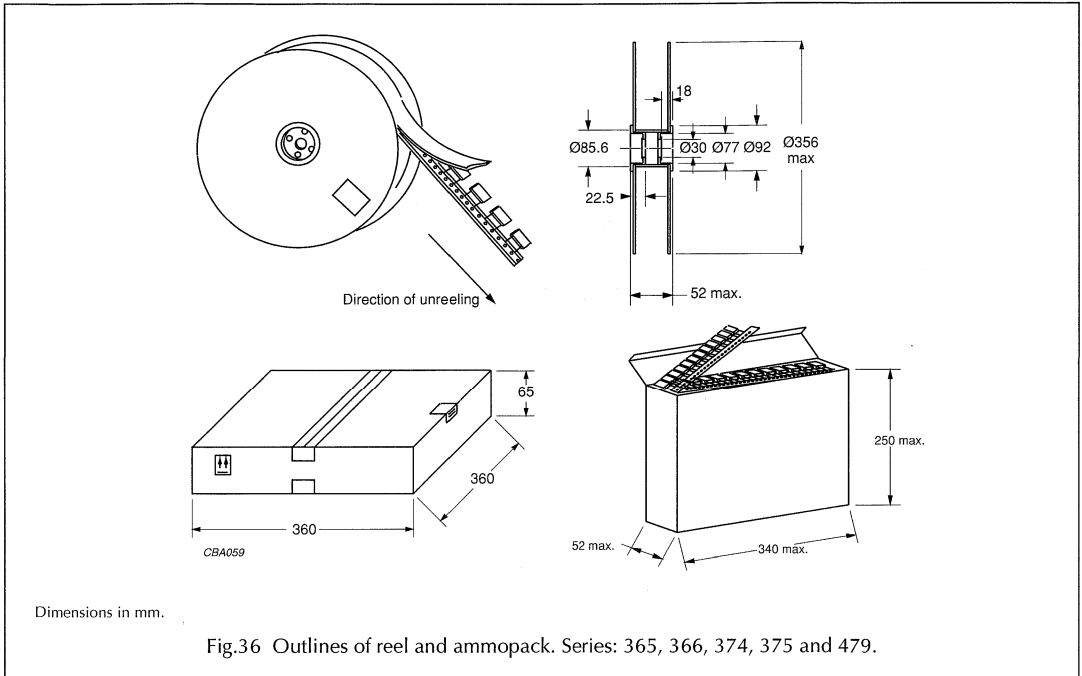
Characteristics of tape

RADIAL LEADS	
DESCRIPTION	VALUE
Pull-out force of the component	≥5 N
Peel-off force of adhesive tape	≥6 N
Tearing force of tape	≥15 N
Storage conditions	
Storage temperature	-25 to +40 °C
Maximum relative humidity without condensation	80%

Film capacitors

Taping information

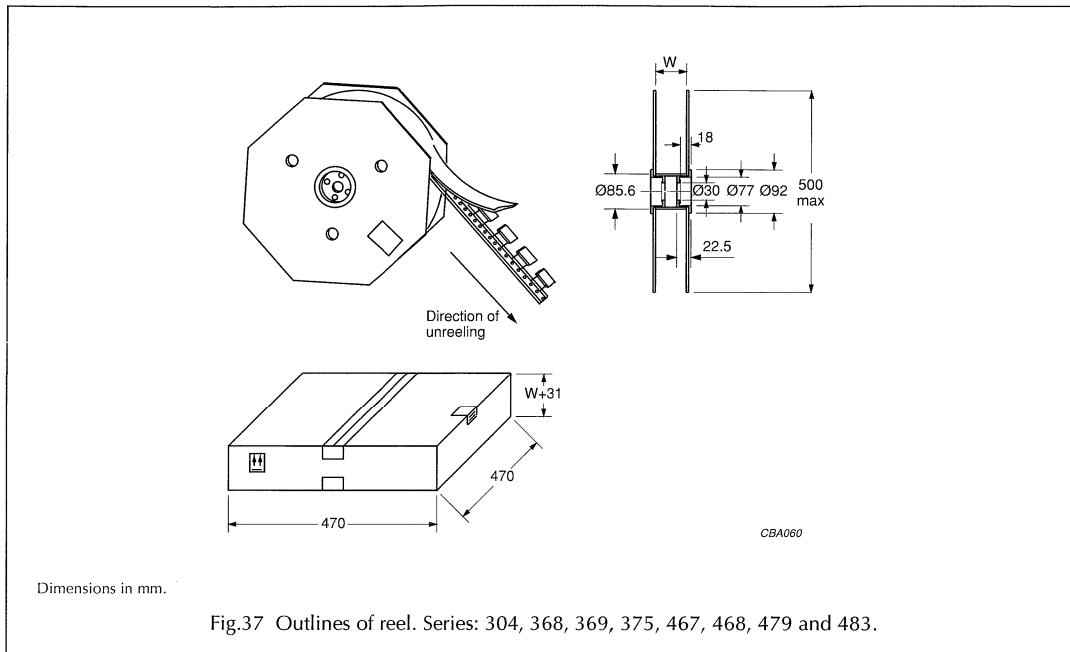
Series: 365, 366, 374, 375 and 479; pitch = 5, 7.5 and 10.0 mm



Film capacitors

Taping information

Series: 304, 368, 369, 375, 467, 468, 479 and 483; pitch = 15 and 22.5 mm



W as a function of product height

h (mm)	W ±2 mm
9.0	40
10.0 up to and including 15.0	45
15.5 up to and including 19.5	50
21.0 up to and including 23.0	55
25.0 up to and including 28.0	60
31.0	65

The cumulative pitch error is: 1.0 mm per 20 pitches.

The maximum number of empty positions per reel shall not exceed 0.5%⁽¹⁾ 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.

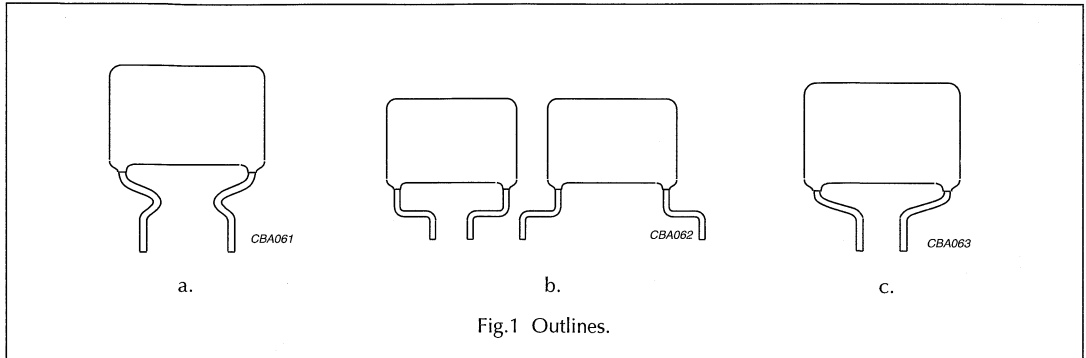
(1) This is 5% for capacitors in ammopack (except for capacitors with b = 2.5 or 3.5 mm and l = 7.2 mm).

SPECIAL LEAD CONFIGURATIONS

Film capacitors

Special lead configurations

BENDING BACK OR BENDING OUT CAPABILITIES FOR RADIAL LACQUERED FILM CAPACITORS.



Bending capabilities

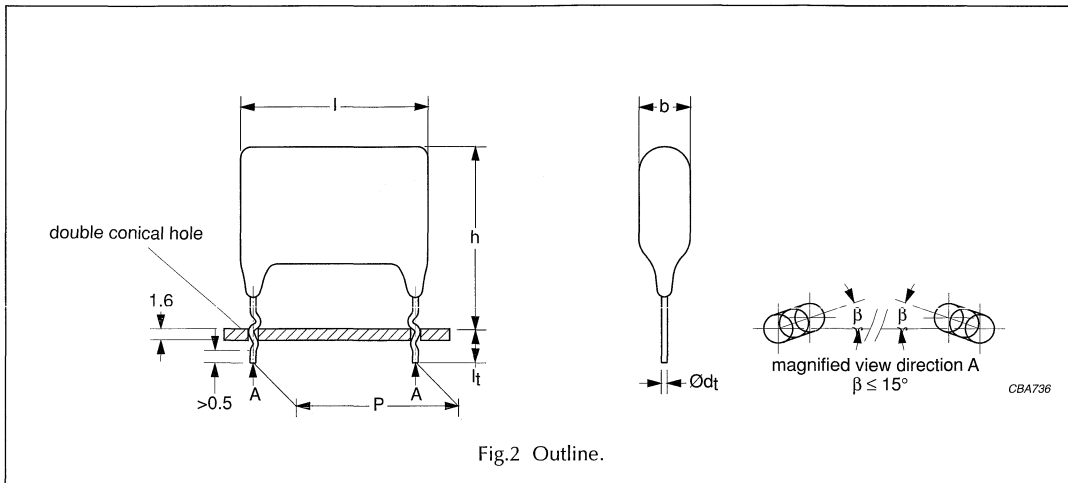
MAX. BODY SIZE	ORIGINAL PITCH	BENT BACK PITCH	BENT OUT PITCH	PACKING
Bending shape (see Fig.1a)				
10.0 mm	7.5 mm	5.0 mm	–	loose in box; ammopack; taped on reel
30.0 mm	27.5 mm	22.5 mm	–	loose in box
Bending shape (see Fig.1b)				
7.3 mm	5.0 mm	–	7.5 mm	loose in box
		–	10.0 mm	loose in box
10.0 mm	7.5 mm	–	10.0 mm	loose in box
		–	15.0 mm	loose in box
14.0 mm	10.0 mm	7.5 mm	15.0 mm	loose in box
18.5 mm	15.0 mm	7.5 mm	20.0 mm	loose in box
		10.0 mm	22.5 mm	loose in box
26.0 mm	22.5 mm	15.0 mm	25.0 mm	loose in box
		20.0 mm	27.5 mm	loose in box
30.0 mm	27.5 mm	20.0 mm	–	loose in box
Bending shape (see Fig.1c)				
14.0 mm	10.0 mm	5.0 mm	–	taped on reel
		7.5 mm	–	taped on reel
18.5 mm	15.0 mm	7.5 mm	–	loose in box; taped on reel
		10.0 mm	–	loose in box

Film capacitors

Special lead configurations

RADIAL LACQUERED FILM CAPACITORS WITH DOUBLE KINK

General data



Double kink capacitors

PITCH (mm)	LEAD DIAMETER (mm)
10.0 ±1.0	0.6
15.0 ±1.0	0.8
22.5 ±1.0	0.8
27.5 ±1.0	0.8

The capacitors are designed for mounting on printed-circuit boards (PCBs). They are fixed to the board by double kinked leads which prevent the component from jumping out of the PCB during transport.

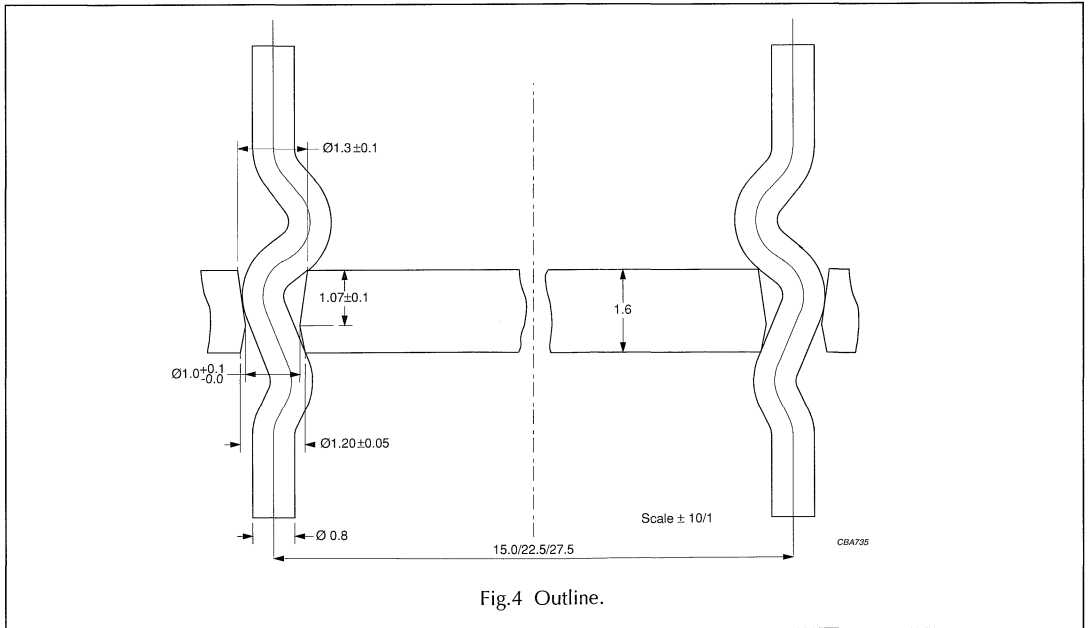
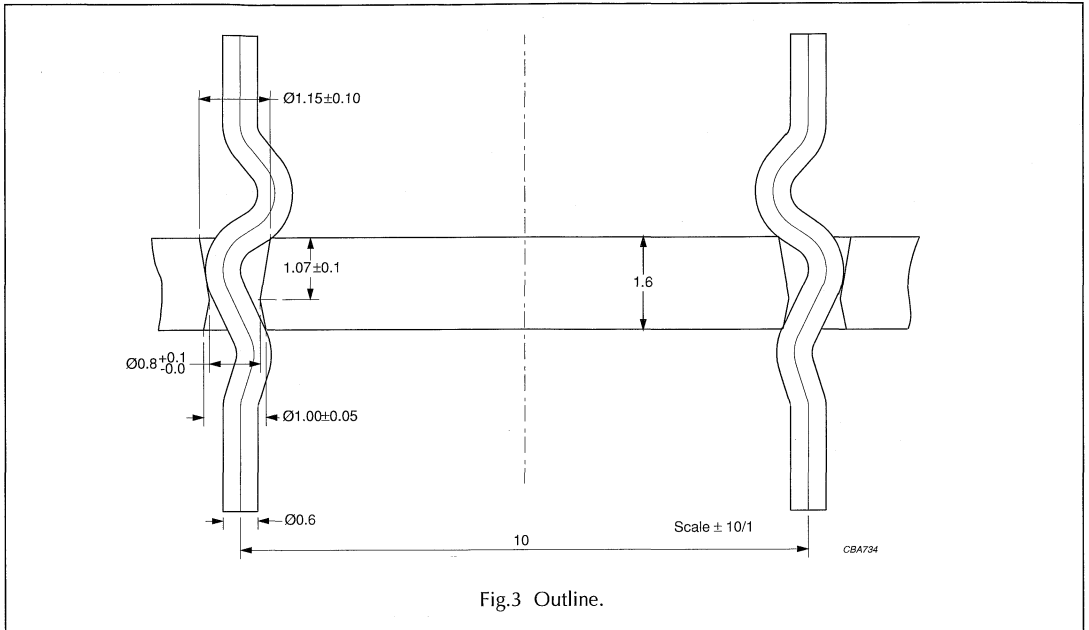
Components with a lead diameter of 0.6 mm are inserted in punched holes with a nominal diameter of 0.8 mm and components with a lead diameter of 0.8 mm are inserted in punched holes with a nominal diameter of 1.0 mm.

The pitch is specified on the top of the leads. After manufacturing, the products meet the specification. Although special care is taken with the packaging, deviations may occur due to transport.

Film capacitors

Special lead configurations

Detail of lock lead



Film capacitors

Package marking

Package marking example

The package containing the capacitors is marked as shown in Fig.5.

BCcomponents
 MADE IN BELGIUM
 DC FILM CAPACITORS
 MKT RADIAL EPOXY LACQUERED TYPE
 10.1µF ±10% 250V= 55/105/56

WO:12345678

ORIG **A170** RPC **HQ**

TYPE **MKT 303**

QTY **2000** DATE **0106**

CODENO **2222 303 41104**

Barcode label marking

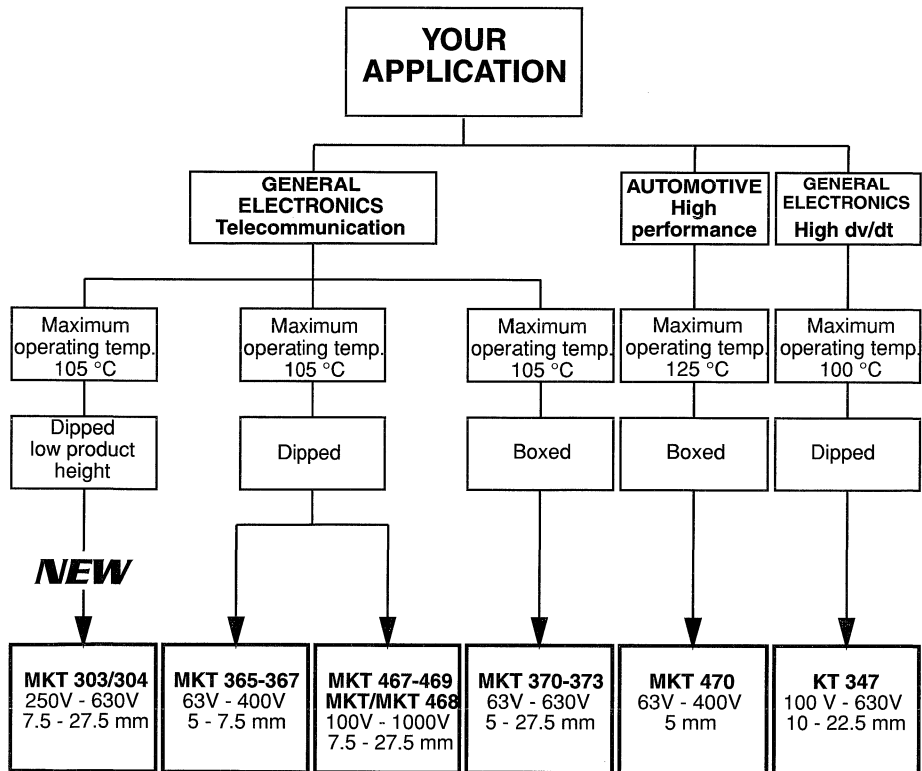
LINE	MARKING EXPLANATION
1	Manufacturer's name
2	Country of origin
3	Sub-family
4	Type description
5	Capacitance value in µF, tolerance, voltage and climatic category ("IEC 60068-1")
6	Batchnumber (only for capacitors from PRC)
7	<ul style="list-style-type: none"> • Country of origin: Belgium Preference origin code: A Country of origin in code: 170 (Belgium) Responsible production centre: HQ Work order: WO • Country of origin: China Preference origin code: N Country of origin in code: 260 (PRC) Responsible production centre: 07
8	Product type description
9	Quantity and production period, year and week code
10	Product code (12NC)

Fig.5 Example of barcode label.

GENERAL PURPOSE CAPACITORS

General purpose

HOW TO SELECT



CBB328

Metallized polyester film capacitors**MKT 303/304**

MKT RADIAL EPOXY LACQUERED TYPE

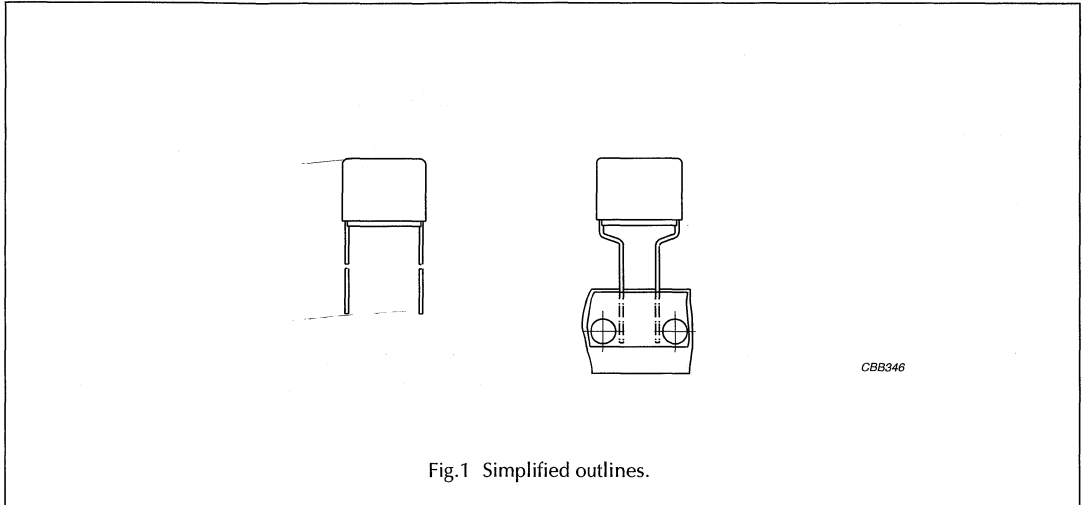
PITCH 10/15/22.5/27.5 mm
PITCH 7.5 (bent back leads)

Fig.1 Simplified outlines.

FEATURES

- Low-inductive wound cell of metallized (PETP) film
- Special series for automatic insertion
- Cell protected by epoxy lacquer
- Radial leads solder-coated wire
- Withstands solvents and rinsing liquids

APPLICATIONS

- Blocking, coupling and decoupling
- Bypass and energy reservoir.

DETAIL SPECIFICATION

For more detailed data and test requirements see "Type detail specification HQN-384-02/108".

QUICK REFERENCE DATA

DESCRIPTION	VALUE
Capacitance range (E12 series)	0.01 to 10 μ F
Capacitance tolerance	\pm 10%; \pm 5%
Rated (DC) voltage	250 V; 400 V; 630 V
Rated (AC) voltage	63 V; 100 V; 160 V
Climatic category	55/105/56
Rated temperature	85 °C
Maximum application temperature	105 °C
Reference specifications	IEC 60384-2
Performance grade	grade 1 (long life)

Metallized polyester film capacitors

MKT 303/304

COMPOSITION OF CATALOGUE NUMBER

TYPE AND PITCHES	
303	10.0 mm
	15.0 mm
	22.5 mm
	27.5 mm
304	7.5 mm (bent back)

MULTIPLIER (nF)	
1	3
10	4
100	5

CAPACITANCE
(numerically)

Example:
104 = 10 x 10 = 100 nF

2222 30. XX XX X

TYPE	PACKAGING	LEAD CONFIGURATION	PREFERRED			
			C-TOL	250 V	400 V	630 V
303	loose in box	straight leads 3.5 mm	±10%	41	51	61
			±5%	42	52	62
304	taped on reel	bent back leads	±10%	43	53	63
			±5%	44	54	64
			ON REQUEST			
303	loose in box	straight long leads	±10%	43	53	63
			±5%	44	54	64
			ON REQUEST (ALTERNATIVE DIMENSIONS)			
303	loose in box	straight lead 3.5 mm	±10%	45	55	65
			±5%	46	56	66
		straight long leads	±10%	47	57	67
			±5%	48	58	68
304	taped on reel	bent back leads	±10%	47	57	67
			±5%	48	58	68

Metallized polyester film capacitors

MKT 303

MKT 303 GENERAL DATA

PITCH 10/15/22.5/27.5 mm (straight lead)

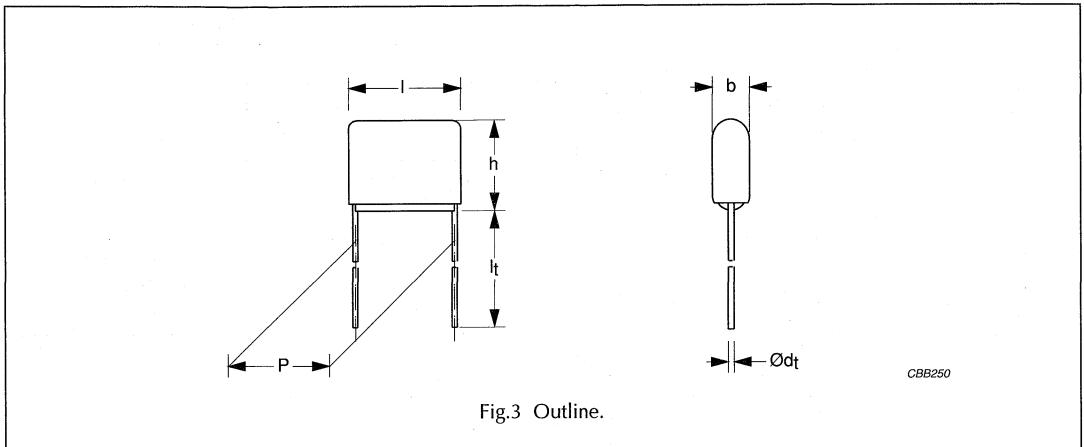


Fig.3 Outline.

Specific reference data for the 250 V DC capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle:			
$C \leq 0.47 \mu\text{F}$	$\leq 75 \times 10^{-4}$	$\leq 120 \times 10^{-4}$	$\leq 225 \times 10^{-4}$
$C > 0.47 \mu\text{F}$	$\leq 75 \times 10^{-4}$	$\leq 120 \times 10^{-4}$	–
Rated voltage pulse slope $(dU/dt)_R$ at 250 V (DC):			
$l_{\text{max}} = 12.5 \text{ mm}$		18 V/ μs	
$l_{\text{max}} = 17.5 \text{ mm}$		6 V/ μs	
$l_{\text{max}} = 26.0 \text{ mm}$		2 V/ μs	
$l_{\text{max}} = 30.0 \text{ mm}$		2 V/ μs	
R between leads, for $C \leq 0.33 \mu\text{F}$ at 100 V; 1 minute		>30000 M Ω	
RC between leads, for $C > 0.33 \mu\text{F}$ at 100 V; 1 minute		>10000 s	
R between interconnecting leads and casing; 100 V; 1 minute		>30000 M Ω	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s		400 V; 1 minute	
Withstanding (DC) voltage between leads and case		500 V; 1 minute	

Available 250 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 3.5 \pm 0.5 \text{ mm}$	$\pm 10\%$	2222 303 41...	preferred
		$\pm 5\%$	2222 303 42...	preferred
	long leads; note 1	$\pm 10\%$	2222 303 43...	on request
		$\pm 5\%$	2222 303 44...	on request

Note

- Length of long leads:
 - $l_t = 19.0 \pm 4.0 \text{ mm}$ for pitch = 10 and 15.0 mm.
 - $l_t = 25.0 \pm 4.0 \text{ mm}$ for pitch = 22.5 mm.
 - $l_t = 24.0 \pm 4.0 \text{ mm}$ for pitch = 27.5 mm.

Metallized polyester film capacitors

MKT 303

 $U_{Rdc} = 250 \text{ V}$; $U_{Rac} = 63 \text{ V}$; standard dimensions

C (μF)	DIMENSIONS $b_{\max} \times h_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER	
			LOOSE IN BOX	
			short leads	
			C-tol = $\pm 10\%$	C-tol = $\pm 5\%$
			catalogue number	last 5 digits
Pitch = 10.0 ± 0.4 mm; $d_t = 0.60 \pm 0.06$ mm				
0.1	4.7 \times 9.4 \times 12.5	0.5	2222 303 41104	.. 42104
0.12	4.3 \times 9.1 \times 12.5	0.4	2222 303 41124	.. 42124
0.15	4.8 \times 9.5 \times 12.5	0.5	2222 303 41154	.. 42154
0.18	5.2 \times 9.9 \times 12.5	0.6	2222 303 41184	.. 42184
0.22	4.5 \times 9.3 \times 12.5	0.5	2222 303 41224	.. 42224
0.27	5.0 \times 9.7 \times 12.5	0.5	2222 303 41274	.. 42274
0.33	4.6 \times 9.3 \times 12.5	0.5	2222 303 41334	.. 42334
0.39	4.9 \times 9.6 \times 12.5	0.5	2222 303 41394	.. 42394
0.47	5.4 \times 10.1 \times 12.5	0.6	2222 303 41474	.. 42474
0.56	5.8 \times 10.5 \times 12.5	0.7	2222 303 41564	.. 42564
Pitch = 15.0 ± 0.4 mm; $d_t = 0.80 \pm 0.08$ mm				
0.68	6.0 \times 10.7 \times 17.5	1.0	2222 303 41684	.. 42684
0.82	5.4 \times 10.2 \times 17.5	0.8	2222 303 41824	.. 42824
1.0	6.0 \times 10.7 \times 17.5	1.0	2222 303 41105	.. 42105
1.2	6.5 \times 11.2 \times 17.5	1.1	2222 303 41125	.. 42125
1.5	7.3 \times 12.0 \times 17.5	1.3	2222 303 41155	.. 42155
1.8	7.9 \times 12.7 \times 17.5	1.5	2222 303 41185	.. 42185
Pitch = 22.5 ± 0.4 mm; $d_t = 0.80 \pm 0.08$ mm				
2.2	9.7 \times 17.5 \times 26.0	3.8	2222 303 41225	.. 42225
2.7	8.3 \times 16.1 \times 26.0	3.0	2222 303 41275	.. 42275
3.3	9.2 \times 17.1 \times 26.0	3.6	2222 303 41335	.. 42335
3.9	8.2 \times 16.0 \times 26.0	3.0	2222 303 41395	.. 42395
4.7	9.0 \times 16.9 \times 26.0	3.4	2222 303 41475	.. 42475
5.6	9.9 \times 17.7 \times 26.0	4.0	2222 303 41565	.. 42565
Pitch = 27.5 ± 0.4 mm; $d_t = 0.80 \pm 0.08$ mm				
6.8	10.0 \times 17.9 \times 30.0	4.7	2222 303 41685	.. 42685
8.2	11.1 \times 18.9 \times 30.0	5.5	2222 303 41825	.. 42825
10.0	12.3 \times 20.2 \times 30.0	6.5	2222 303 41106	.. 42106

Metallized polyester film capacitors

MKT 303

MKT 303 GENERAL DATA

PITCH 15/22.5/27.5 mm (straight leads)

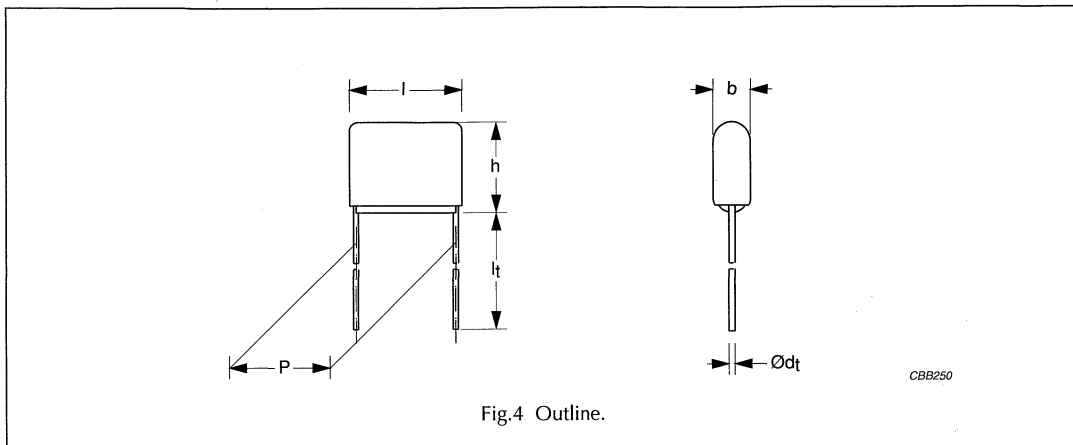


Fig.4 Outline.

Specific reference data for the 250 V DC capacitors (alternative larger dimensions)

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle:			
$C \leq 0.47 \mu\text{F}$	$\leq 75 \times 10^{-4}$	$\leq 120 \times 10^{-4}$	$\leq 225 \times 10^{-4}$
$C > 0.47 \mu\text{F}$	$\leq 75 \times 10^{-4}$	$\leq 120 \times 10^{-4}$	–
Rated voltage pulse slope $(dU/dt)_R$ at 250 V (DC):			
$l_{\text{max}} = 17.5 \text{ mm}$		6 V/ μs	
$l_{\text{max}} = 26.0 \text{ mm}$		2 V/ μs	
$l_{\text{max}} = 30.0 \text{ mm}$		2 V/ μs	
RC between leads, for $C > 0.33 \mu\text{F}$ at 100 V; 1 minute		>10000 s	
R between interconnecting leads and casing; 100 V; 1 minute		>30000 M Ω	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s		400 V; 1 minute	
Withstanding (DC) voltage between leads and case		500 V; 1 minute	

Available 250 V DC versions (alternative larger dimensions)

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 3.5 \pm 0.5 \text{ mm}$	$\pm 10\%$	2222 303 45...	on request
		$\pm 5\%$	2222 303 46...	on request
	long leads; note 1	$\pm 10\%$	2222 303 47...	on request
		$\pm 5\%$	2222 303 48...	on request

Note

- Length of long leads:
 - $l_t = 19.0 \pm 4.0 \text{ mm}$ for pitch = 15.0 mm.
 - $l_t = 25.0 \pm 4.0 \text{ mm}$ for pitch = 22.5 mm.
 - $l_t = 24.0 \pm 4.0 \text{ mm}$ for pitch = 27.5 mm.

Metallized polyester film capacitors**MKT 303** **$U_{Rdc} = 250 \text{ V}$; $U_{Rac} = 63 \text{ V}$; alternative larger dimensions**

C (μF)	DIMENSIONS $b_{\text{max}} \times h_{\text{max}} \times l_{\text{max}}$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			short leads
			C-tol = $\pm 10\%$
Pitch = $15.0 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.39	$5.8 \times 10.5 \times 17.5$	0.9	2222 303 45394
0.47	$6.4 \times 11.1 \times 17.5$	1.1	2222 303 45474
0.56	$5.5 \times 10.2 \times 17.5$	0.9	2222 303 45564
Pitch = $22.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
1.8	$8.7 \times 16.5 \times 26.0$	3.3	2222 303 45185
Pitch = $27.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
5.6	$9.0 \times 16.9 \times 30.0$	4.0	2222 303 45565

Metallized polyester film capacitors

MKT 303

MKT 303 GENERAL DATA

PITCH 10/15/22.5/27.5 mm (straight leads)

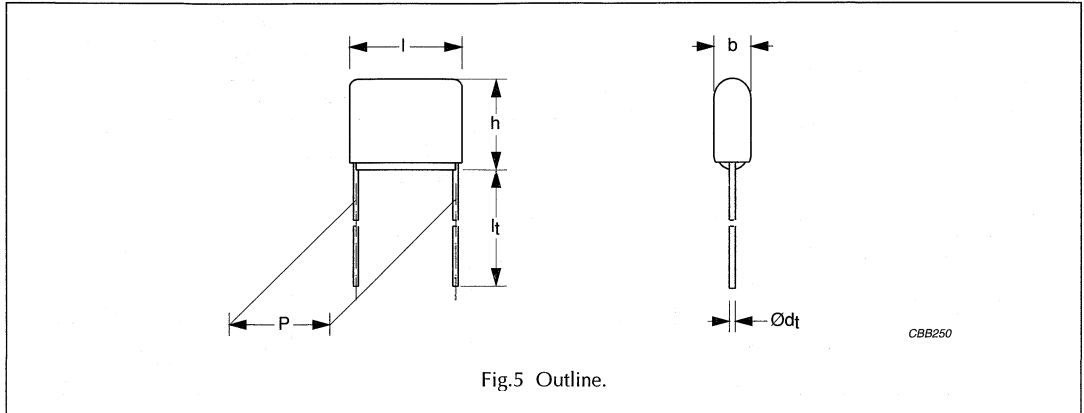


Fig.5 Outline.

Specific reference data for the 400 V DC capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle: $C \leq 0.47 \mu\text{F}$ $C > 0.47 \mu\text{F}$	$\leq 75 \times 10^{-4}$ $\leq 75 \times 10^{-4}$	$\leq 120 \times 10^{-4}$ $\leq 120 \times 10^{-4}$	$\leq 225 \times 10^{-4}$ -
Rated voltage pulse slope $(dU/dt)_R$ at 400 V (DC): $I_{\text{max}} = 12.5 \text{ mm}$ $I_{\text{max}} = 17.5 \text{ mm}$ $I_{\text{max}} = 26.0 \text{ mm}$ $I_{\text{max}} = 30.0 \text{ mm}$		45 V/ μs 15 V/ μs 6 V/ μs 4 V/ μs	
R between leads, for $C \leq 0.33 \mu\text{F}$ at 100 V; 1 minute		>30000 M Ω	
RC between leads, for $C > 0.33 \mu\text{F}$ at 100 V; 1 minute		>10000 s	
R between interconnecting leads and casing; 100 V; 1 minute		>30000 M Ω	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s		640 V; 1 minute	
Withstanding (DC) voltage between leads and case		800 V; 1 minute	

Available 400 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 3.5 \pm 0.5 \text{ mm}$	$\pm 10\%$	2222 303 51...	preferred
		$\pm 5\%$	2222 303 52...	preferred
	long leads; note 1	$\pm 10\%$	2222 303 53...	on request
		$\pm 5\%$	2222 303 54...	on request

Note

- Length of long leads:
 - $l_t = 19.0 \pm 4.0 \text{ mm}$ for pitch = 10 and 15.0 mm.
 - $l_t = 25.0 \pm 4.0 \text{ mm}$ for pitch = 22.5 mm.
 - $l_t = 24.0 \pm 4.0 \text{ mm}$ for pitch = 27.5 mm.

Metallized polyester film capacitors**MKT 303** $U_{Rdc} = 400 \text{ V}$; $U_{Rac} = 100 \text{ V}$; standard dimensions

C (μF)	DIMENSIONS $b_{\max} \times h_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER	
			LOOSE IN BOX	
			short leads	
			C-tol = $\pm 10\%$	C-tol = $\pm 5\%$
			catalogue number	last 5 digits
Pitch = $10.0 \pm 0.4 \text{ mm}$; $d_t = 0.60 \pm 0.06 \text{ mm}$				
0.1	$4.7 \times 9.4 \times 12.5$	0.5	2222 303 51104	.. 52104
0.12	$4.3 \times 9.1 \times 12.5$	0.4	2222 303 51124	.. 52124
0.15	$4.8 \times 9.5 \times 12.5$	0.5	2222 303 51154	.. 52154
0.18	$5.2 \times 9.9 \times 12.5$	0.6	2222 303 51184	.. 52184
0.22	$5.7 \times 10.4 \times 12.5$	0.6	2222 303 51224	.. 52224
Pitch = $15.0 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$				
0.27	$5.8 \times 10.5 \times 17.5$	0.9	2222 303 51274	.. 52274
0.33	$5.4 \times 10.1 \times 17.5$	0.8	2222 303 51334	.. 52334
0.39	$5.8 \times 10.5 \times 17.5$	0.9	2222 303 51394	.. 52394
0.47	$6.4 \times 11.1 \times 17.5$	1.1	2222 303 51474	.. 52474
0.56	$6.9 \times 11.7 \times 17.5$	1.2	2222 303 51564	.. 52564
0.68	$7.6 \times 12.3 \times 17.5$	1.4	2222 303 51684	.. 52684
0.82	$8.4 \times 13.1 \times 17.5$	1.7	2222 303 51824	.. 52824
Pitch = $22.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$				
1.0	$7.7 \times 15.5 \times 26.0$	2.7	2222 303 51105	.. 52105
1.2	$8.4 \times 16.3 \times 26.0$	3.1	2222 303 51125	.. 52125
1.5	$7.9 \times 15.8 \times 26.0$	2.8	2222 303 51155	.. 52155
1.8	$8.7 \times 16.6 \times 26.0$	3.3	2222 303 51185	.. 52185
2.2	$9.7 \times 17.5 \times 26.0$	3.8	2222 303 51225	.. 52225
Pitch = $27.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$				
2.7	$9.9 \times 17.7 \times 30.0$	4.6	2222 303 51275	.. 52275
3.3	$11.0 \times 18.8 \times 30.0$	5.4	2222 303 51335	.. 52335
3.9	$12.0 \times 19.9 \times 30.0$	6.2	2222 303 51395	.. 52395

Metallized polyester film capacitors

MKT 303

MKT 303 GENERAL DATA

PITCH 15/22.5/27.5 mm (straight leads)

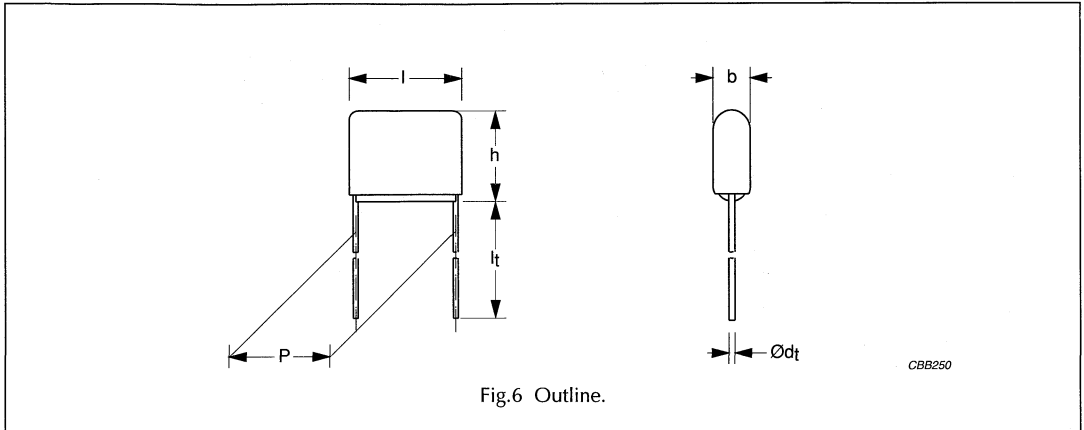


Fig.6 Outline.

CBB250

Specific reference data for the 400 V DC capacitors (alternative larger dimensions)

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle: $C \leq 0.47 \mu\text{F}$ $C > 0.47 \mu\text{F}$	$\leq 75 \times 10^{-4}$ $\leq 75 \times 10^{-4}$	$\leq 120 \times 10^{-4}$ $\leq 120 \times 10^{-4}$	$\leq 225 \times 10^{-4}$ -
Rated voltage pulse slope $(dU/dt)_R$ at 400 V (DC): $I_{\text{max}} = 17.5 \text{ mm}$ $I_{\text{max}} = 26.0 \text{ mm}$ $I_{\text{max}} = 30.0 \text{ mm}$		15 V/ μs 6 V/ μs 4 V/ μs	
R between leads, for $C \leq 0.33 \mu\text{F}$ at 100 V; 1 minute		$>30000 \text{ M}\Omega$	
RC between leads, for $C > 0.33 \mu\text{F}$ at 100 V; 1 minute		$>10000 \text{ s}$	
R between interconnecting leads and casing; 100 V; 1 minute		$>30000 \text{ M}\Omega$	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s		640 V; 1 minute	
Withstanding (DC) voltage between leads and case		800 V; 1 minute	

Available 400 V DC versions (alternative larger dimensions)

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 3.5 \pm 0.5 \text{ mm}$	$\pm 10\%$	2222 303 55...	on request
		$\pm 5\%$	2222 303 56...	on request
	long leads; note 1	$\pm 10\%$	2222 303 57...	on request
		$\pm 5\%$	2222 303 58...	on request

Note

1. Length of long leads:
 - a) $l_t = 19.0 \pm 4.0 \text{ mm}$ for pitch = 15.0 mm.
 - b) $l_t = 25.0 \pm 4.0 \text{ mm}$ for pitch = 22.5 mm.
 - c) $l_t = 24.0 \pm 4.0 \text{ mm}$ for pitch = 27.5 mm.

Metallized polyester film capacitors**MKT 303** $U_{Rdc} = 400 \text{ V}$; $U_{Rac} = 100 \text{ V}$; alternative larger dimensions

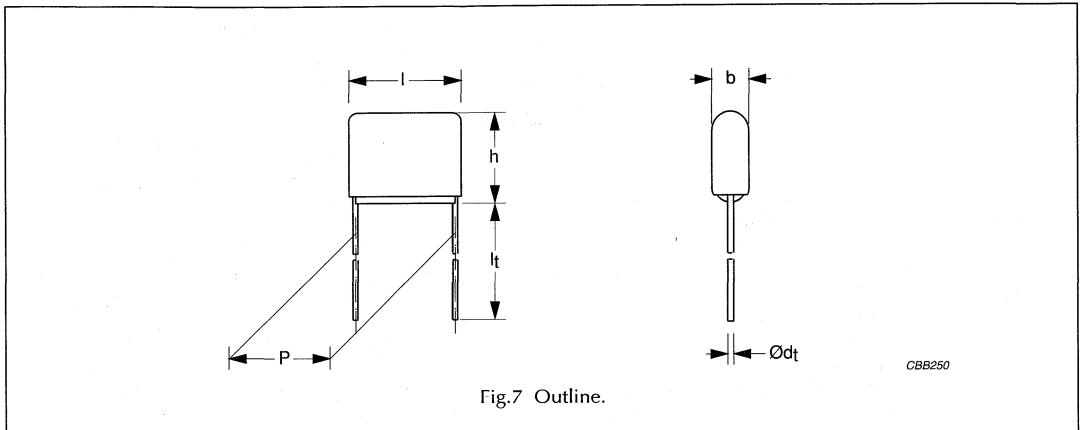
C (μF)	DIMENSIONS $b_{\max} \times h_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			short leads
			C-tol = $\pm 10\%$
Pitch = $15.0 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.12	$5.7 \times 10.4 \times 17.5$	1.1	2222 303 55124
0.15	$5.4 \times 10.1 \times 17.5$	0.8	2222 303 55154
0.18	$5.9 \times 10.6 \times 17.5$	1.0	2222 303 55184
0.22	$5.3 \times 10.0 \times 17.5$	0.8	2222 303 55224
Pitch = $22.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.56	$9.9 \times 17.7 \times 26.0$	4.0	2222 303 55564
0.68	$7.9 \times 15.8 \times 26.0$	2.8	2222 303 55684
0.82	$8.7 \times 16.6 \times 26.0$	3.3	2222 303 55824
Pitch = $27.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
1.5	$8.7 \times 16.5 \times 30.0$	3.8	2222 303 55155
1.8	$8.0 \times 15.8 \times 30.0$	3.3	2222 303 55185
2.2	$8.8 \times 16.7 \times 30.0$	3.8	2222 303 55225

Metallized polyester film capacitors

MKT 303

MKT 303 GENERAL DATA

PITCH 10/15/22.5/27.5 mm (straight leads)



Specific reference data for the 630 V DC capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle: C ≤ 0.47 μF	≤75 × 10 ⁻⁴	≤120 × 10 ⁻⁴	≤225 × 10 ⁻⁴
C > 0.47 μF	≤75 × 10 ⁻⁴	≤120 × 10 ⁻⁴	—
Rated voltage pulse slope (dU/dt) _R at 630 V (DC): I _{max} = 12.5 mm	137 V/μs		
I _{max} = 17.5 mm	44 V/μs		
I _{max} = 26.0 mm	17 V/μs		
I _{max} = 30.0 mm	12 V/μs		
R between leads, for C ≤ 0.33 μF at 500 V; 1 minute	>30000 MΩ		
RC between leads, for C > 0.33 μF at 500 V; 1 minute	>10000 s		
R between interconnecting leads and casing; 100 V; 1 minute	>30000 MΩ		
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	1 008 V; 1 minute		
Withstanding (DC) voltage between leads and case	1 260 V; 1 minute		

Available 630 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	l _l = 3.5 ±0.5 mm	±10%	2222 303 61...	preferred
		±5%	2222 303 62...	preferred
	long leads; note 1	±10%	2222 303 63...	on request
		±5%	2222 303 64...	on request

Note

- Length of long leads:
 - I_l = 19.0 ±4.0 mm for pitch = 10 and 15.0 mm.
 - I_l = 25.0 ±4.0 mm for pitch = 22.5 mm.
 - I_l = 24.0 ±4.0 mm for pitch = 27.5 mm.

Metallized polyester film capacitors

MKT 303

 $U_{Rdc} = 630 \text{ V}$; $U_{Rac} = 160 \text{ V}$; standard dimensions

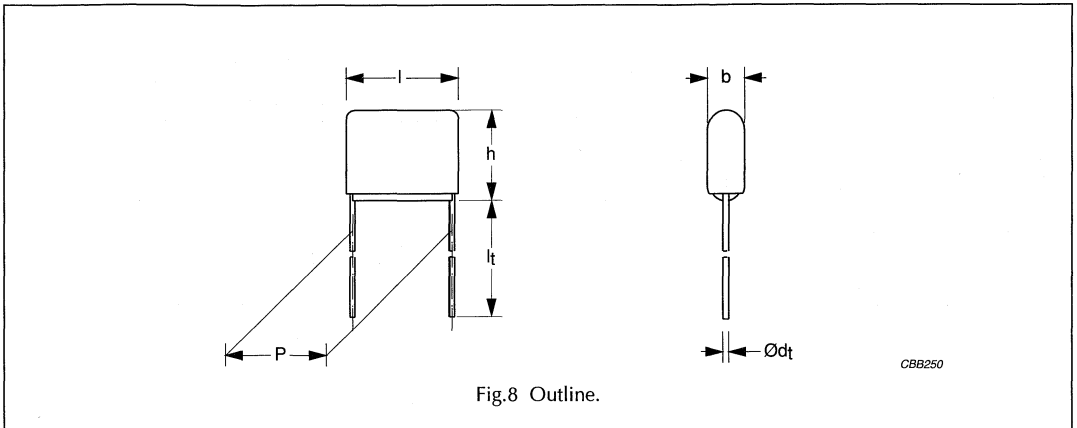
C (μF)	DIMENSIONS $b_{\max} \times h_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER	
			LOOSE IN BOX	
			short leads	
			C-tol = $\pm 10\%$	C-tol = $\pm 5\%$
			catalogue number	last 5 digits
Pitch = 10.0 ± 0.4 mm; $d_t = 0.60 \pm 0.06$ mm				
0.01	4.1 \times 8.8 \times 12.5	0.4	2222 303 61103	.. 62103
0.012	4.5 \times 9.3 \times 12.5	0.5	2222 303 61123	.. 62123
0.015	4.9 \times 9.6 \times 12.5	0.5	2222 303 61153	.. 62153
0.018	4.4 \times 9.1 \times 12.5	0.4	2222 303 61183	.. 62183
0.022	4.8 \times 9.5 \times 12.5	0.5	2222 303 61223	.. 62223
0.027	4.2 \times 8.9 \times 12.5	0.4	2222 303 61273	.. 62273
0.033	4.0 \times 8.7 \times 12.5	0.4	2222 303 61333	.. 62333
0.039	4.3 \times 9.0 \times 12.5	0.4	2222 303 61393	.. 62393
0.047	4.7 \times 9.4 \times 12.5	0.5	2222 303 61473	.. 62473
0.056	5.1 \times 9.8 \times 12.5	0.5	2222 303 61563	.. 62563
0.068	5.5 \times 10.3 \times 12.5	0.6	2222 303 61683	.. 62683
Pitch = 15.0 ± 0.4 mm; $d_t = 0.80 \pm 0.08$ mm				
0.082	5.4 \times 10.1 \times 17.5	0.8	2222 303 61823	.. 62823
0.1	5.2 \times 9.9 \times 17.5	0.8	2222 303 61104	.. 62104
0.12	5.7 \times 10.4 \times 17.5	0.9	2222 303 61124	.. 62124
0.15	6.3 \times 11.0 \times 17.5	1.1	2222 303 61154	.. 62154
0.18	6.9 \times 11.6 \times 17.5	1.2	2222 303 61184	.. 62184
0.22	7.6 \times 12.3 \times 17.5	1.4	2222 303 61224	.. 62224
0.27	8.4 \times 13.1 \times 17.5	1.7	2222 303 61274	.. 62274
Pitch = 22.5 ± 0.4 mm; $d_t = 0.80 \pm 0.08$ mm				
0.33	9.9 \times 17.8 \times 26.0	4.0	2222 303 61334	.. 62334
0.39	8.1 \times 16.0 \times 26.0	2.9	2222 303 61394	.. 62394
0.47	7.7 \times 15.6 \times 26.0	2.7	2222 303 61474	.. 62474
0.56	8.4 \times 16.3 \times 26.0	3.1	2222 303 61564	.. 62564
0.68	9.4 \times 17.2 \times 26.0	3.7	2222 303 61684	.. 62684
Pitch = 27.5 ± 0.4 mm; $d_t = 0.80 \pm 0.08$ mm				
0.82	9.5 \times 17.3 \times 30.0	4.3	2222 303 61824	.. 62824
1.0	10.5 \times 18.4 \times 30.0	5.1	2222 303 61105	.. 62105
1.2	11.6 \times 19.5 \times 30.0	5.9	2222 303 61125	.. 62125

Metallized polyester film capacitors

MKT 303

MKT 303 GENERAL DATA

PITCH 15/22.5 mm (straight leads)



Specific reference data for the 630 V DC capacitors (alternative larger dimensions)

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle:			
$C \leq 0.47 \mu\text{F}$	$\leq 75 \times 10^{-4}$	$\leq 120 \times 10^{-4}$	$\leq 225 \times 10^{-4}$
$C > 0.47 \mu\text{F}$	$\leq 75 \times 10^{-4}$	$\leq 120 \times 10^{-4}$	—
Rated voltage pulse slope $(dU/dt)_R$ at 630 V (DC):			
$l_{\text{max}} = 17.5 \text{ mm}$		44 V/ μs	
$l_{\text{max}} = 26.0 \text{ mm}$		17 V/ μs	
$l_{\text{max}} = 30.0 \text{ mm}$		12 V/ μs	
R between leads, for $C \leq 0.33 \mu\text{F}$ at 500 V; 1 minute		>30000 M Ω	
RC between leads, for $C > 0.33 \mu\text{F}$ at 500 V; 1 minute		>10000 s	
R between interconnecting leads and casing; 100 V; 1 minute		>30000 M Ω	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s		1008 V; 1 minute	
Withstanding (DC) voltage between leads and case		1260 V; 1 minute	

Available 630 V DC versions (alternative larger dimensions)

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 3.5 \pm 0.5 \text{ mm}$	$\pm 10\%$	2222 303 65...	on request
		$\pm 5\%$	2222 303 66...	on request
	long leads; note 1	$\pm 10\%$	2222 303 67...	on request
		$\pm 5\%$	2222 303 68...	on request

Note

- Length of long leads:
 - $l_t = 19.0 \pm 4.0 \text{ mm}$ for pitch = 15.0 mm.
 - $l_t = 25.0 \pm 4.0 \text{ mm}$ for pitch = 22.5 mm.

Metallized polyester film capacitors**MKT 303** $U_{Rdc} = 630 \text{ V}$; $U_{Rac} = 160 \text{ V}$; alternative larger dimensions

C (μF)	DIMENSIONS $b_{\max} \times h_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			short leads
			C-tol = $\pm 10\%$
Pitch = 15.0 ± 0.4 mm; $d_t = 0.80 \pm 0.08$ mm			
0.056	5.9 \times 10.6 \times 17.5	1.0	2222 303 65563
0.068	6.4 \times 11.1 \times 17.5	1.1	2222 303 65683
Pitch = 22.5 ± 0.4 mm; $d_t = 0.80 \pm 0.08$ mm			
0.27	8.9 \times 16.8 \times 26.0	3.4	2222 303 65274

Metallized polyester film capacitors

MKT 304

MKT 304 GENERAL DATA

PITCH 7.5 mm (bent back leads)

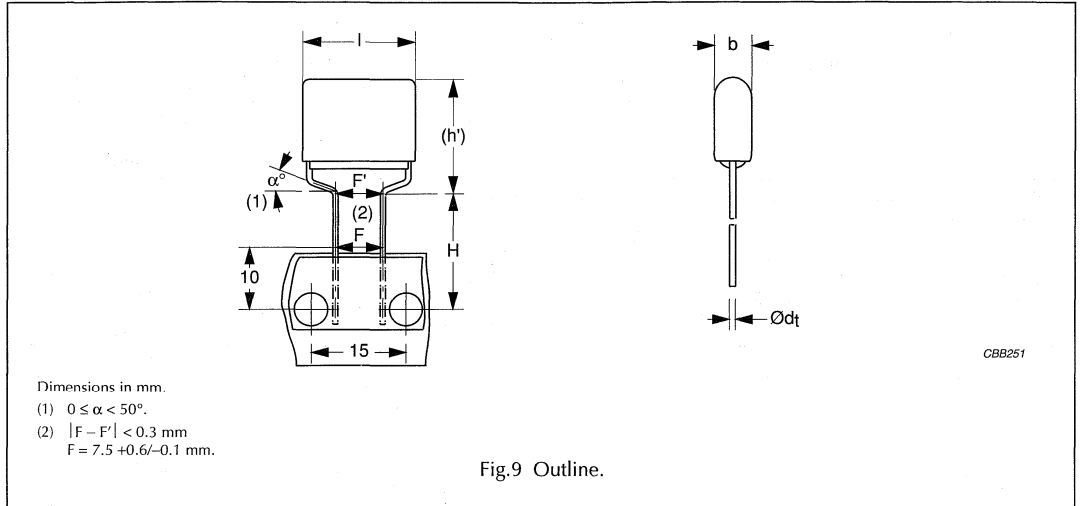


Fig.9 Outline.

Specific reference data for the 250 V DC capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle: C ≤ 0.47 μF C > 0.47 μF	≤75 × 10 ⁻⁴ ≤75 × 10 ⁻⁴	≤120 × 10 ⁻⁴ ≤120 × 10 ⁻⁴	≤225 × 10 ⁻⁴ -
Rated voltage pulse slope (dU/dt) _R at 250 V (DC): I _{max} = 12.5 mm I _{max} = 17.5 mm	18 V/μs 6 V/μs		
R between leads, for C ≤ 0.33 μF at 100 V; 1 minute	>30000 MΩ		
RC between leads, for C > 0.33 μF at 100 V; 1 minute	>10000 s		
R between interconnecting leads and casing; 100 V; 1 minute	>30000 MΩ		
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	400 V; 1 minute		
Withstanding (DC) voltage between leads and case	500 V; 1 minute		

Available 250 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Taped on reel (bent back)	standard dimensions: H = 16.0 mm; P ₀ = 15.0 mm	±10%	2222 304 43...	preferred
		±5%	2222 304 44...	preferred
	alternative dimensions: H = 16.0 mm; P ₀ = 15.0 mm	±10%	2222 304 47...	on request
		±5%	2222 304 48...	on request

Metallized polyester film capacitors

MKT 304

 $U_{Rdc} = 250 \text{ V}; U_{Rac} = 63 \text{ V};$ standard dimensions

C (μF)	DIMENSIONS $b_{\max} \times h'_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER	
			REEL DIAMETER = 500 mm; H = 16.0 mm; $P_0 = 15.0 \text{ mm}$	
			C-tol = $\pm 10\%$	C-tol = $\pm 5\%$
			catalogue number	last 5 digits
Pitch = $7.5 \pm 0.4 \text{ mm}; d_t = 0.60 \pm 0.06 \text{ mm}$			bent back	
0.1	$4.7 \times 15.2 \times 12.5$	0.5	2222 304 43104	.. 44104
0.12	$4.3 \times 14.8 \times 12.5$	0.4	2222 304 43124	.. 44124
0.15	$4.8 \times 15.3 \times 12.5$	0.5	2222 304 43154	.. 44154
0.18	$5.2 \times 15.7 \times 12.5$	0.6	2222 304 43184	.. 44184
0.22	$4.5 \times 15.0 \times 12.5$	0.5	2222 304 43224	.. 44224
0.27	$5.0 \times 15.5 \times 12.5$	0.5	2222 304 43274	.. 44274
0.33	$4.6 \times 15.1 \times 12.5$	0.5	2222 304 43334	.. 44334
0.39	$4.9 \times 15.4 \times 12.5$	0.5	2222 304 43394	.. 44394
0.47	$5.4 \times 15.9 \times 12.5$	0.6	2222 304 43474	.. 44474
0.56	$5.8 \times 16.3 \times 12.5$	0.7	2222 304 43564	.. 44564
Pitch = $7.5 \pm 0.4 \text{ mm}; d_t = 0.80 \pm 0.08 \text{ mm}$			bent back	
0.68	$6.0 \times 16.5 \times 17.5$	1.0	2222 304 43684	.. 44684
0.82	$5.4 \times 15.9 \times 17.5$	0.8	2222 304 43824	.. 44824
1.0	$6.0 \times 16.5 \times 17.5$	1.0	2222 304 43105	.. 44105
1.2	$6.5 \times 17.0 \times 17.5$	1.1	2222 304 43125	.. 44125
1.5	$7.3 \times 17.8 \times 17.5$	1.3	2222 304 43155	.. 44155
1.8	$7.9 \times 18.4 \times 17.5$	1.5	2222 304 43185	.. 44185

 $U_{Rdc} = 250 \text{ V}; U_{Rac} = 63 \text{ V};$ alternative larger dimensions

C (μF)	DIMENSIONS $b_{\max} \times h'_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER	
			REEL DIAMETER = 500 mm; H = 16.0 mm; $P_0 = 15.0 \text{ mm}$	
			C-tol = $\pm 10\%$	C-tol = $\pm 5\%$
			catalogue number	last 5 digits
Pitch = $7.5 \pm 0.4 \text{ mm}; d_t = 0.80 \pm 0.08 \text{ mm}$			bent back	
0.39	$5.8 \times 16.3 \times 17.5$	0.9	2222 304 47394	.. 48394
0.47	$6.4 \times 16.9 \times 17.5$	1.1	2222 304 47474	.. 48474
0.56	$5.5 \times 16.0 \times 17.5$	0.9	2222 304 47564	.. 48564

Metallized polyester film capacitors

MKT 304

MKT 304 GENERAL DATA

PITCH 7.5 mm (bent back leads)

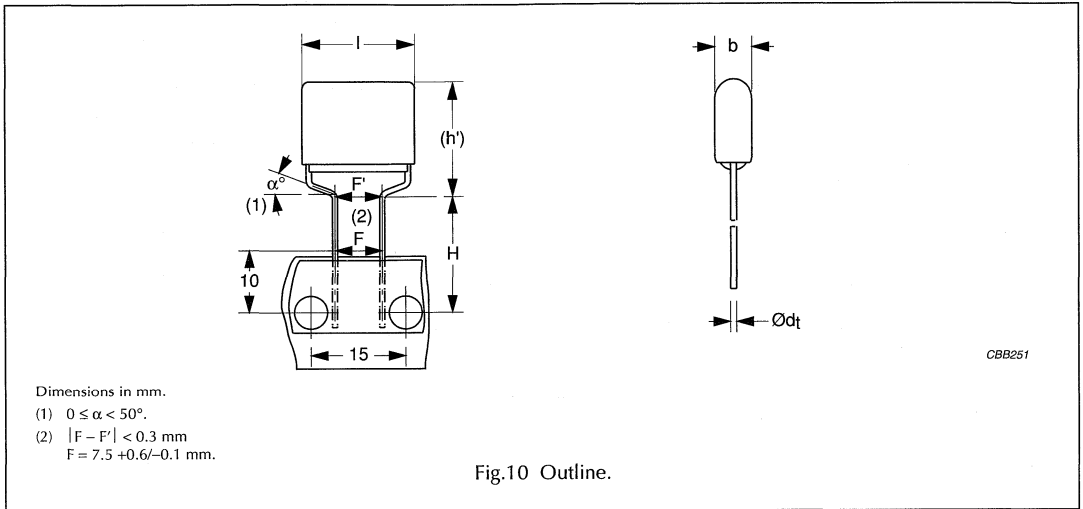


Fig.10 Outline.

Specific reference data for the 400 V DC capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle: $C \leq 0.47 \mu\text{F}$ $C > 0.47 \mu\text{F}$	$\leq 75 \times 10^{-4}$ $\leq 75 \times 10^{-4}$	$\leq 120 \times 10^{-4}$ $\leq 120 \times 10^{-4}$	$\leq 225 \times 10^{-4}$ -
Rated voltage pulse slope $(dU/dt)_R$ at 400 V (DC): $I_{\text{max}} = 12.5 \text{ mm}$ $I_{\text{max}} = 17.5 \text{ mm}$	45 V/ μs 15 V/ μs		
R between leads, for $C \leq 0.33 \mu\text{F}$ at 100 V; 1 minute	$>30000 \text{ M}\Omega$		
RC between leads, for $C > 0.33 \mu\text{F}$ at 100 V; 1 minute	$>10000 \text{ s}$		
R between interconnecting leads and casing; 100 V; 1 minute	$>30000 \text{ M}\Omega$		
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	640 V; 1 minute		
Withstanding (DC) voltage between leads and case	800 V; 1 minute		

Available 400 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Taped on reel (bent back)	standard dimensions: $H = 16.0 \text{ mm}$; $P_0 = 15.0 \text{ mm}$	$\pm 10\%$	2222 304 53...	preferred
		$\pm 5\%$	2222 304 54...	preferred
	alternative dimensions: $H = 16.0 \text{ mm}$; $P_0 = 15.0 \text{ mm}$	$\pm 10\%$	2222 304 57...	on request
		$\pm 5\%$	2222 304 58...	on request

Metallized polyester film capacitors

MKT 304

 $U_{Rdc} = 400 \text{ V}$; $U_{Rac} = 100 \text{ V}$; standard dimensions

C (μF)	DIMENSIONS $b_{\max} \times h'_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER	
			REEL DIAMETER = 500 mm; H = 16.0 mm; P ₀ = 15.0 mm	
			C-tol = $\pm 10\%$	C-tol = $\pm 5\%$
			catalogue number	last 5 digits
Pitch = $7.5 \pm 0.4 \text{ mm}$; $d_t = 0.60 \pm 0.06 \text{ mm}$			bent back	
0.1	$4.7 \times 15.2 \times 12.5$	0.5	2222 304 53104	.. 54104
0.12	$4.3 \times 14.8 \times 12.5$	0.4	2222 304 53124	.. 54124
0.15	$4.8 \times 15.3 \times 12.5$	0.5	2222 304 53154	.. 54154
0.18	$5.2 \times 15.7 \times 12.5$	0.6	2222 304 53184	.. 54184
0.22	$5.7 \times 16.2 \times 12.5$	0.6	2222 304 53224	.. 54224
Pitch = $7.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			bent back	
0.27	$5.8 \times 16.3 \times 17.5$	0.9	2222 304 53274	.. 54274
0.33	$5.4 \times 15.9 \times 17.5$	0.8	2222 304 53334	.. 54334
0.39	$5.8 \times 16.3 \times 17.5$	0.9	2222 304 53394	.. 54394
0.47	$6.4 \times 16.9 \times 17.5$	1.1	2222 304 53474	.. 54474
0.56	$6.9 \times 17.4 \times 17.5$	1.2	2222 304 53564	.. 54564
0.68	$7.6 \times 18.1 \times 17.5$	1.4	2222 304 53684	.. 54684
0.82	$8.4 \times 18.9 \times 17.5$	1.7	2222 304 53824	.. 54824

 $U_{Rdc} = 400 \text{ V}$; $U_{Rac} = 100 \text{ V}$; alternative larger dimensions

C (μF)	DIMENSIONS $b_{\max} \times h'_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER	
			REEL DIAMETER = 500 mm; H = 16.0 mm; P ₀ = 15.0 mm	
			C-tol = $\pm 10\%$	C-tol = $\pm 5\%$
			catalogue number	last 5 digits
Pitch = $7.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			bent back	
0.12	$6.5 \times 17.0 \times 17.5$	1.1	2222 304 57124	.. 58124
0.15	$5.4 \times 15.9 \times 17.5$	0.8	2222 304 57154	.. 58154
0.18	$5.9 \times 16.4 \times 17.5$	1.0	2222 304 57184	.. 58184
0.22	$5.3 \times 15.8 \times 17.5$	0.8	2222 304 57224	.. 58224

Metallized polyester film capacitors

MKT 304

MKT 304 GENERAL DATA

PITCH 7.5 mm (bent back leads)

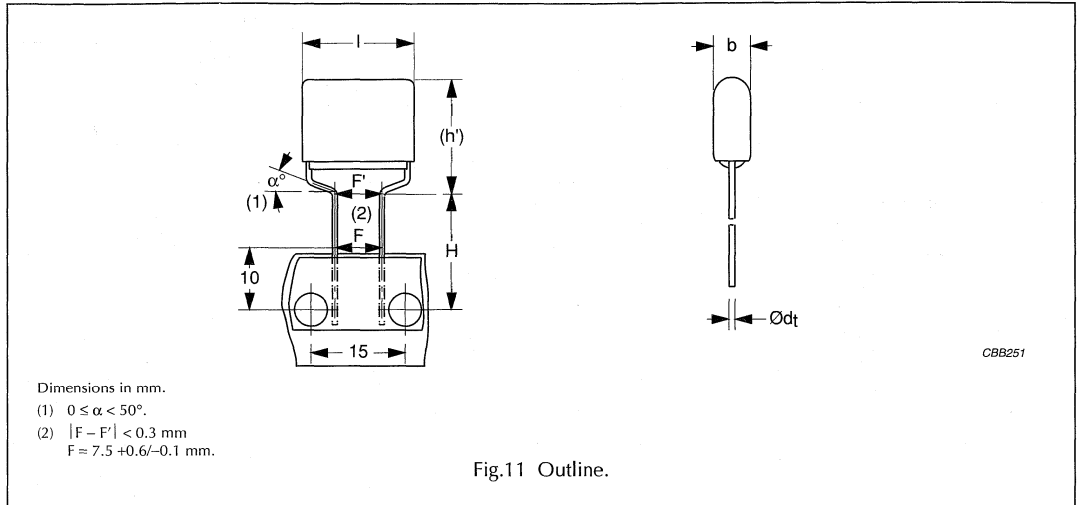


Fig.11 Outline.

Specific reference data for the 630 V DC capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle: C ≤ 0.47 μF C > 0.47 μF	≤ 75 × 10 ⁻⁴ ≤ 75 × 10 ⁻⁴	≤ 120 × 10 ⁻⁴ ≤ 120 × 10 ⁻⁴	≤ 225 × 10 ⁻⁴ -
Rated voltage pulse slope (dU/dt) _R at 400 V (DC): l _{max} = 12.5 mm l _{max} = 17.5 mm	137 V/μs 44 V/μs		
R between leads, for C ≤ 0.33 μF at 100 V; 1 minute	> 30000 MΩ		
RC between leads, for C > 0.33 μF at 100 V; 1 minute	> 10000 s		
R between interconnecting leads and casing; 100 V; 1 minute	> 30000 MΩ		
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	1008 V; 1 minute		
Withstanding (DC) voltage between leads and case	1260 V; 1 minute		

Available 630 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Taped on reel (bent back)	standard dimensions: H = 16.0 mm; P ₀ = 15.0 mm	±10%	2222 304 63...	preferred
		±5%	2222 304 64...	preferred
	alternative dimensions: H = 16.0 mm; P ₀ = 15.0 mm	±10%	2222 304 67...	on request
		±5%	2222 304 68...	on request

Metallized polyester film capacitors

MKT 304

 $U_{Rdc} = 630 \text{ V}$; $U_{Rac} = 160 \text{ V}$; standard dimensions

C (μF)	DIMENSIONS $b_{\max} \times h'_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER	
			REEL DIAMETER = 500 mm; H = 16.0 mm; $P_0 = 15.0 \text{ mm}$	
			C-tol = $\pm 10\%$	C-tol = $\pm 5\%$
			catalogue number	last 5 digits
Pitch = $7.5 \pm 0.4 \text{ mm}$; $d_t = 0.60 \pm 0.06 \text{ mm}$			bent back	
0.01	$4.1 \times 14.6 \times 12.5$	0.4	2222 304 63103	.. 64103
0.012	$4.5 \times 15.0 \times 12.5$	0.5	2222 304 63123	.. 64123
0.015	$4.9 \times 15.4 \times 12.5$	0.5	2222 304 63153	.. 64153
0.018	$4.4 \times 14.9 \times 12.5$	0.4	2222 304 63183	.. 64183
0.022	$4.8 \times 15.3 \times 12.5$	0.5	2222 304 63223	.. 64223
0.027	$4.2 \times 14.7 \times 12.5$	0.4	2222 304 63273	.. 64273
0.033	$4.0 \times 14.5 \times 12.5$	0.4	2222 304 63333	.. 64333
0.039	$4.3 \times 14.8 \times 12.5$	0.4	2222 304 63393	.. 64393
0.047	$4.7 \times 15.2 \times 12.5$	0.5	2222 304 63473	.. 64473
0.056	$5.1 \times 15.6 \times 12.5$	0.5	2222 304 63563	.. 64563
0.068	$5.5 \times 16.0 \times 12.5$	0.6	2222 304 63683	.. 64683
Pitch = $7.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			bent back	
0.082	$5.4 \times 15.9 \times 17.5$	0.8	2222 304 63823	.. 64823
0.1	$5.2 \times 15.7 \times 17.5$	0.8	2222 304 63104	.. 64104
0.12	$5.7 \times 16.2 \times 17.5$	0.9	2222 304 63124	.. 64124
0.15	$6.3 \times 16.8 \times 17.5$	1.1	2222 304 63154	.. 64154
0.18	$6.9 \times 17.4 \times 17.5$	1.2	2222 304 63184	.. 64184
0.22	$7.6 \times 18.1 \times 17.5$	1.4	2222 304 63224	.. 64224
0.27	$8.4 \times 18.9 \times 17.5$	1.7	2222 304 63274	.. 64274

 $U_{Rdc} = 630 \text{ V}$; $U_{Rac} = 160 \text{ V}$; alternative larger dimensions

C (μF)	DIMENSIONS $b_{\max} \times h'_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER	
			REEL DIAMETER = 500 mm; H = 16.0 mm; $P_0 = 15.0 \text{ mm}$	
			C-tol = $\pm 10\%$	C-tol = $\pm 5\%$
			catalogue number	last 5 digits
Pitch = $7.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			bent back	
0.056	$5.9 \times 16.4 \times 17.5$	1.0	2222 304 67563	.. 68563
0.068	$6.4 \times 16.9 \times 17.5$	1.1	2222 304 67683	.. 68683

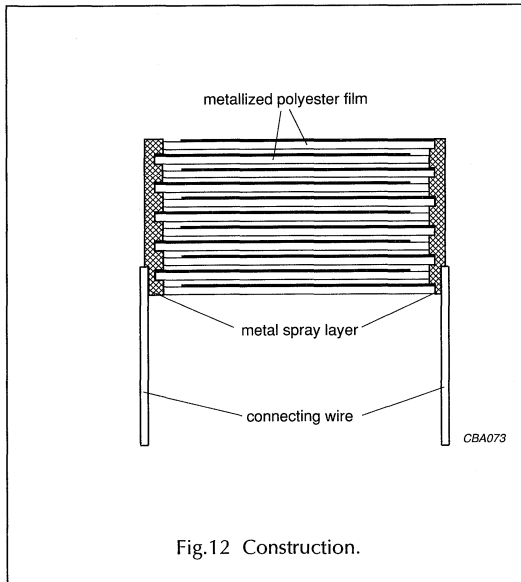
Metallized polyester film capacitors

MKT 303/304

CONSTRUCTION

Description

- Low-inductive wound cell of metallized polyethylene terephthalate 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 tape specifications refer to this handbook, chapter "Packaging information".

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 crimps are in good contact with the printed-circuit board:

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

Storage temperature

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

RATINGS AND CHARACTERISTICS REFERENCE CONDITIONS

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 $50 \pm 2\%$.

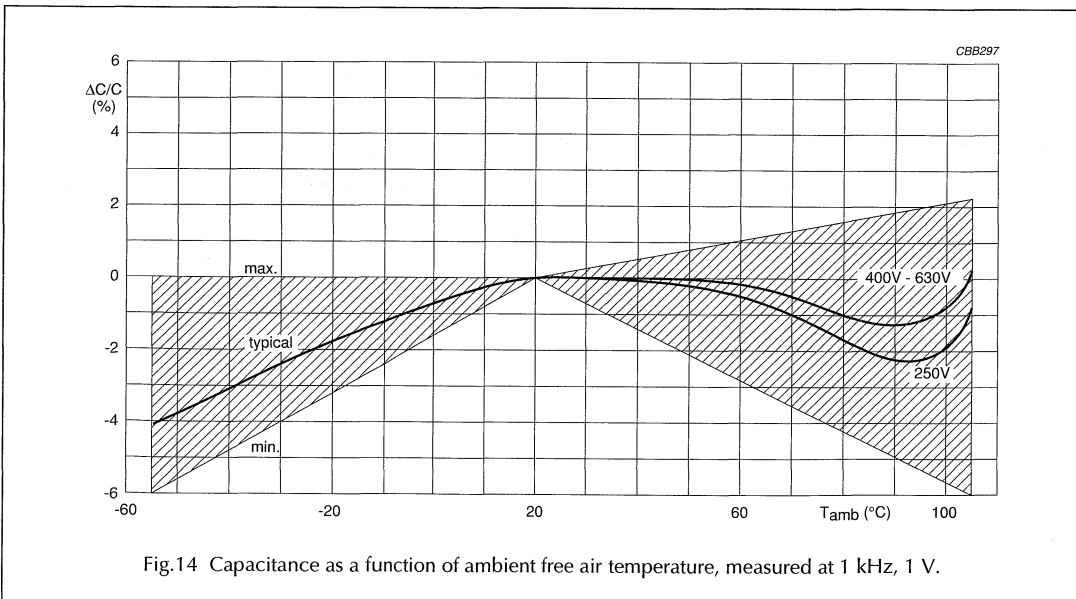
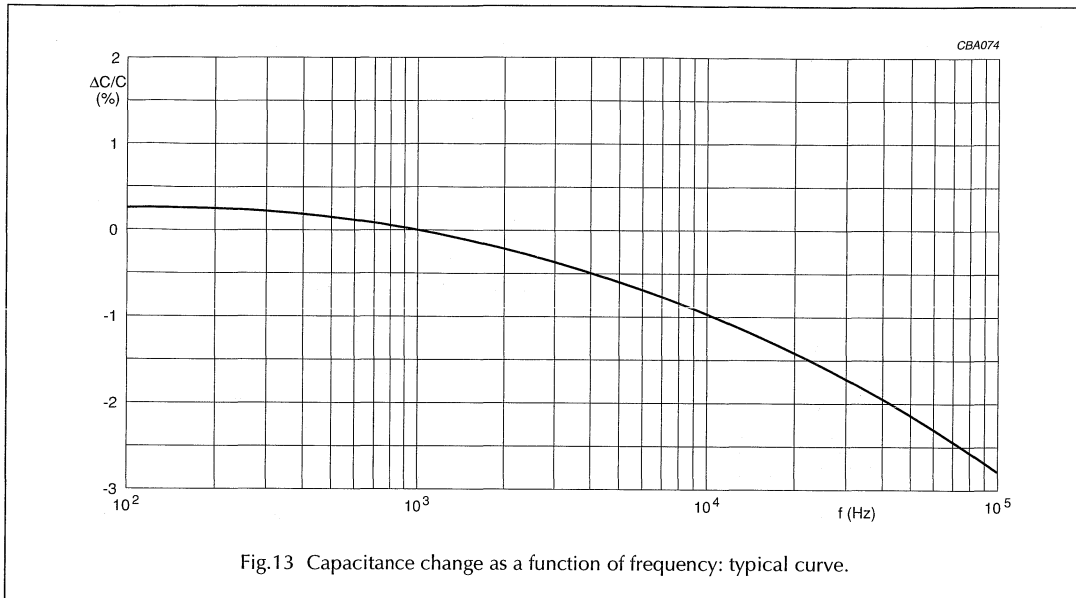
For reference testing, a conditioning period shall be applied over 96 ± 4 hours by heating the products in a circulating air oven at the rated temperature and a relative humidity not exceeding 20%.

Metalized polyester film capacitors

MKT 303/304

CHARACTERISTICS

Capacitance



Metallized polyester film capacitors

MKT 303/304

Impedance

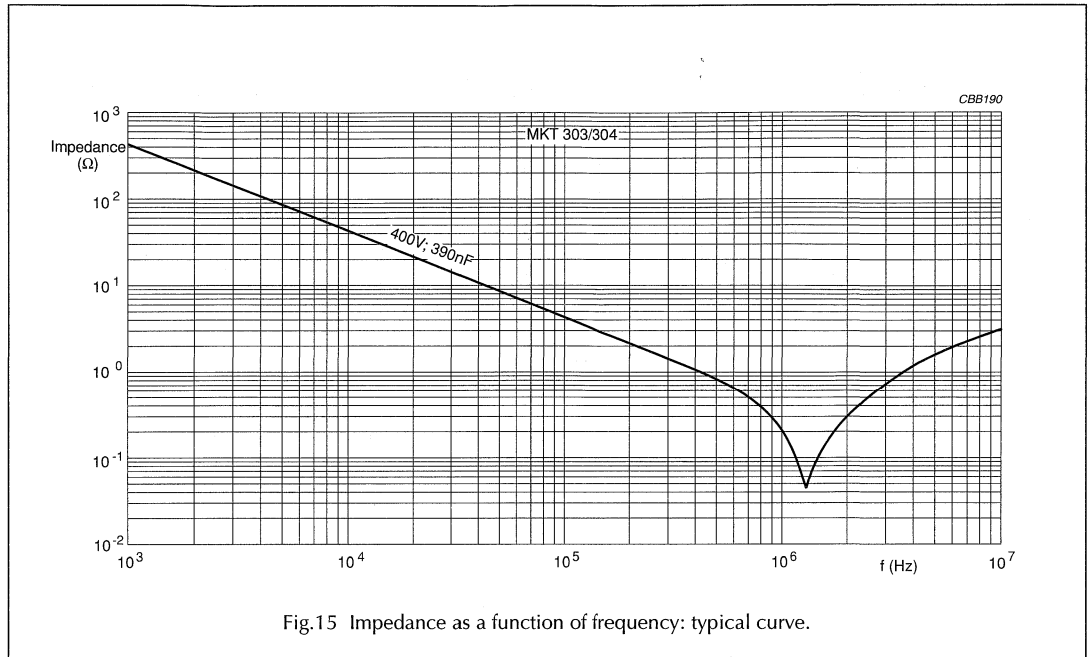


Fig.15 Impedance as a function of frequency: typical curve.

Maximum DC and AC voltage as a function of temperature

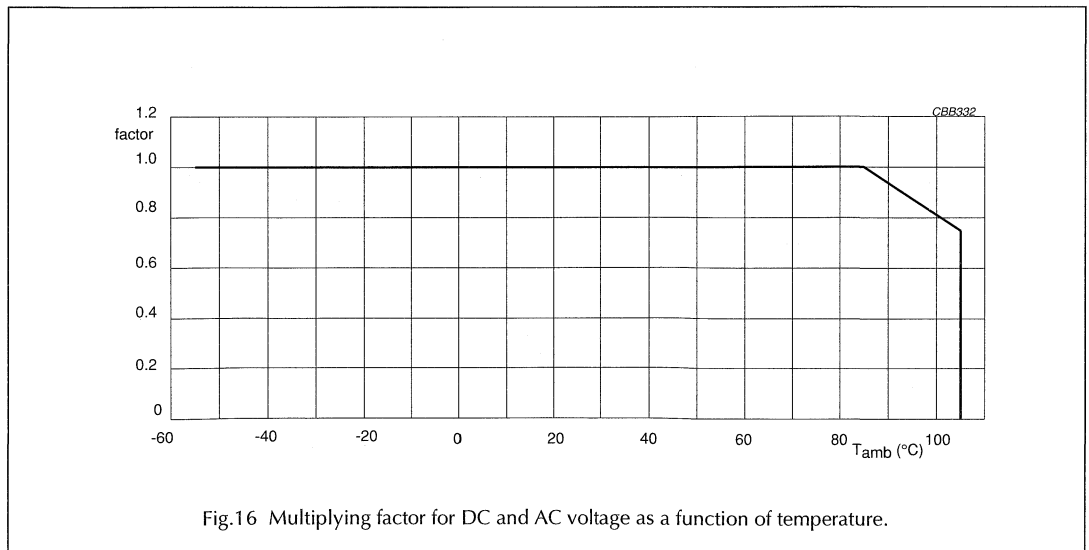
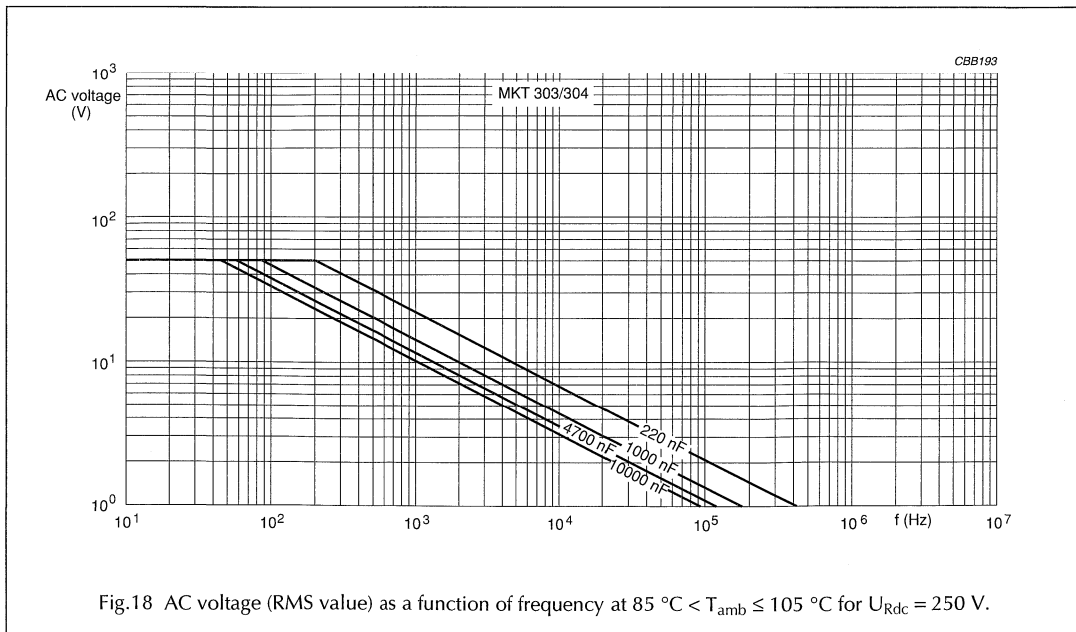
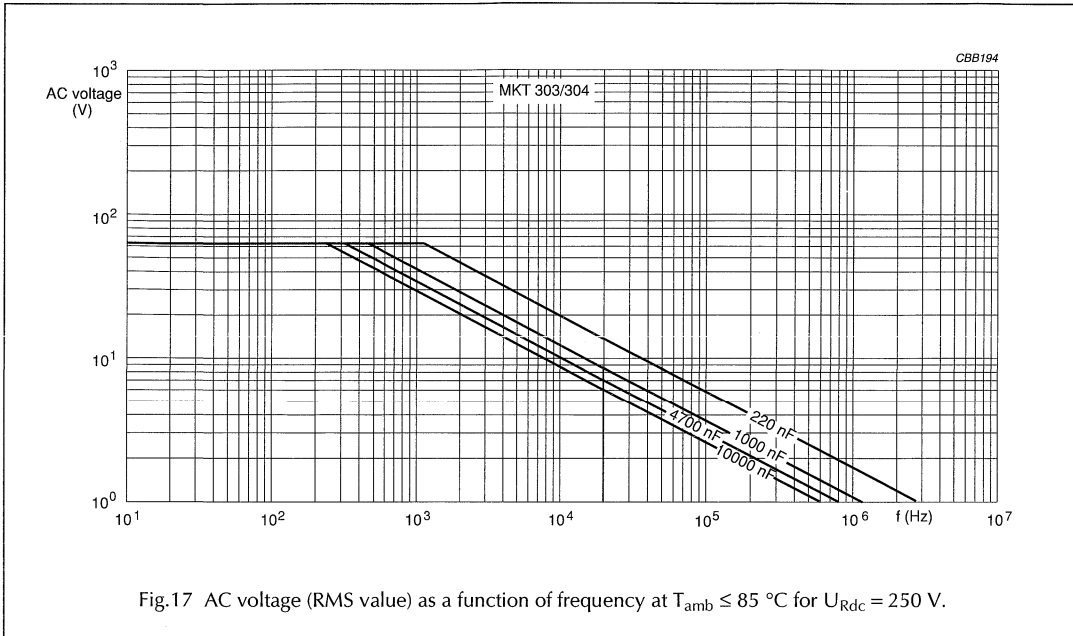


Fig.16 Multiplying factor for DC and AC voltage as a function of temperature.

Metallized polyester film capacitors

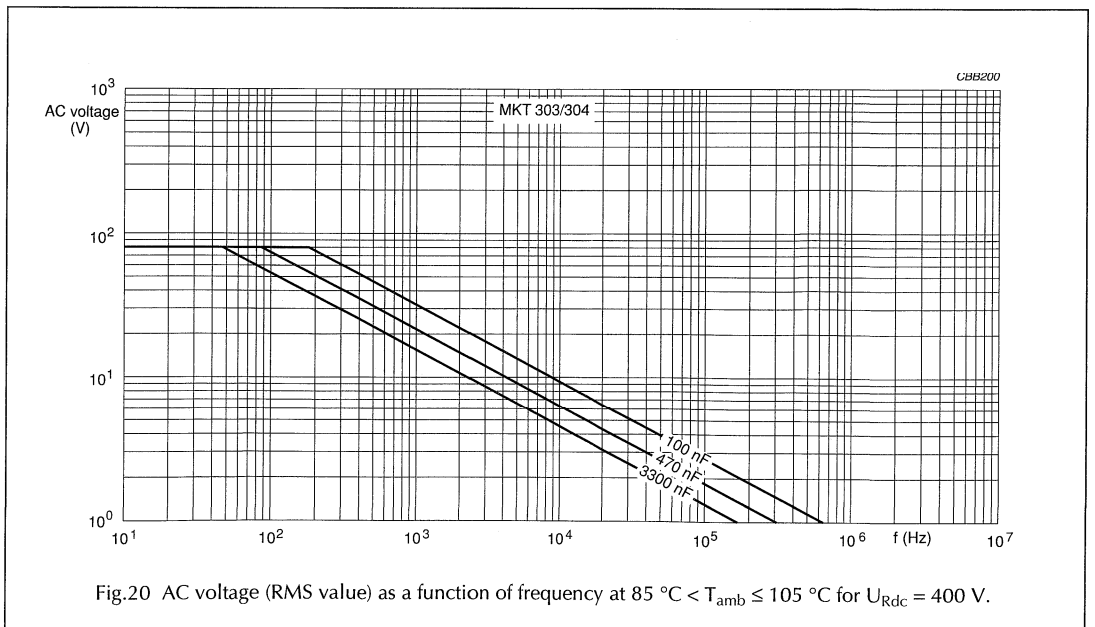
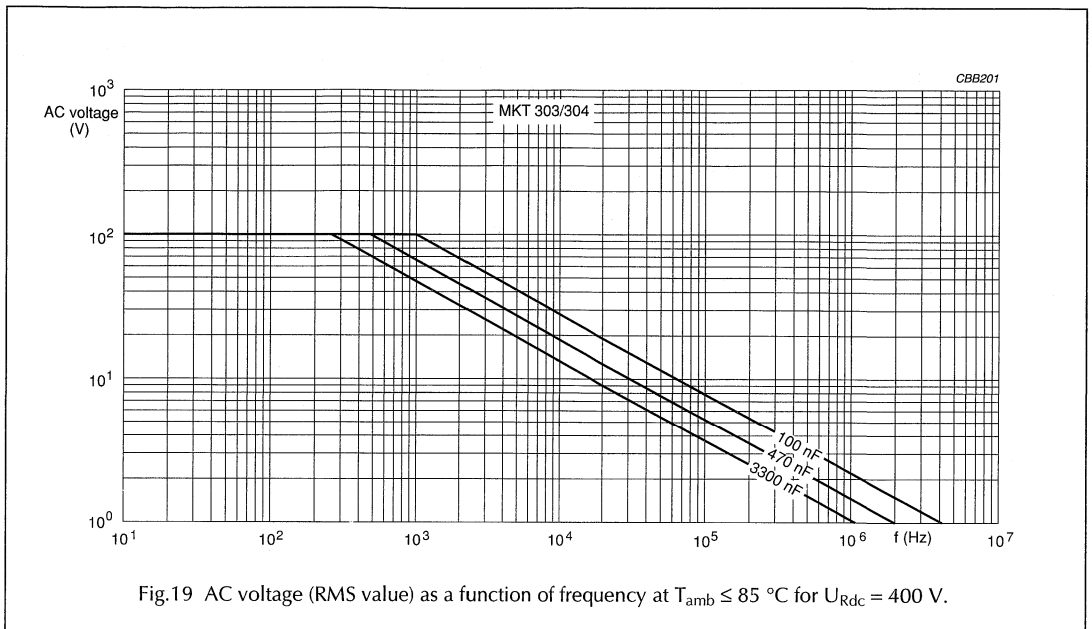
MKT 303/304

Maximum RMS voltage and AC current (sinewave) as a function of frequency



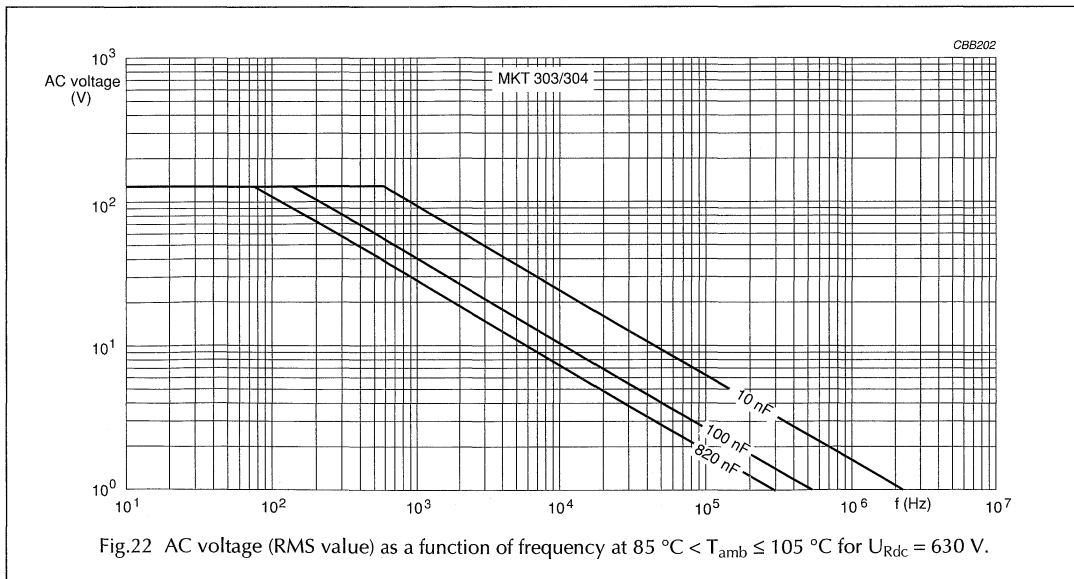
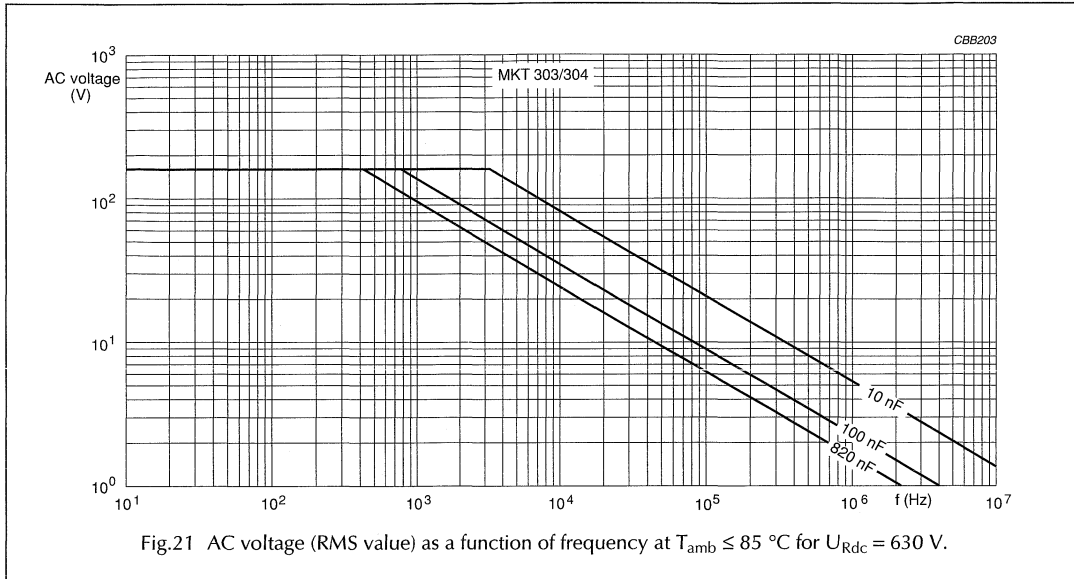
Metallized polyester film capacitors

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Metallized polyester film capacitors

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Maximum RMS current (sinewave) as a function of frequency

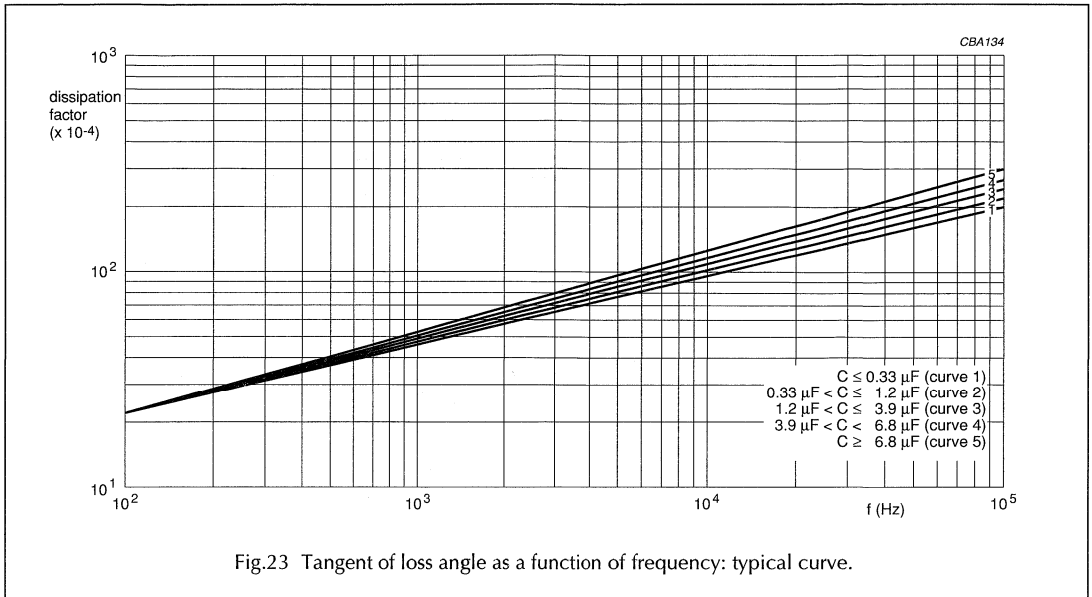
The maximum RMS current is defined by $I_{ac} = \omega \times C \times U_{ac}$.

U_{ac} is the maximum AC voltage depending on the ambient temperature in Figs 17 to 22.

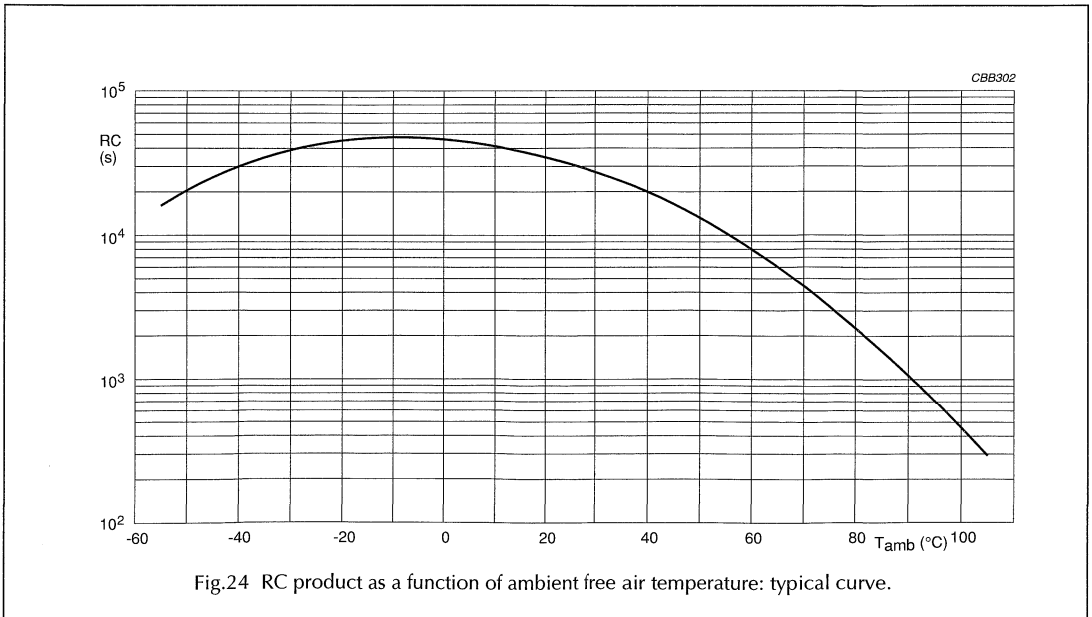
Metallized polyester film capacitors

MKT 303/304

Tangent of loss angle



Insulation resistance



Metallized polyester film capacitors

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Maximum allowed component temperature rise (ΔT) as a function of the ambient temperature (T_{amb})

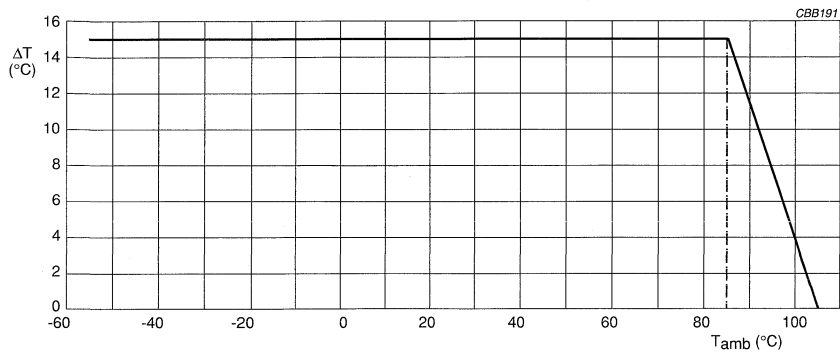


Fig.25 Maximum allowed component temperature rise as a function of the ambient temperature.

Metallized polyester film capacitors

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Heat conductivity (G) as a function of pitch and capacitor body thickness in mW/°C

Table 1 Heat conductivity

b_{\max} (mm)	ORIGINAL PITCH (mm)			
	10	15	22.5	27.5
4.0	4.0	5.0	–	–
4.5	4.5	6.0	–	–
5.0	5.0	6.0	12.0	13.0
5.5	6.0	6.5	13.0	15.0
6.0	6.0	6.5	13.0	15.0
6.5	6.5	8.0	15.0	17.0
7.0	–	8.0	15.0	17.0
7.5	–	9.0	17.0	18.0
8.0	–	9.0	17.0	20.0
8.5	–	11.0	18.0	20.0
9.0	–	11.0	18.0	22.0
9.5	–	12.0	20.0	22.0
10.0	–	12.0	20.0	23.0
10.5	–	–	22.0	25.0
11.0	–	–	–	25.0
11.5	–	–	–	27.0
12.0	–	–	–	27.0
12.5	–	–	–	30.0
13.0	–	–	–	30.0
13.5	–	–	–	30.0
14.0	–	–	–	30.0
14.5	–	–	–	33.0
15.0	–	–	–	33.0
15.5	–	–	–	37.0
16.0	–	–	–	37.0

Power dissipation and maximum component temperature rise

The power dissipation must be limited in order not to exceed the maximum allowed component temperature rise as a function of the free air ambient temperature.

The power dissipation can be calculated according chapter "Introduction", section "Maximum power dissipation".

The component temperature rise (ΔT) can be measured (see Section "Measuring the component temperature" for more details) or calculated by $\Delta T = P/G$:

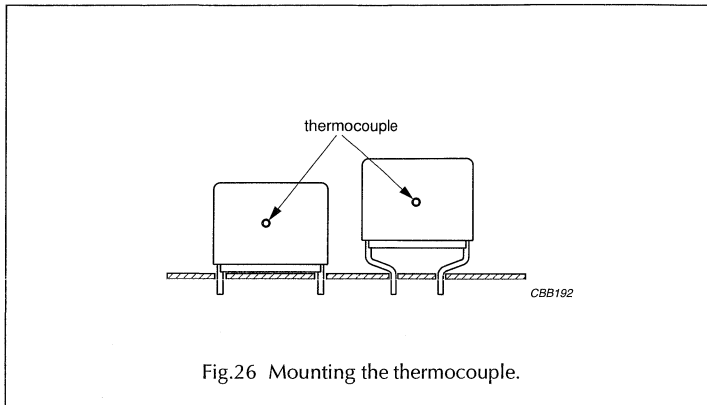
- ΔT = component temperature rise (°C).
- P = power dissipation of the component (mW).
- G = heat conductivity of the component (mW/°C).

Metallized polyester film capacitors

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Measuring the component temperature

A thermocouple must be attached to the capacitor body as in Fig.26.



The temperature is measured in unloaded (T_{amb}) and maximum loaded condition (T_c).

The temperature rise is given by $\Delta T = T_c - T_{amb}$.

To avoid radiation or convection, the capacitor should be tested in a wind-free box.

Metallized polyester film capacitors

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Application note and limiting conditions

These capacitors are not suitable for mains applications as across-the-line capacitors.

To select the capacitor for a certain application, the following 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 the maximum U_{p-p} to avoid the ionisation inception level.
3. The voltage pulse slope (dU/dt) shall not exceed the rated voltage pulse slope in an RC-circuit at rated voltage and without ringing. If the pulse voltage is lower than the rated DC voltage, the rated voltage pulse slope may be multiplied by U_{Rdc} and divided by the applied voltage.

For all other pulses following equation must be fulfilled:

$$2 \times \int_0^T \left(\frac{dU}{dt} \right)^2 \times dt < U_{Rdc} \times \left(\frac{dU}{dt} \right)_{rated}$$

T is the pulse duration.

The rated voltage pulse slope is valid for ambient temperatures up to 85 °C. For higher temperatures a derating factor of 3% per K shall be applied.

4. The maximum component surface temperature rise must be lower than the limits in Fig.25.
5. Since in circuits used at voltages over 280 V peak-to-peak the risk for an intrinsically active flammability after a capacitor breakdown (short circuit) increases, it is recommended that the power to the component is limited to 100 times the values mentioned in Table 1 "Heat conductivity".
6. When using these capacitors as across-the-line capacitor in the input filter for mains applications or as series connected with an impedance to the mains the applicant must guarantee that following conditions are fulfilled in any case (spikes and surge voltages from the mains included):

VOLTAGE CONDITIONS FOR 6 ABOVE

ALLOWED VOLTAGES	$T_{amb} \leq 85 \text{ °C}$	$85 \text{ °C} < T_{amb} \leq 105 \text{ °C}$
Maximum continuous RMS voltage	U_{Rac}	$0.8 \times U_{Rac}$
Maximum temporary RMS -overvoltage (<24 hours)	$1.25 \times U_{Rac}$	$1.0 \times U_{Rac}$
Maximum peak voltage (V_{o-p}) (<2 s)	$1.6 \times U_{Rdc}$	$1.3 \times U_{Rdc}$

Metallized polyester film capacitors

MKT 303/304

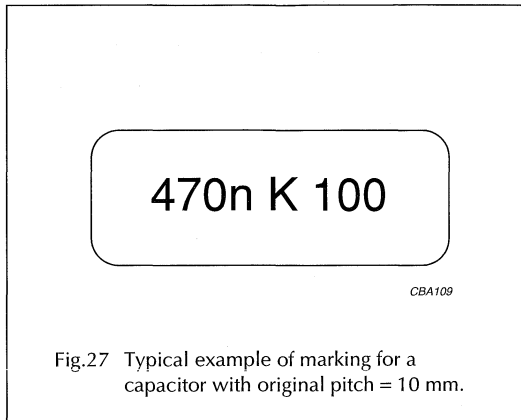
MARKING

Product marking

CAPACITORS WITH ORIGINAL PITCH = 10 mm

The capacitors are marked (see Fig.27) with the following information:

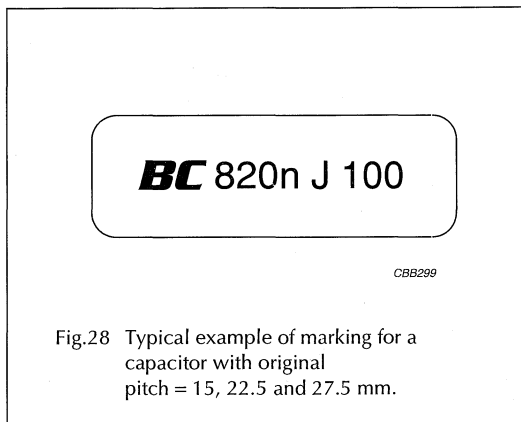
1. Capacitance code in accordance with "IEC 60062"
2. Tolerance on rated capacitance: K = $\pm 10\%$; J = $\pm 5\%$
3. Rated voltage (DC).



CAPACITORS WITH ORIGINAL PITCH = 15, 22.5 AND 27.5 mm

The capacitors are marked (see Fig.28) with the following information:

1. Manufacturer's symbol
2. Capacitance code in accordance with "IEC 60062"
3. Tolerance on rated capacitance: K = $\pm 10\%$; J = $\pm 5\%$
4. Rated voltage (DC).



Metallized polyester film capacitors**MKT 303/304****QUICK REFERENCE TEST REQUIREMENTS**

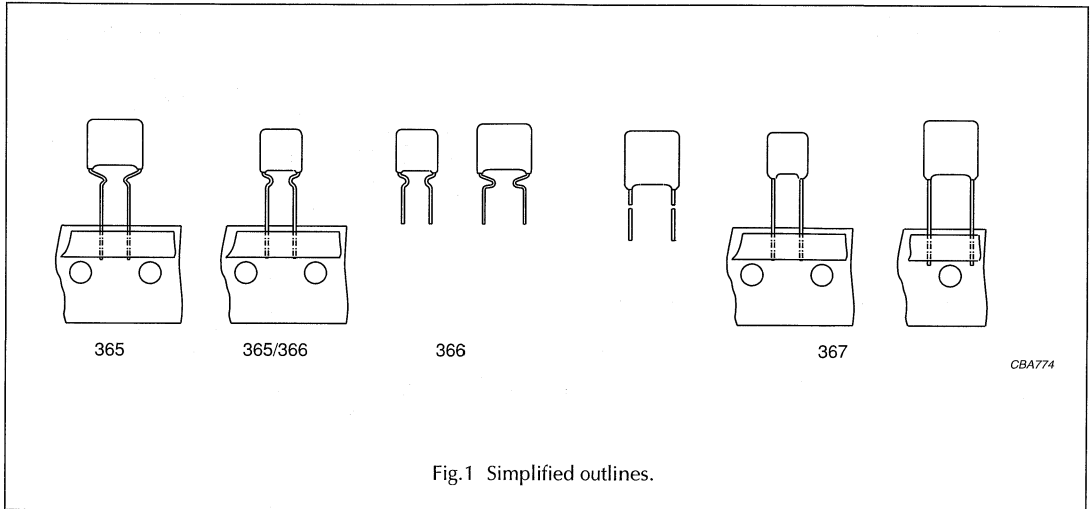
TEST	PROCEDURE (quick reference)	REQUIREMENTS
Robustness of leads		
Tensile: "IEC 60068-2-21"	load 10 N; 10 s	no visible damage legible marking $ \Delta C/C \leq 2\%$ $\Delta \tan \delta \leq 30 \times 10^{-4}$; note 1
Bending: "IEC 60068-2-21"	load 5 N; $4 \times 90^\circ$	
Peel off force	>2.5 N	
Resistance to soldering heat "IEC 60068-2-20"	solder bath: 260 °C; 10 s	
Resistance to solvents	isopropyl alcohol; 23 °C; 5 minutes	
Robustness of component		
Vibration: "IEC 60068-2-6"	10 to 55 Hz; amplitude 0.75 mm or acceleration 98 m/s ² ; 6 hours	$ \Delta C/C \leq 3\%$ $\Delta \tan \delta \leq 30 \times 10^{-4}$; note 1
Shock: "IEC 60068-2-27"	half sinewave; 490 m/s ² ; 11 ms	
Climatic sequence		
Dry heat: "IEC 60068-2-2"	16 hours; 105 °C	$ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 50 \times 10^{-4}$; note 1 $R_{ins} \geq 50\%$ of specified value
Damp heat cyclic, test Db, first cycle: "IEC 60068-2-30"		
Cold: "IEC 60068-2-1"	2 hours; -55 °C	
Damp heat cyclic, test Db, remaining cycles: "IEC 60068-2-30"		
Other applicable tests		
Damp heat, steady state: "IEC 60068-2-3"	56 days; 40 °C; 90 to 95% RH	$ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 50 \times 10^{-4}$; note 1 $R_{ins} \geq 50\%$ of specified value
Endurance (DC): "IEC 60384-2"	2000 hours: $1.25 \times U_{Rdc}$; 85 °C $1 \times U_{Rdc}$; 105 °C	
Heat storage: "IEC 60384-2"	2000 hours; 105 °C	$ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 30 \times 10^{-4}$; note 1
Resistance to soldering heat with preheating: "IEC 60384-2"	body temperature: 100 °C; bath temperature: 260 °C; dwell time: 10 s	$ \Delta C/C \leq 2\%$ $\Delta \tan \delta \leq 30 \times 10^{-4}$; note 1

Note

1. Measuring frequency 10 kHz.

Metallized polyester film capacitors**MKT 365/366/367**

MKT RADIAL EPOXY LACQUERED TYPE

PITCH 5 mm (kinked, straight and bent back leads)
PITCH 7.5 mm (kinked and straight leads)**FEATURES**

- Low-inductive wound cell of metallized (PETP) film
- Cell protected by epoxy lacquer
- Radial leads of solder-coated wire
- Resistant to solvents and rinsing liquids.

APPLICATIONS

- Blocking and coupling
- Bypass and energy reservoir.

DETAIL SPECIFICATION

For more detailed data and test requirements see "Type detail specification HQN-384-02/105".

QUICK REFERENCE DATA

DESCRIPTION	VALUE
Capacitance range (E12 series)	0.01 to 1.0 μF
Capacitance tolerance	$\pm 10\%$; $\pm 5\%$
Rated (DC) voltage	63 V; 100 V; 250 V; 400 V
Rated (AC) voltage	40 V; 63 V; 160 V; 220 V
Climatic category	55/105/56
Rated temperature	85 °C
Maximum application temperature	105 °C
Reference specification	IEC 60384-2
Performance grade	grade 1 (long life)
Materials	qualified in accordance with UL94 V-0

Metallized polyester film capacitors

MKT 365

COMPOSITION OF CATALOGUE NUMBER

TYPE AND PITCHES	
365	5.0 mm

MULTIPLIER (nF)	
0.1	2
1	3
10	4
100	5

CAPACITANCE
(numerically)

Example:
104 = 10 x 10 = 100 nF

2222 365 XX XX X

TYPE	PACKAGING	LEAD CONFIGURATION	PREFERRED TYPES				
			C-TOL	63 V	100 V	250 V	400 V
365	ammopack	kinked leads	±10%	75	85	–	–
			±5%	76	86	–	–
		bent back leads	±10%	15	25	45	55
			±5%	16	26	46	56
			ON REQUEST				
365	taped on reel	kinked leads	±10%	71	81	–	–
			±5%	72	82	–	–
		bent back leads	±10%	11	21	41	51
			±5%	12	22	42	52

Metallized polyester film capacitors

MKT 366/367

TYPE AND PITCHES	
366	5.0 and 7.5 mm
367	5.0 and 7.5 mm

MULTIPLIER (nF)	
0.1	2
1	3
10	4
100	5

CAPACITANCE
(numerically)

Example:
104 = 10 x 10 = 100 nF

2222 36. XX XX X

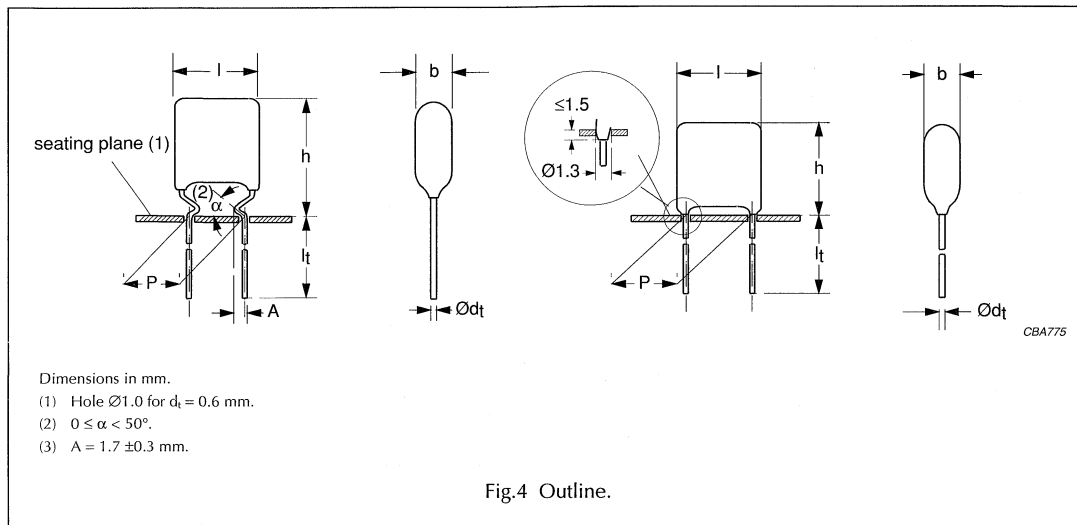
TYPE	PACKAGING	LEAD CONFIGURATION	PREFERRED TYPES				
			C-TOL	63 V	100 V	250 V	400 V
Pitch = 5.0 mm							
366	loose in box	kinked leads 4.0 mm	±10%	75	85	–	–
			±5%	76	86	–	–
		kinked leads 17.0 mm	±10%	71	81	–	–
			±5%	72	82	–	–
367	loose in box	straight leads 4.0 mm	±10%	75	85	–	–
			±5%	76	86	–	–
		straight leads 22.0 mm	±10%	71	81	–	–
			±5%	72	82	–	–
Pitch = 7.5 mm							
			ON REQUEST				
366	loose in box	kinked leads 4.0 mm	±10%	15	25	45	55
			±5%	16	26	46	56
		kinked leads 17.0 mm	±10%	11	21	41	51
			±5%	12	22	42	52
	ammopack	kinked leads	±10%	13	23	43	53
			±5%	17	27	47	57
367	loose in box	straight leads 4.0 mm	±10%	15	25	45	55
			±5%	16	26	46	56
		straight leads 22.0 mm	±10%	11	21	41	51
			±5%	12	22	42	52
	ammopack	straight leads	±10%	13	23	43	53
			±5%	17	27	47	57

Metallized polyester film capacitors

MKT 365/366/367

MKT 365/366/367 GENERAL DATA

PITCH 5 mm (kinked and straight leads)



Specific reference data for the 63 V DC capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle: $C \leq 0.47 \mu\text{F}$ $0.47 \mu\text{F} < C \leq 1.0 \mu\text{F}$	$\leq 75 \times 10^{-4}$ $\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$ $\leq 130 \times 10^{-4}$	$\leq 225 \times 10^{-4}$ --
Rated voltage pulse slope $(dU/dt)_R$ at 63 V (DC)	110 V/ μs		
R between leads, for $C \leq 0.33 \mu\text{F}$ at 10 V; 1 minute	$> 15000 \text{ M}\Omega$		
RC between leads, for $C > 0.33 \mu\text{F}$ at 10 V; 1 minute	$> 5000 \text{ s}$		
R between interconnecting leads and casing; 100 V; 1 minute	$> 30000 \text{ M}\Omega$		
Withstanding voltage DC (cut off current 10 mA); rise time 100 V/s	100 V; 1 minute		

Available 63 V DC versions

PACKAGING	DIMENSIONS	LEAD CONFIGURATION	PITCH (mm)	FIRST 9 DIGITS OF CATALOGUE NUMBER		ORDERING
				C-tol = $\pm 10\%$	C-tol = $\pm 5\%$	
Ammopack	$H = 16.0 \text{ mm};$ $P_0 = 12.7 \text{ mm}$	kinked	5	2222 365 75...	2222 365 76...	preferred
Taped on reel			5	2222 365 71...	2222 365 72...	on request
Loose in box	$l_t = 4.0 +1.0/-0.5 \text{ mm}$		5	2222 366 75...	2222 366 76...	on request
	$l_t = 17.0 \pm 4.0 \text{ mm}$		5	2222 366 71...	2222 366 72...	on request
Loose in box	$l_t = 4.0 +1.0/-0.5 \text{ mm}$	straight	5	2222 367 75...	2222 367 76...	on request
	$l_t = 22.0 \pm 4.0 \text{ mm}$		5	2222 367 71...	2222 367 72...	on request

Metallized polyester film capacitors**MKT 365/366/367** $U_{Rdc} = 63 \text{ V}; U_{Rac} = 40 \text{ V}$

Pitch 5 mm (kinked and straight leads)

C (μF)	DIMENSIONS ⁽¹⁾ $b_{\text{max}} \times h_{\text{max}} \times l_{\text{max}}$ (mm)	MASS (g)	CATALOGUE NUMBER	
			AMMOPACK	
			H = 16.0 mm; P ₀ = 12.7 mm	
			C-tol = $\pm 10\%$	C-tol = $\pm 5\%$
			catalogue number	last 5 digits
Pitch = 5.0 +0.4/-0.2 mm; d_l = 0.50 \pm0.05 mm				
0.047	4.0 \times 12.5 (7.5) \times 7.3	0.3	2222 365 75473	.. 76473
0.056			2222 365 75563	.. 76563
0.068			2222 365 75683	.. 76683
0.082			2222 365 75823	.. 76823
0.1			2222 365 75104	.. 76104
0.12			2222 365 75124	.. 76124
0.15	4.0 \times 13.0 (8.0) \times 7.3	0.3	2222 365 75154	.. 76154
0.18	4.0 \times 13.5 (8.5) \times 7.3	0.4	2222 365 75184	.. 76184
0.22	4.2 \times 13.5 (8.5) \times 7.3	0.4	2222 365 75224	.. 76224
0.27	4.5 \times 14.0 (9.0) \times 7.3	0.4	2222 365 75274	.. 76274
0.33	4.5 \times 14.5 (10.5) \times 7.3	0.4	2222 365 75334	.. 76334
0.39			2222 365 75394	.. 76394
0.47	4.5 \times 15.5 (11.5) \times 7.3	0.4	2222 365 75474	.. 76474
0.56	5.0 \times 14.0 (10.0) \times 7.3	0.4	2222 365 75564	.. 76564
0.68	5.5 \times 14.5 (10.5) \times 7.3	0.4	2222 365 75684	.. 76684
0.82	5.5 \times 15.0 (11.0) \times 7.3	0.5	2222 365 75824	.. 76824
1.0	5.5 \times 15.5 (11.5) \times 7.3	0.5	2222 365 75105	.. 76105

Note

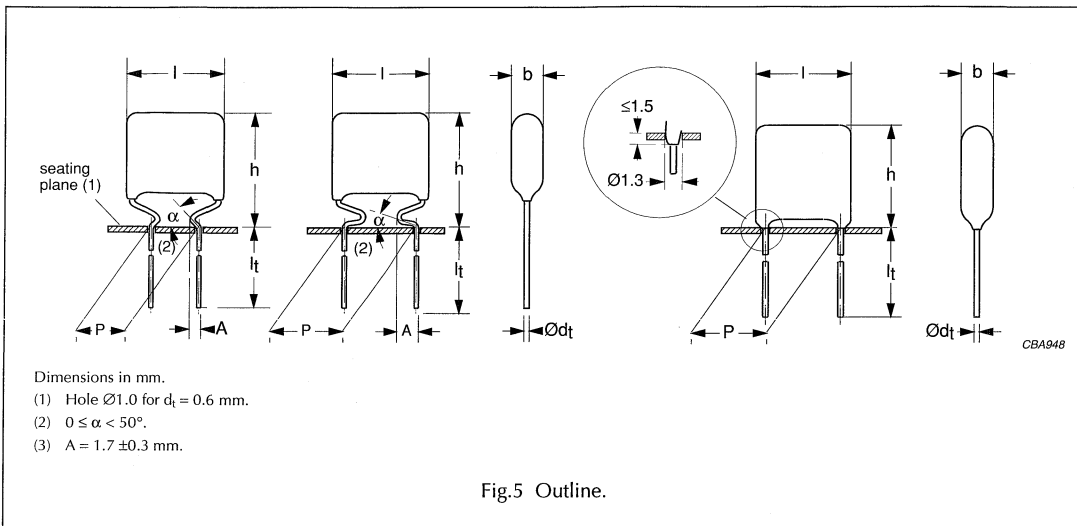
1. Dimensions in brackets for straight leads.

Metallized polyester film capacitors

MKT 365/366/367

MKT 365/366/367 GENERAL DATA

PITCH 5 mm (bent back leads)
 PITCH 7.5 mm (kinked and straight leads)



Specific reference data for the 63 V DC capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle: $C \leq 0.47 \mu\text{F}$ $0.47 \mu\text{F} < C \leq 1.0 \mu\text{F}$	$\leq 75 \times 10^{-4}$ $\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$ $\leq 130 \times 10^{-4}$	$\leq 225 \times 10^{-4}$ -
Rated voltage pulse slope $(dU/dt)_R$ at 63 V (DC)	110 V/ μs		
R between leads, for $C \leq 0.33 \mu\text{F}$ at 10 V; 1 minute	$>15000 \text{ M}\Omega$		
RC between leads, for $C > 0.33 \mu\text{F}$ at 10 V; 1 minute	$>5000 \text{ s}$		
R between interconnecting leads and casing; 100 V; 1 minute	$>30000 \text{ M}\Omega$		
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	100 V; 1 minute		

Available 63 V DC versions

PACKAGING	DIMENSIONS	LEAD CONFIGURATION	PITCH (mm)	FIRST 9 DIGITS OF CATALOGUE NUMBER		ORDERING
				C-tol = $\pm 10\%$	C-tol = $\pm 5\%$	
Ammopack	$H = 16.0 \text{ mm};$ $P_0 = 12.7 \text{ mm}$	bent back	5	2222 365 15...	2222 365 16...	preferred
Taped on reel			5	2222 365 11...	2222 365 12...	on request
Ammopack	$H = 16.0 \text{ mm}$	kinked	7.5	2222 366 13...	2222 366 17...	on request
Loose in box			$l_t = 4.0 +1.0/-0.5 \text{ mm}$	7.5	2222 366 15...	2222 366 16...
		$l_t = 17.0 \pm 4.0 \text{ mm}$	7.5	2222 366 11...	2222 366 12...	on request
Ammopack	$H = 18.5 \text{ mm}$	straight	7.5	2222 367 13...	2222 367 17...	on request
Loose in box			$l_t = 4.0 +1.0/-0.5 \text{ mm}$	7.5	2222 367 15...	2222 367 16...
		$l_t = 22.0 \pm 4.0 \text{ mm}$	7.5	2222 367 11...	2222 367 12...	on request

Metallized polyester film capacitors

MKT 365/366/367

 $U_{Rdc} = 63 \text{ V}$; $U_{Rac} = 40 \text{ V}$

Pitch 5 mm (bent back leads)

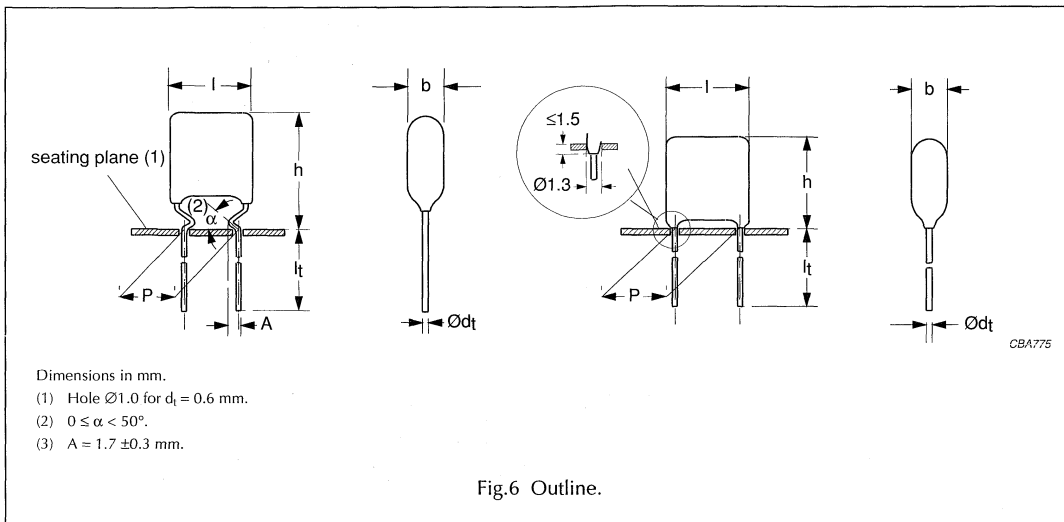
C (μF)	DIMENSIONS $b_{\max} \times h_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER	
			AMMOPACK	
			H = 16.0 mm; P ₀ = 12.7 mm	
			C-tol = $\pm 10\%$	C-tol = $\pm 5\%$
			catalogue number	last 5 digits
Pitch = 5.0 +0.4/-0.2 mm; d_t = 0.60 \pm0.06 mm				
0.12	4.0 \times 13.5 \times 10.0	0.4	2222 365 15124	.. 16124
0.15			2222 365 15154	.. 16154
0.18			2222 365 15184	.. 16184
0.22			2222 365 15224	.. 16224
0.27	4.5 \times 14.0 \times 10.0	0.5	2222 365 15274	.. 16274
0.33	5.0 \times 14.5 \times 10.0	0.6	2222 365 15334	.. 16334
0.39			2222 365 15394	.. 16394
0.47	5.5 \times 15.0 \times 10.0	0.7	2222 365 15474	.. 16474
0.56			2222 365 15564	.. 16564
0.68			2222 365 15684	.. 16684
0.82			2222 365 15824	.. 16824
1.0			2222 365 15105	.. 16105

Metallized polyester film capacitors

MKT 365/366/367

MKT 365/366/367 GENERAL DATA

PITCH 5 mm (kinked and straight leads)



Specific reference data for the 100 V DC capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle: $C \leq 0.27 \mu\text{F}$	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 225 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 100 V (DC)	110 V/ μs		
R between leads, for $C \leq 0.33 \mu\text{F}$ at 100 V; 1 minute	>15000 M Ω		
RC between leads, for $C > 0.33 \mu\text{F}$ at 100 V; 1 minute	>5000 s		
R between interconnecting leads and casing; 100 V; 1 minute	>30000 M Ω		
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	160 V; 1 minute		

Available 100 V DC versions

PACKAGING	DIMENSIONS	LEAD CONFIGURATION	PITCH (mm)	FIRST 9 DIGITS OF CATALOGUE NUMBER		ORDERING
				C-tol = $\pm 10\%$	C-tol = $\pm 5\%$	
Ammopack	H = 16.0 mm;	kinked	5	2222 365 85...	2222 365 86...	preferred
Taped on reel	$P_0 = 12.7$ mm		5	2222 365 81...	2222 365 82...	on request
Loose in box	$l_t = 4.0 +1.0/-0.5$ mm		5	2222 366 85...	2222 366 86...	on request
	$l_t = 17.0 \pm 4.0$ mm		5	2222 366 81...	2222 366 82...	on request
Loose in box	$l_t = 4.0 +1.0/-0.5$ mm	straight	5	2222 367 85...	2222 367 86...	on request
	$l_t = 22.0 \pm 4.0$ mm		5	2222 367 81...	2222 367 82...	on request

Metallized polyester film capacitors**MKT 365/366/367** $U_{Rdc} = 100 \text{ V}; U_{Rac} = 63 \text{ V}$

Pitch 5 mm (kinked and straight leads)

C (μF)	DIMENSIONS ⁽¹⁾ $b_{\max} \times h_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER	
			AMMOPACK	
			H = 16.0 mm; P ₀ = 12.7 mm	
			C-tol = $\pm 10\%$	C-tol = $\pm 5\%$
			catalogue number	last 5 digits
Pitch = 5.0 +0.4/-0.2 mm; d_t = 0.50 \pm0.05 mm				
0.01	3.7 \times 12.5 (7.5) \times 7.3	0.3	2222 365 85103	.. 86103
0.012			2222 365 85123	.. 86123
0.015			2222 365 85153	.. 86153
0.018			2222 365 85183	.. 86183
0.022			2222 365 85223	.. 86223
0.027			2222 365 85273	.. 86273
0.033			2222 365 85333	.. 86333
0.039			2222 365 85393	.. 86393
0.047	4.0 \times 12.5 (7.5) \times 7.3	0.3	2222 365 85473	.. 86473
0.056			2222 365 85563	.. 86563
0.068			2222 365 85683	.. 86683
0.082	4.0 \times 13.0 (8.0) \times 7.3	0.3	2222 365 85823	.. 86823
0.1	4.0 \times 13.5 (8.5) \times 7.3	0.4	2222 365 85104	.. 86104
0.12			2222 365 85124	.. 86124
0.15			2222 365 85154	.. 86154
0.18			2222 365 85184	.. 86184
0.22	4.2 \times 13.5 (8.5) \times 7.3	0.4	2222 365 85224	.. 86224
0.27	4.5 \times 14.0 (9.0) \times 7.3	0.4	2222 365 85274	.. 86274

Note

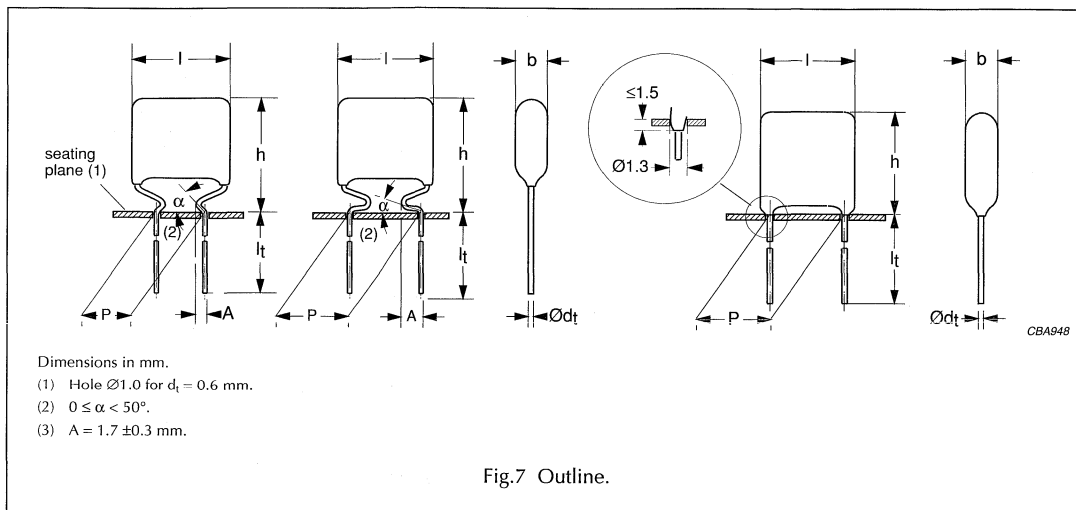
- Dimensions in brackets for straight leads.

Metallized polyester film capacitors

MKT 365/366/367

MKT 365/366/367 GENERAL DATA

PITCH 5 mm (bent back leads)
 PITCH 7.5 mm (kinked and straight leads)



Specific reference data for the 100 V DC capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle: $C \leq 0.47 \mu\text{F}$	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 225 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 100 V (DC)	110 V/ μs		
R between leads, for $C \leq 0.33 \mu\text{F}$ at 100 V; 1 minute	$> 15000 \text{ M}\Omega$		
RC between leads, for $C > 0.33 \mu\text{F}$ at 100 V; 1 minute	$> 5000 \text{ s}$		
R between interconnecting leads and casing; 100 V; 1 minute	$> 30000 \text{ M}\Omega$		
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	160 V; 1 minute		

Available 100 V DC versions

PACKAGING	DIMENSIONS	LEAD CONFIGURATION	PITCH (mm)	FIRST 9 DIGITS OF CATALOGUE NUMBER		ORDERING
				C-tol = $\pm 10\%$	C-tol = $\pm 5\%$	
Ammopack Taped on reel	H = 16.0 mm; P ₀ = 12.7 mm	bent back	5	2222 365 25...	2222 365 26...	preferred
			5	2222 365 21...	2222 365 22...	on request
Ammopack	H = 16.0 mm	kinked	7.5	2222 366 23...	2222 366 27...	on request
			7.5	2222 366 25...	2222 366 26...	on request
Loose in box	$l_t = 4.0 + 1.0 / -0.5$ mm	kinked	7.5	2222 366 21...	2222 366 22...	on request
	$l_t = 17.0 \pm 4.0$ mm		7.5	2222 367 23...	2222 367 27...	on request
Ammopack	H = 18.5 mm	straight	7.5	2222 367 25...	2222 367 26...	on request
Loose in box	$l_t = 4.0 + 1.0 / -0.5$ mm		7.5	2222 367 21...	2222 367 22...	on request
	$l_t = 22.0 \pm 4.0$ mm		7.5	2222 367 21...	2222 367 22...	on request

Metallized polyester film capacitors**MKT 365/366/367** $U_{Rdc} = 100 \text{ V}; U_{Rac} = 63 \text{ V}$

Pitch 5 mm (bent back leads)

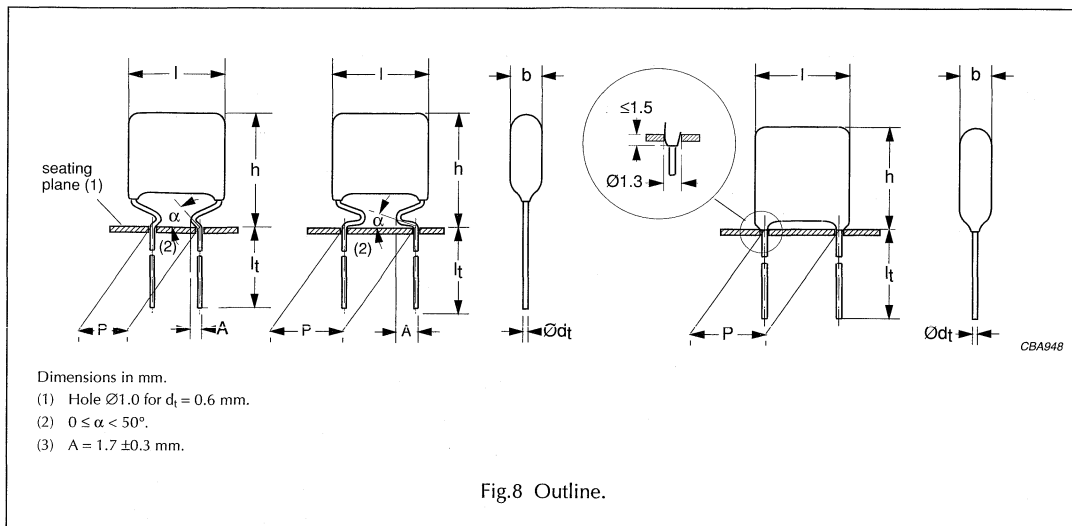
C (μF)	DIMENSIONS $b_{\max} \times h_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER	
			AMMOPACK	
			H = 16.0 mm; P ₀ = 12.7 mm	
			C-tol = $\pm 10\%$	C-tol = $\pm 5\%$
			catalogue number	last 5 digits
Pitch = 5.0 +0.4/-0.2 mm; d_t = 0.60 \pm0.06 mm				
0.039	4.0 \times 13.5 \times 10.0	0.4	2222 365 25393	.. 26393
0.047			2222 365 25473	.. 26473
0.056			2222 365 25563	.. 26563
0.068			2222 365 25683	.. 26683
0.082			2222 365 25823	.. 26823
0.1			2222 365 25104	.. 26104
0.12	4.5 \times 14.0 \times 10.5	0.5	2222 365 25124	.. 26124
0.15	5.0 \times 14.5 \times 10.5	0.6	2222 365 25154	.. 26154
0.18			2222 365 25184	.. 26184
0.22	5.5 \times 15.0 \times 10.5	0.7	2222 365 25224	.. 26224
0.27	6.0 \times 15.5 \times 10.5	0.7	2222 365 25274	.. 26274
0.33			2222 365 25334	.. 26334
0.39			2222 365 25394	.. 26394
0.47			2222 365 25474	.. 26474

Metallized polyester film capacitors

MKT 365/366/367

MKT 365/366/367 GENERAL DATA

PITCH 5 mm (bent back leads)
 PITCH 7.5 mm (kinked and straight leads)



Specific reference data for the 250 V DC capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle $C \leq 0.15 \mu\text{F}$	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 225 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 250 V (DC)	130 V/ μs		
R between leads, for $C \leq 0.33 \mu\text{F}$ at 100 V; 1 minute	$> 30000 \text{ M}\Omega$		
R between interconnected leads and casing; 100 V; 1 minute	$> 30000 \text{ M}\Omega$		
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	400 V; 1 minute		

Available 250 V DC versions

PACKAGING	DIMENSIONS	LEAD CONFIGURATION	PITCH (mm)	FIRST 9 DIGITS OF CATALOGUE NUMBER		ORDERING
				C-tol = $\pm 10\%$	C-tol = $\pm 5\%$	
Ammopack	$H = 16.0$ mm; $P_0 = 12.7$ mm	bent back	5	2222 365 45...	2222 365 46...	preferred
Taped on reel			5	2222 365 41...	2222 365 42...	on request
Ammopack	$H = 16.0$ mm	kinked	7.5	2222 366 43...	2222 366 47...	on request
Loose in box	$l_t = 4.0 +1.0/-0.5$ mm		7.5	2222 366 45...	2222 366 46...	on request
	$l_t = 17.0 \pm 4.0$ mm	7.5	2222 366 41...	2222 366 42...	on request	
Ammopack	$H = 18.5$ mm	straight	7.5	2222 367 43...	2222 367 47...	on request
Loose in box	$l_t = 4.0 +1.0/-0.5$ mm		7.5	2222 367 45...	2222 367 46...	on request
	$l_t = 22.0 \pm 4.0$ mm		7.5	2222 367 41...	2222 367 42...	on request

Metallized polyester film capacitors

MKT 365/366/367

 $U_{Rdc} = 250 \text{ V}$; $U_{Rac} = 160 \text{ V}$

Pitch 5 mm (bent back leads)

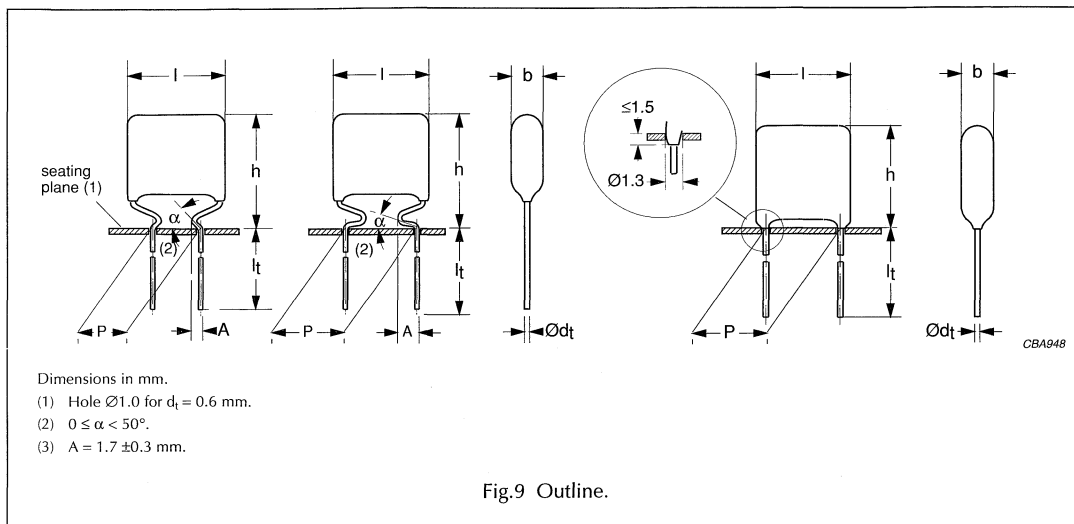
C (μF)	DIMENSIONS $b_{\max} \times h_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER	
			AMMOPACK	
			H = 16.0 mm; P ₀ = 12.7 mm	
			C-tol = $\pm 10\%$	C-tol = $\pm 5\%$
			catalogue number	last 5 digits
Pitch = 5.0 +0.4/-0.2 mm; d_t = 0.60 \pm0.06 mm				
0.018	4.0 \times 13.5 \times 10.0	0.4	2222 365 45183	.. 46183
0.022			2222 365 45223	.. 46223
0.027			2222 365 45273	.. 46273
0.033			2222 365 45333	.. 46333
0.039			2222 365 45393	.. 46393
0.047			2222 365 45473	.. 46473
0.056			2222 365 45563	.. 46563
0.068	4.5 \times 14.0 \times 10.0	0.5	2222 365 45683	.. 46683
0.082	4.5 \times 13.0 \times 10.0	0.5	2222 365 45823	.. 46823
0.1	5.0 \times 13.5 \times 10.0	0.6	2222 365 45104	.. 46104
0.12	5.5 \times 14.0 \times 10.0	0.6	2222 365 45124	.. 46124
0.15	5.5 \times 15.5 \times 10.0	0.7	2222 365 45154	.. 46154

Metallized polyester film capacitors

MKT 365/366/367

MKT 365/366/367 GENERAL DATA

PITCH 5 mm (bent back leads)



Specific reference data for the 400 V DC capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle: $C \leq 0.056 \mu\text{F}$	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 225 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 400 V (DC)	170 V/ μs		
R between leads, for $C \leq 0.33 \mu\text{F}$ at 100 V; 1 minute	$> 30000 \text{ M}\Omega$		
R between interconnected leads and casing; 100 V; 1 minute	$> 30000 \text{ M}\Omega$		
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	640 V; 1 minute		

Available 400 V DC versions

PACKAGING	DIMENSIONS	LEAD CONFIGURATION	PITCH (mm)	FIRST 9 DIGITS OF CATALOGUE NUMBER		ORDERING
				C-tol = $\pm 10\%$	C-tol = $\pm 5\%$	
Ammopack	$H = 16.0$ mm; $P_0 = 12.7$ mm	bent back	5	2222 365 55...	2222 365 56...	preferred
Taped on reel			5	2222 365 51...	2222 365 52...	on request
Ammopack	$H = 16.0$ mm	kinked	7.5	2222 366 53...	2222 366 57...	on request
Loose in box	$l_t = 4.0 +1.0/-0.5$ mm		7.5	2222 366 55...	2222 366 56...	on request
	$l_t = 17.0 \pm 4.0$ mm	7.5	2222 366 51...	2222 366 52...	on request	
Ammopack	$H = 18.5$ mm	straight	7.5	2222 367 53...	2222 367 57...	on request
Loose in box	$l_t = 4.0 +1.0/-0.5$ mm		7.5	2222 367 55...	2222 367 56...	on request
	$l_t = 22.0 \pm 4.0$ mm		7.5	2222 367 51...	2222 367 52...	on request

Metallized polyester film capacitors

MKT 365/366/367

 $U_{Rdc} = 400 \text{ V}$; $U_{Rac} = 220 \text{ V}$

Pitch 5 mm (bent back leads)

C (μF)	DIMENSIONS $b_{\text{max}} \times h_{\text{max}} \times l_{\text{max}}$ (mm)	MASS (g)	CATALOGUE NUMBER	
			AMMOPACK	
			H = 16.0 mm; P ₀ = 12.7 mm	
			C-tol = $\pm 10\%$	C-tol = $\pm 5\%$
			catalogue number	last 5 digits
Pitch = 5.0 +0.4/-0.2 mm; d_t = 0.60 \pm0.06 mm				
0.0033	4.0 \times 13.5 \times 10.0	0.4	2222 365 55332	.. 56332
0.0039			2222 365 55392	.. 56392
0.0047			2222 365 55472	.. 56472
0.0056			2222 365 55562	.. 56562
0.0068			2222 365 55682	.. 56682
0.0082			2222 365 55822	.. 56822
0.01			2222 365 55103	.. 56103
0.012			2222 365 55123	.. 56123
0.015			2222 365 55153	.. 56153
0.018	4.5 \times 13.0 \times 10.0	0.6	2222 365 55183	.. 56183
0.022	5.0 \times 13.5 \times 10.0	0.7	2222 365 55223	.. 56223
0.027	4.0 \times 12.5 \times 10.0	0.4	2222 365 55273	.. 56273
0.033	4.5 \times 13.0 \times 10.0	0.5	2222 365 55333	.. 56333
0.039	5.0 \times 13.5 \times 10.0	0.5	2222 365 55393	.. 56393
0.047	5.0 \times 13.5 \times 10.0	0.6	2222 365 55473	.. 56473
0.056	5.5 \times 14.0 \times 10.0	0.7	2222 365 55563	.. 56563

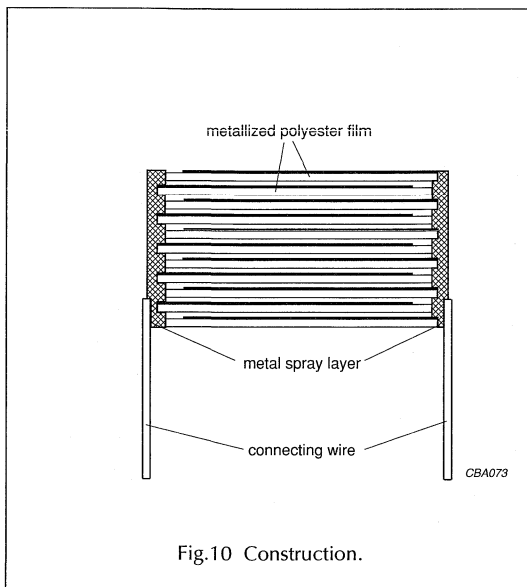
Metallized polyester film capacitors

MKT 365/366/367

CONSTRUCTION

Description

- Low-inductive wound cell of metallized polyethylene terephthalate 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 tape specifications refer to this handbook, chapter "Packaging information".

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.

Storage temperature

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

RATINGS AND CHARACTERISTICS REFERENCE CONDITIONS

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 $50 \pm 2\%$.

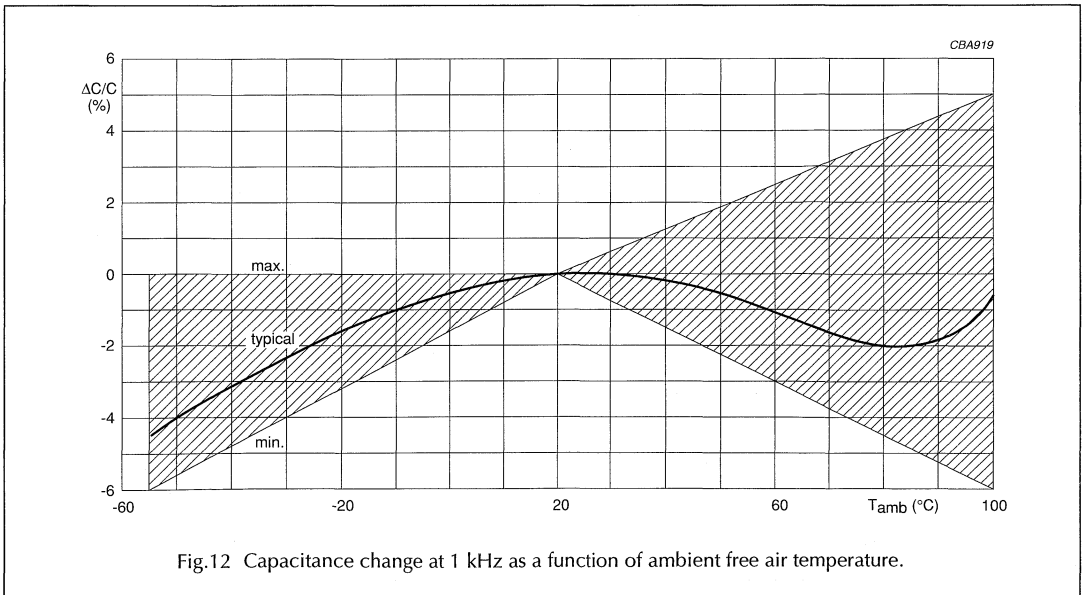
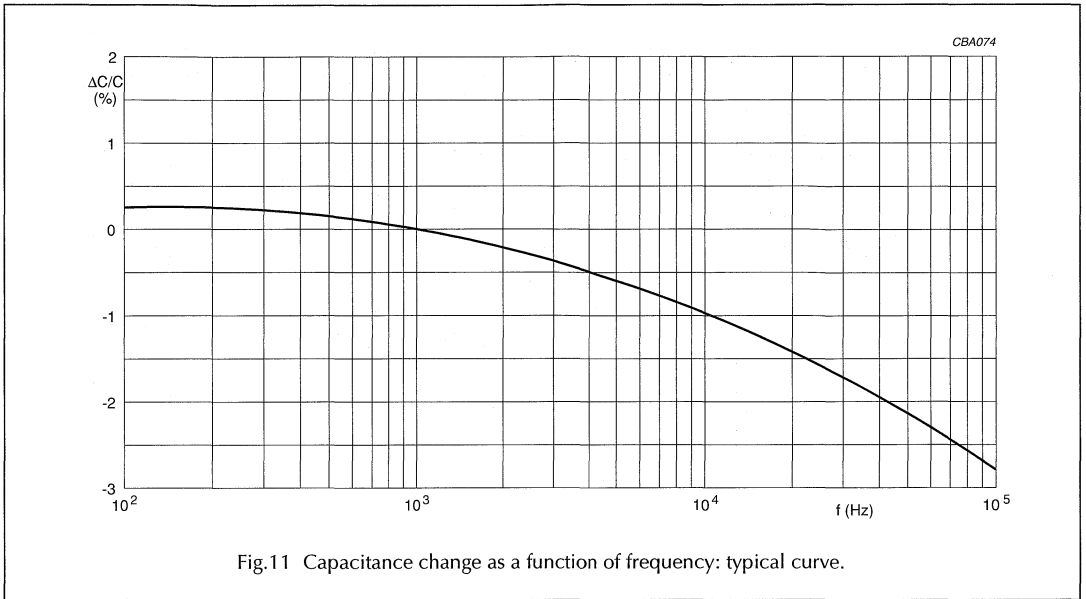
For reference testing, a conditioning period shall be applied over 96 ± 4 hours by heating the products in a circulating air oven at the rated temperature and a relative humidity not exceeding 20%.

Metallized polyester film capacitors

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CHARACTERISTICS

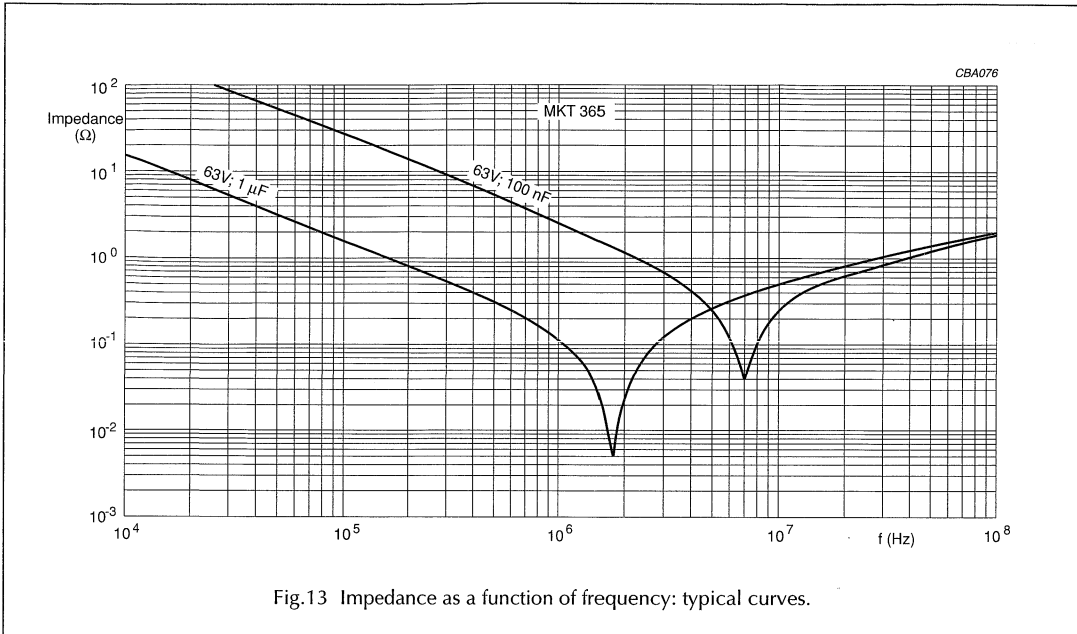
Capacitance



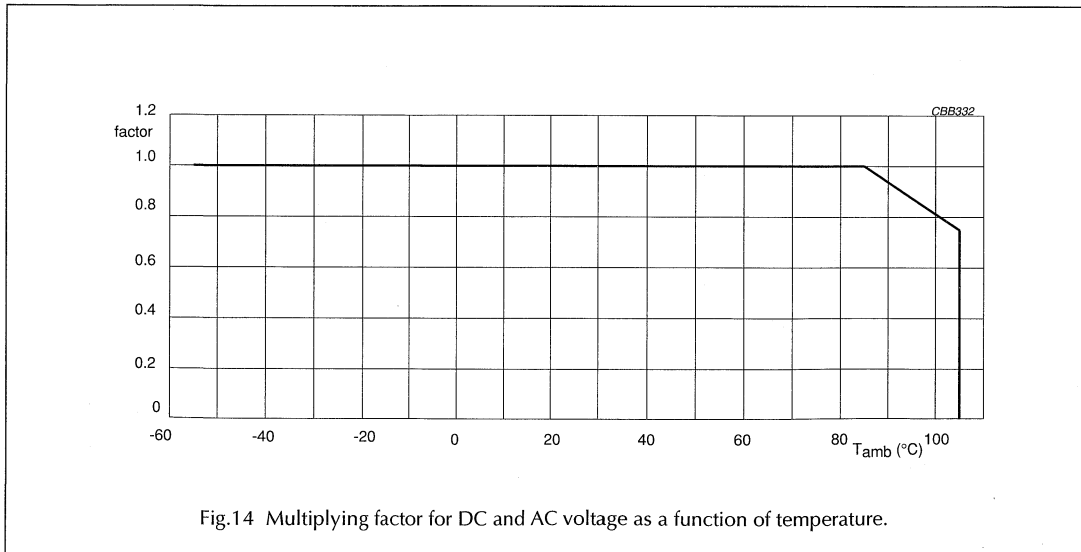
Metallized polyester film capacitors

MKT 365/366/367

Impedance



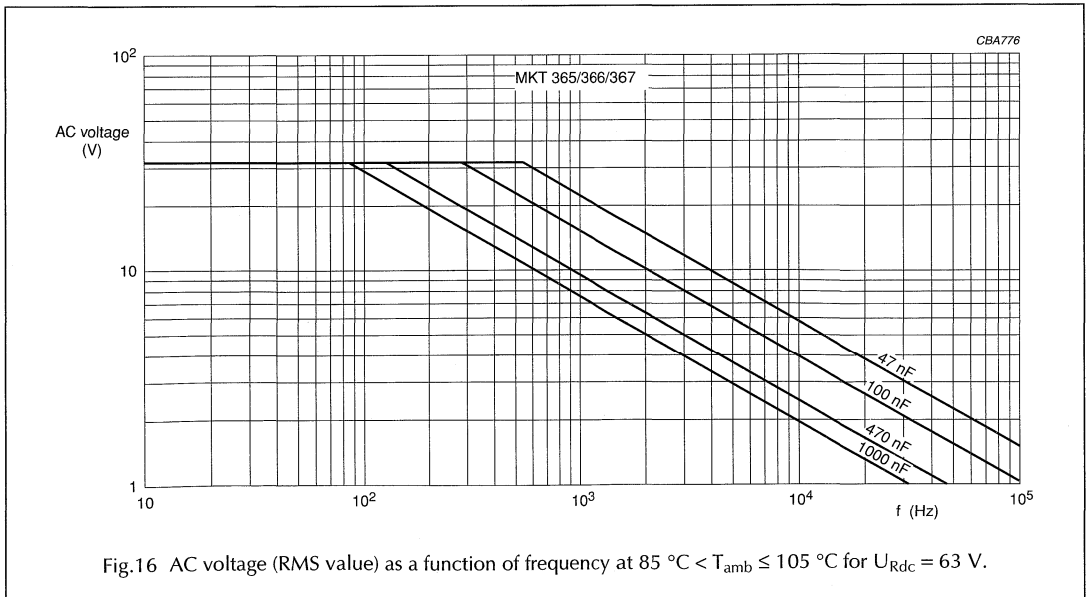
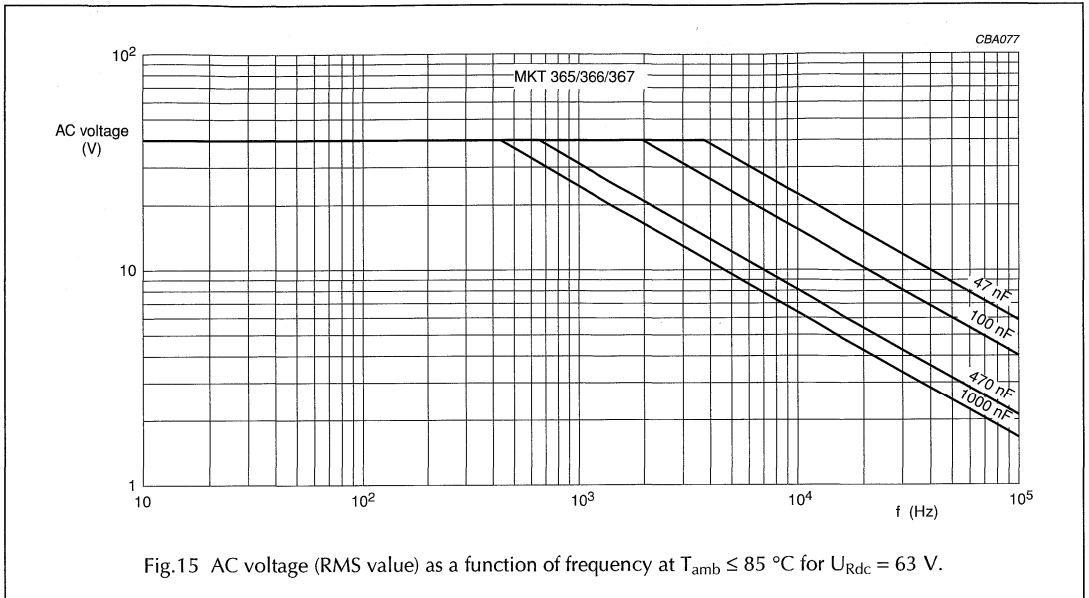
Maximum DC and AC voltage as a function of temperature



Metallized polyester film capacitors

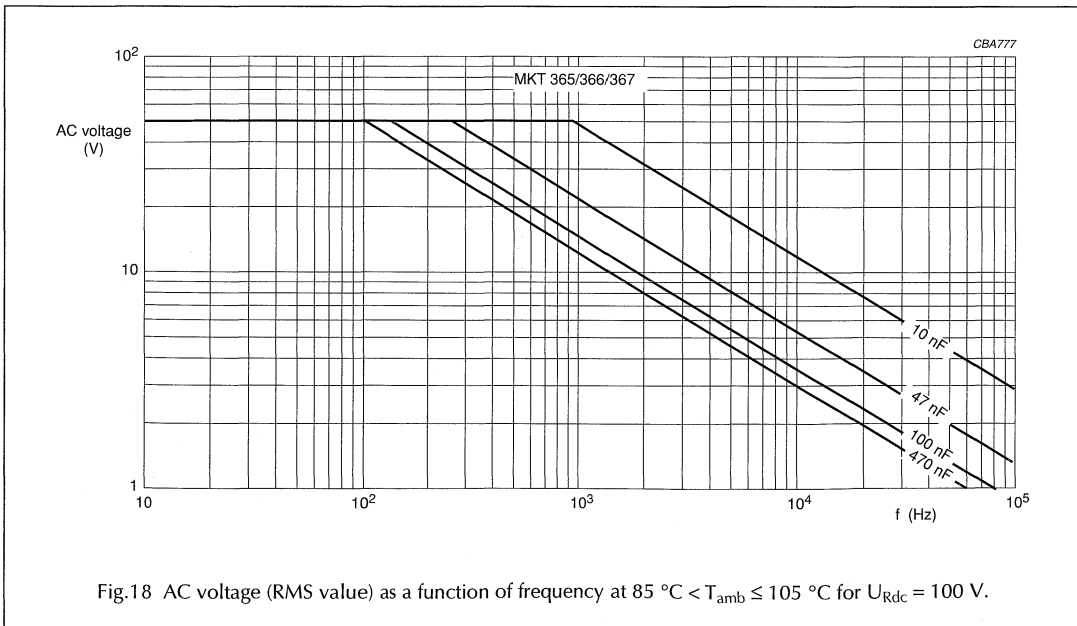
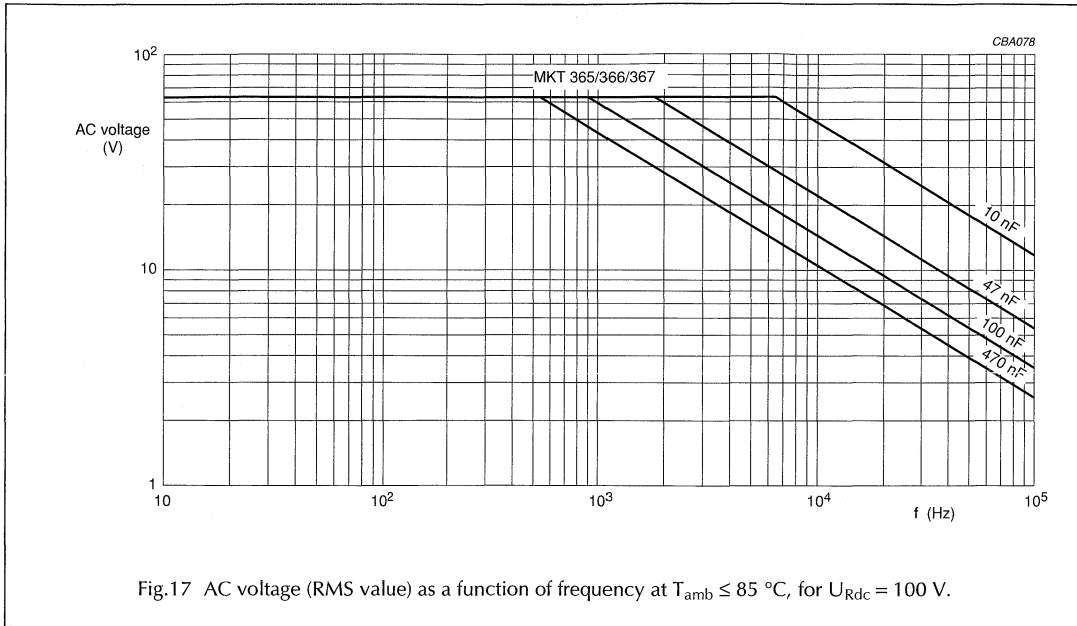
MKT 365/366/367

Maximum RMS voltage (sinewave) as a function of frequency



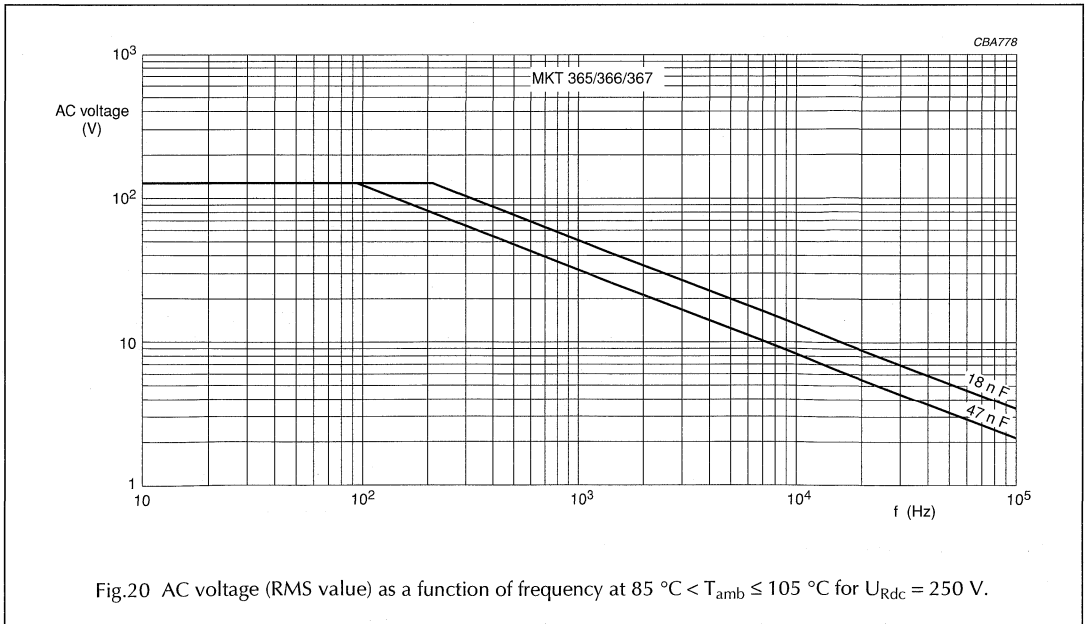
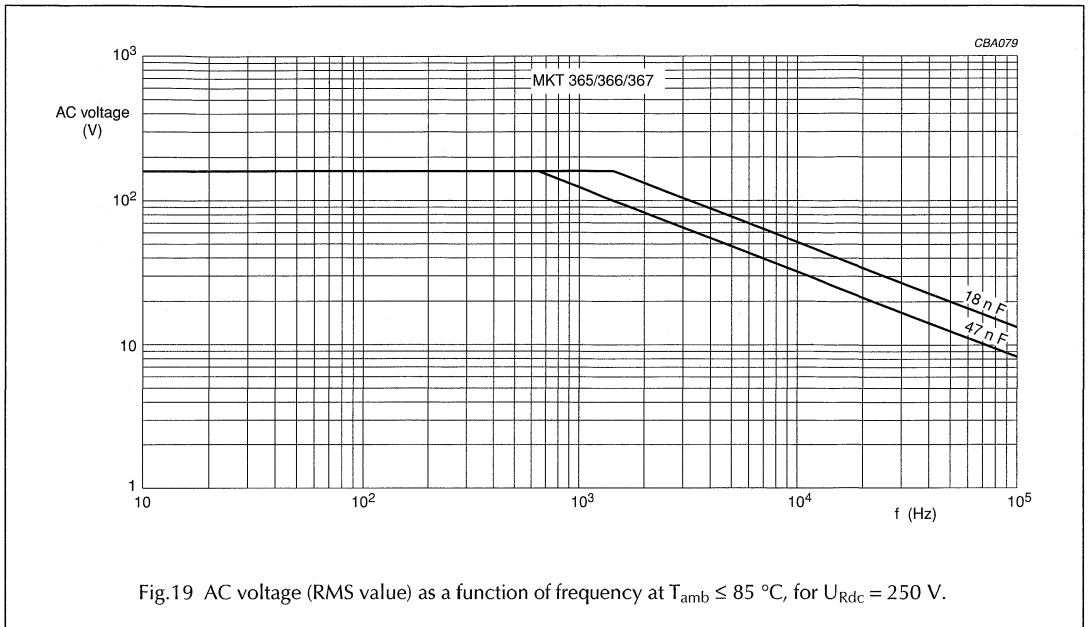
Metallized polyester film capacitors

MKT 365/366/367



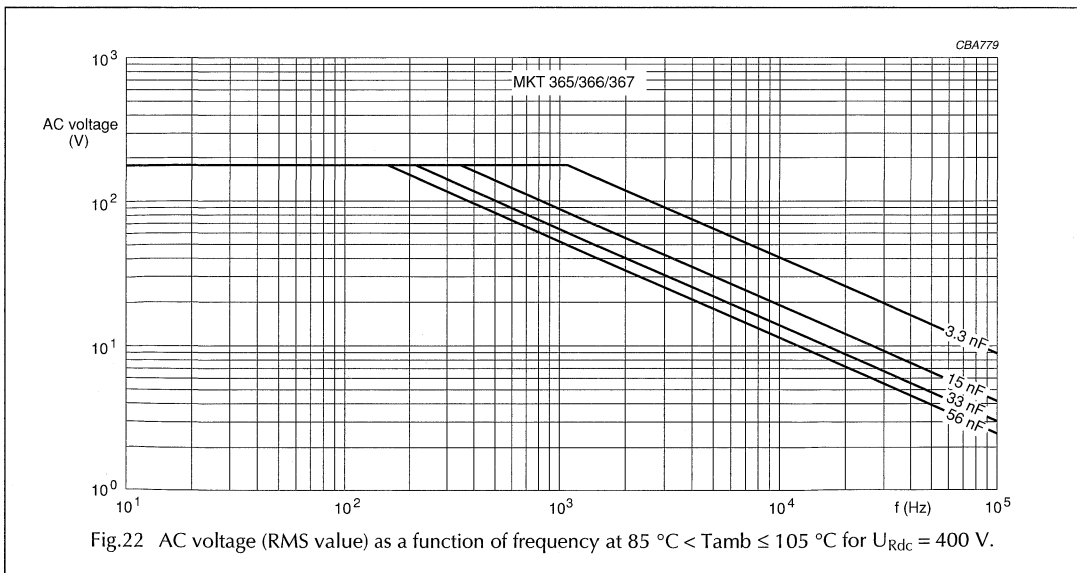
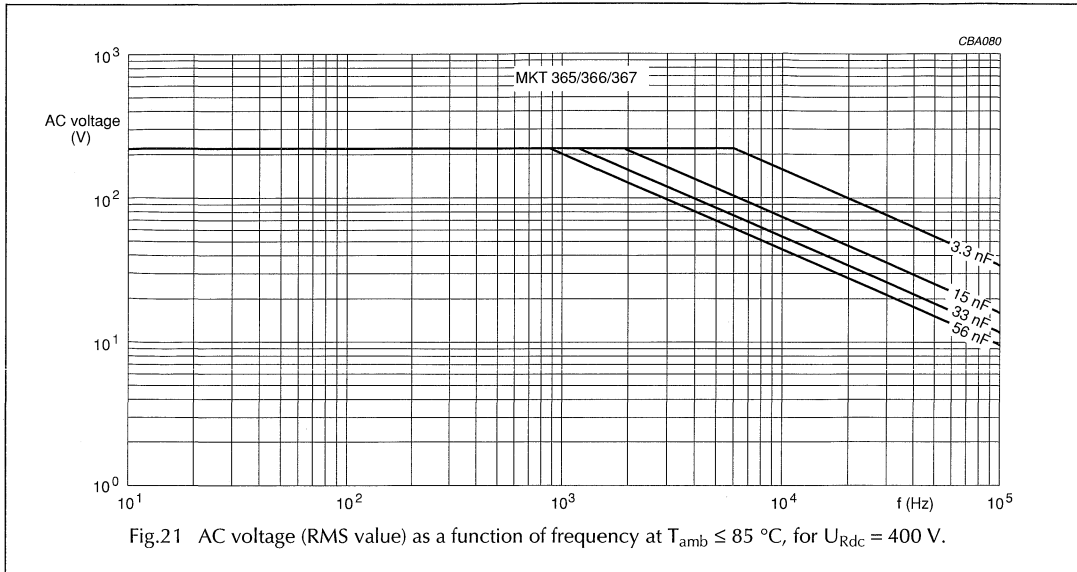
Metallized polyester film capacitors

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Maximum RMS current (sinewave) as a function of frequency

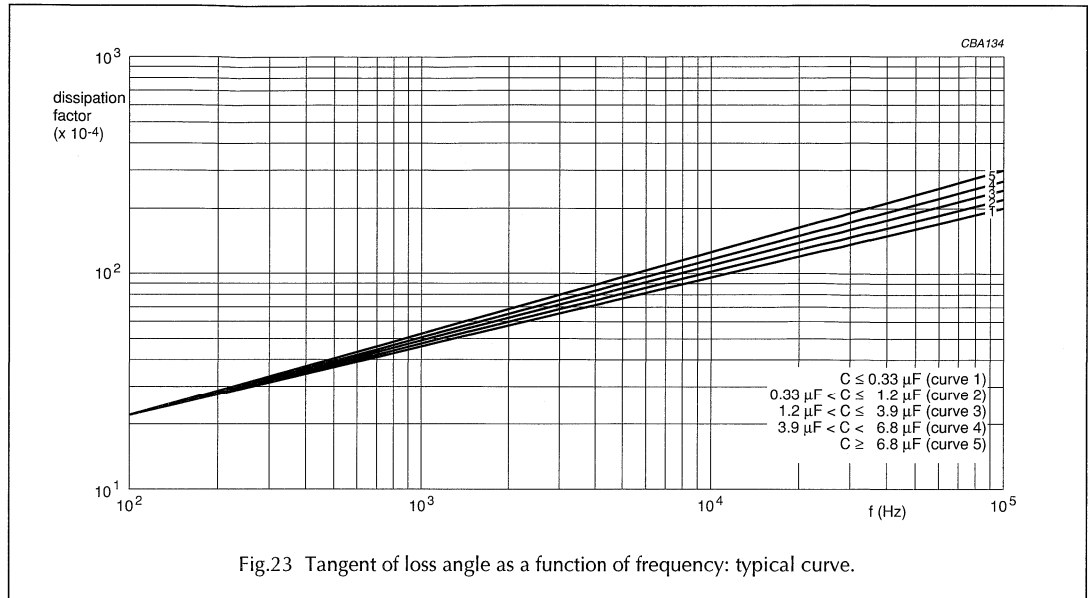
The maximum RMS current is defined by $I_{ac} = \omega \times C \times U_{ac}$.

U_{ac} is the maximum AC voltage depending on the ambient temperature in Figs 15 to 22.

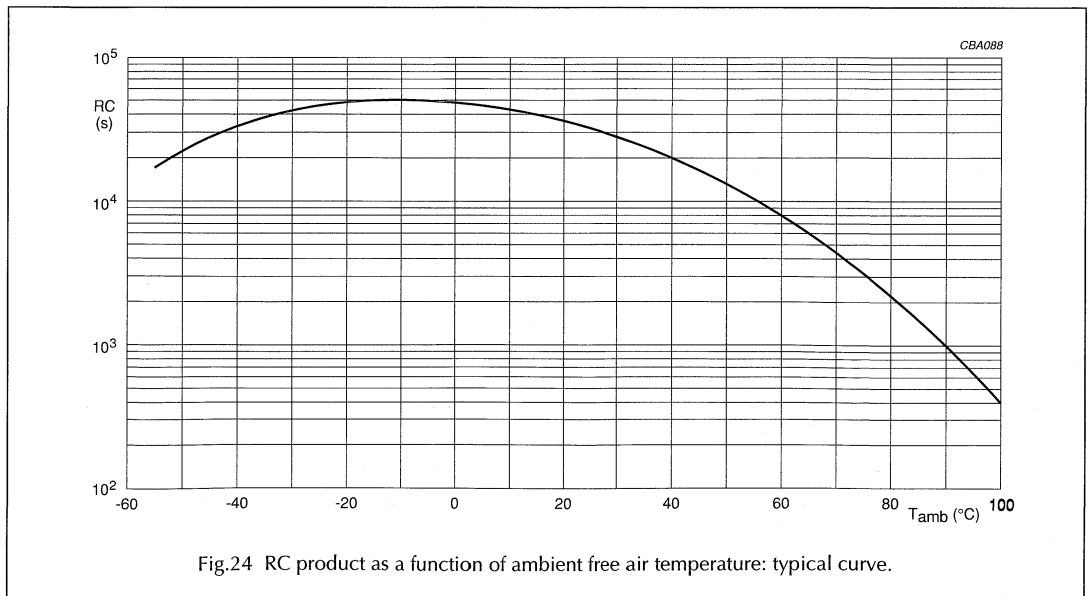
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Tangent of loss angle



Insulation resistance



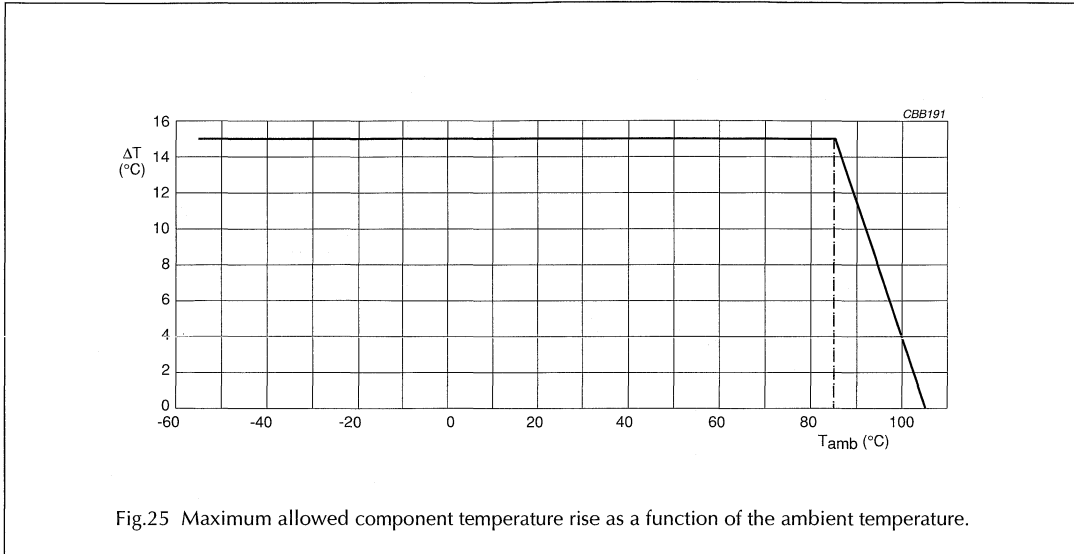
Metallized polyester film capacitors**MKT 365/366/367****Maximum allowed component temperature rise (ΔT) as a function of the ambient temperature (T_{amb})**

Fig.25 Maximum allowed component temperature rise as a function of the ambient temperature.

Heat conductivity (G) as a function of pitch and capacitor body thickness in mW/°C

Table 1 Heat conductivity

b_{max} (mm)	ORIGINAL PITCH (mm)	
	5	7.5
3.5	1.5	3.0
4.0	2.0	3.5
4.5	2.5	3.5
5.0	2.5	4.0
5.5	3.0	4.0
6.0	3.5	4.5
6.5	–	5.0

Power dissipation and maximum component temperature rise

The power dissipation must be limited in order not to exceed the maximum allowed component temperature rise as a function of the free air ambient temperature.

The power dissipation can be calculated according chapter "Introduction", section "Maximum power dissipation".

The component temperature rise (ΔT) can be measured (see section "Measuring the component temperature" for more details) or calculated by $\Delta T = P/G$:

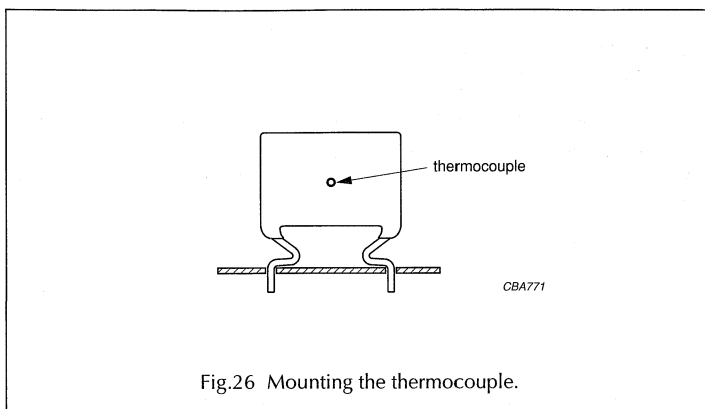
- ΔT = component temperature rise (°C).
- P = power dissipation of the component (mW).
- G = heat conductivity of the component (mW/°C).

Metallized polyester film capacitors

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Measuring the component temperature

A thermocouple must be attached to the capacitor body as in Fig.26.



The temperature is measured in unloaded (T_{amb}) and maximum loaded condition (T_c).

The temperature rise is given by $\Delta T = T_c - T_{amb}$.

To avoid radiation or convection, the capacitor should be tested in a wind-free box.

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Application note and limiting conditions

These capacitors are not suitable for mains applications as across-the-line capacitors without additional protection, as described hereunder. These mains applications are strictly regulated in safety standards and therefore electromagnetic interference suppression capacitors conforming the standards must be used.

To select the capacitor for a certain application, the following 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 the maximum U_{p-p} to avoid the ionisation inception level.
3. The voltage pulse slope (dU/dt) shall not exceed the rated voltage pulse slope in an RC-circuit at rated voltage and without ringing. If the pulse voltage is lower than the rated DC voltage, the rated voltage pulse slope may be multiplied by U_{Rdc} and divided by the applied voltage.

For all other pulses following equation must be fulfilled:

$$2 \times \int_0^T \left(\frac{dU}{dt} \right)^2 \times dt < U_{Rdc} \times \left(\frac{dU}{dt} \right)_{rated}$$

T is the pulse duration.

The rated voltage pulse slope is valid for ambient temperatures up to 85 °C. For higher temperatures a derating factor of 3% per K shall be applied.

4. The maximum component surface temperature rise must be lower than the limits in Fig.25.
5. Since in circuits used at voltages over 280 V peak-to-peak the risk for an intrinsically active flammability after a capacitor breakdown (short circuit) increases, it is recommended that the power to the component is limited to 100 times the values mentioned in Table 1 "Heat conductivity".
6. When using these capacitors as across-the-line capacitor in the input filter for mains applications or as series connected with an impedance to the mains the applicant must guarantee that following conditions are fulfilled in any case (spikes and surge voltages from the mains included).

VOLTAGE CONDITIONS FOR 6 ABOVE

ALLOWED VOLTAGES	$T_{amb} \leq 85 \text{ °C}$	$85 \text{ °C} < T_{amb} \leq 105 \text{ °C}$
Maximum continuous RMS voltage	U_{Rac}	$0.8 \times U_{Rac}$
Maximum temporary RMS -overvoltage (<24 hours)	$1.25 \times U_{Rac}$	U_{Rac}
Maximum peak voltage (V_{o-p}) (<2 s)	$1.6 \times U_{Rdc}$	$1.3 \times U_{Rdc}$

Metallized polyester film capacitors

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Example

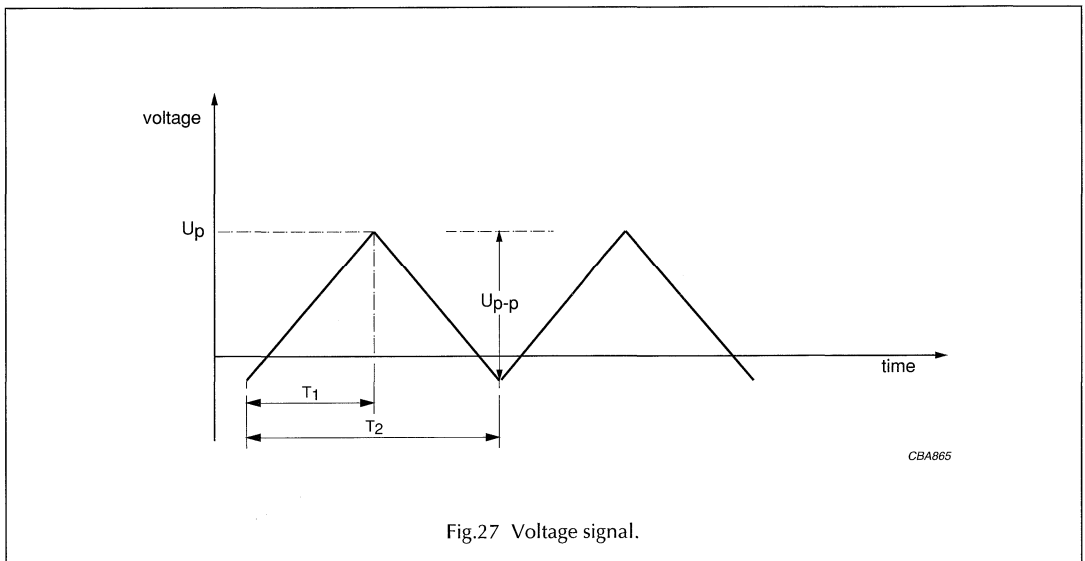
$C = 330 \text{ nF}$ - 63 V used for the voltage signal shown in Fig.27.

$$U_{p-p} = 40 \text{ V}; U_p = 35 \text{ V}; T_1 = 100 \mu\text{s}; T_2 = 200 \mu\text{s}.$$

The ambient temperature is 35 °C.

Checking the conditions:

1. The peak voltage $U_p = 35 \text{ V}$ is lower than 63 V (DC).
2. The peak-to-peak voltage 40 V is lower than $2 \times \sqrt{2} \times 40 \text{ V(AC)} = 113 U_{p-p}$.
3. The voltage pulse slope $dU/dt = 40 \text{ V}/100\mu\text{s} = 0.4 \text{ V}/\mu\text{s}$.
This is lower than 110 V/ μs (see specific reference data for each version).
4. The dissipated power is 16.2 mW as calculated with Fourier terms.
The temperature rise for $b_{\text{max}} = 4.5 \text{ mm}$ and pitch = 5 mm will be $\frac{16.2 \text{ mW}}{2.5 \text{ mW}/^\circ\text{C}} = 6.5 \text{ }^\circ\text{C}$.
This is lower than 15 °C temperature rise at 35 °C; see Fig.25.
5. Not applicable.
6. Not applicable.



Metallized polyester film capacitors

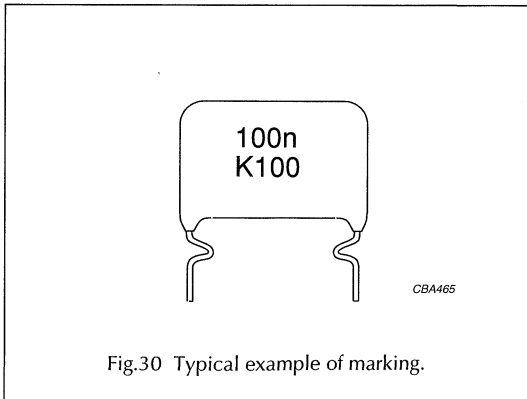
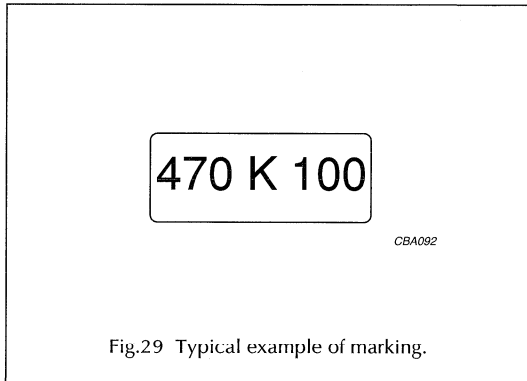
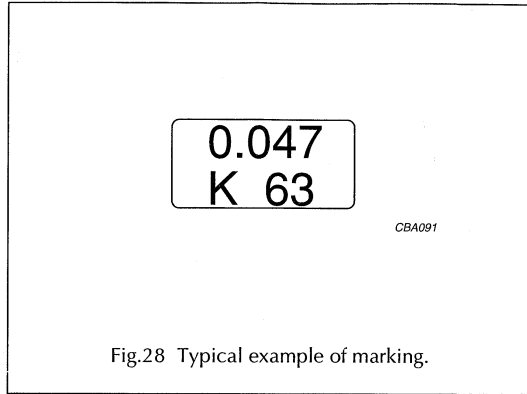
MKT 365/366/367

MARKING

Product marking

The capacitors are marked on the top or the side (for typical examples: see Figs 28 to 30), containing the following information:

1. Rated capacitance code in nF, μ F or accordance with "IEC 60062"
2. Tolerance on rated capacitance: K = $\pm 10\%$; J = $\pm 5\%$
3. Rated (DC) voltage.



Metallized polyester film capacitors**MKT 365/366/367****QUICK REFERENCE TEST REQUIREMENTS**

TEST	PROCEDURE (quick reference)	REQUIREMENTS
Robustness of leads		
Tensile strength: "IEC 60068-2-21"	load 10 N; 10 s	no visible damage legible marking $ \Delta C/C \leq 2\%$ $\Delta \tan \delta \leq 30 \times 10^{-4}$; note 1
Bending: "IEC 60068-2-21"	load 5 N; $4 \times 90^\circ$	
Resistance to soldering heat: "IEC 60068-2-20"	solder bath: 260 °C; 10 s	
Component solvent resistance	isopropyl alcohol; 23 °C; 5 minutes	
Robustness of component		
Vibration: "IEC 60068-2-6"	10 to 55 Hz; amplitude 0.75 mm or acceleration 98 m/s ² ; 6 hours	$ \Delta C/C \leq 3\%$
Shock: "IEC 60068-2-27"	half sinewave; 490 m/s ² ; 11 ms	$\Delta \tan \delta \leq 30 \times 10^{-4}$; note 1
Climatic sequence		
Dry heat: "IEC 60068-2-2"	16 hours; 105 °C	$ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 50 \times 10^{-4}$; note 1 $R_{ins} \geq 50\%$ of specified value
Damp heat cyclic, first cycle: "IEC 60068-2-30":		
Cold: "IEC 60068-2-1"	2 hours; -55 °C	
Damp heat, remaining cycles: "IEC 60068-2-30"		
Other applicable tests		
Damp heat steady state: "IEC 60068-2-3"	56 days; 40 °C; 90 to 95% RH	$ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 50 \times 10^{-4}$; note 1 $R_{ins} \geq 50\%$ of specified value
Endurance (DC): "IEC 60384-2"	2000 hours: $1.25 \times U_{Rdc}$; 85 °C $1 \times U_{Rdc}$; 105 °C	$ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 30 \times 10^{-4}$; note 1 $R_{ins} \geq 50\%$ of specified value
Heat storage: "IEC 60384-2"	2000 hours; 105 °C	$ \Delta C/C \leq 3\%$ $\Delta \tan \delta \leq 30 \times 10^{-4}$; note 1
Resistance to soldering heat with preheating: "IEC 60384-2"	body temperature: 100 °C; bath temperature: 260 °C; dwell time: 5 s	$ \Delta C/C \leq 2\%$ $\Delta \tan \delta \leq 30 \times 10^{-4}$; note 1

Note

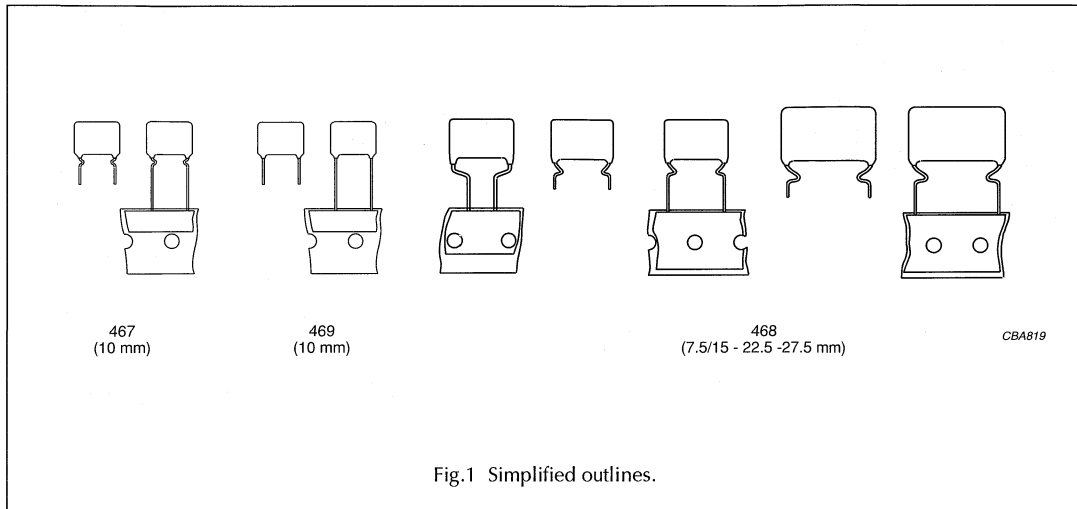
1. Measuring frequency 100 kHz for $C \leq 470$ nF and 10 kHz for $C > 470$ nF.

Metallized polyester film capacitors

**MKT 467/468/469
MKT/MKT 468**

MKT RADIAL EPOXY LACQUERED TYPE

PITCH 10/15/22.5/27.5 mm
PITCH 7.5 (bent back leads)



FEATURES

- Low-inductive wound cell of metallized (PETP) film
- Cell protected by epoxy lacquer
- Radial leads of solder-coated wire
- Withstands solvents and rinsing liquids

APPLICATIONS

- Blocking and coupling
- Bypass and energy reservoir.

DETAIL SPECIFICATION

For more detailed data and test requirements see "Type detail specification HQN-384-02/102".

QUICK REFERENCE DATA

DESCRIPTION	VALUE
Capacitance range (E12 series)	0.01 to 10 µF
Capacitance tolerance	±10%; ±5%
Rated (DC) voltage	100 V; 250 V; 400 V; 630 V; 1000 V
Rated (AC) voltage	63 V; 160 V; 200 V; 250 V; 400 V
Climatic category	55/105/56
Rated temperature	85 °C
Maximum application temperature	105 °C
Reference specifications	IEC 60384-2
Performance grade	grade 1 (long life)
Materials	qualified in accordance with UL94 V-0

Metalized polyester film capacitors

MKT 467/468/469 MKT/MKT 468

COMPOSITION OF CATALOGUE NUMBER

TYPE AND PITCHES	
467	10.0 mm
468	15/7.5 mm
	15.0 mm
	22.5 mm
	27.5 mm
469	10.0 mm

CAPACITANCE
(numerically)

MULTIPLIER (nF)	
0.1	2
1	3
10	4
100	5

Example:
104 = 10 x 10 = 100 nF

2222 46. XX XX X

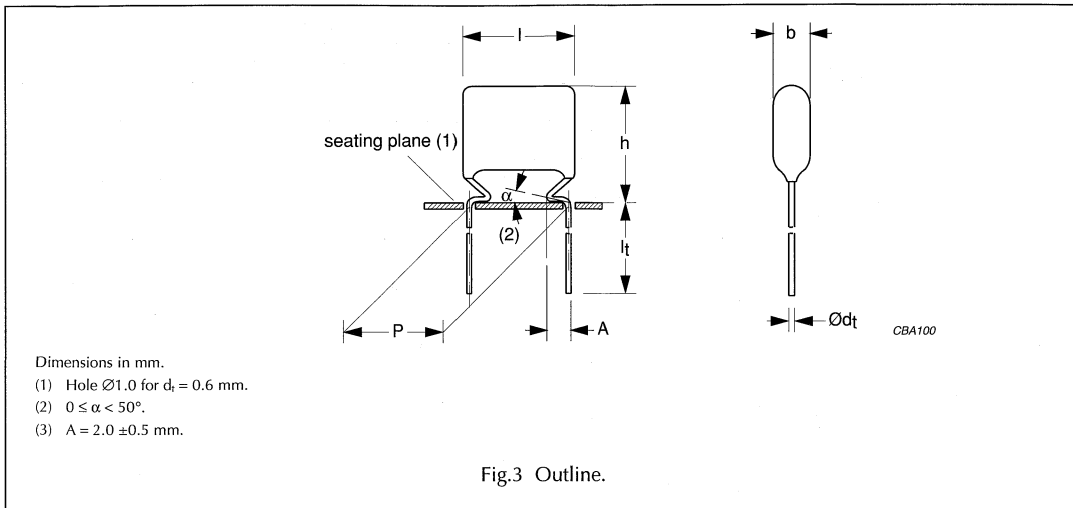
TYPE	PACKAGING	LEAD CONFIGURATION	PREFERRED TYPES					
			C-TOL	100 V	250 V	400 V	630 V	1000 V
MKT 467	loose in box	lead length 3.5 mm	±10%	04	16	28	40	-
			±5%	05	17	29	41	-
MKT 468	loose in box	lead length 3.5 mm	±10%	04	16	28	40	-
			±5%	05	17	29	41	-
	taped on reel	bent back leads	±10%	61	63	65	67	-
			±5%	62	64	66	68	-
MKT/MKT 468	loose in box	lead length 3.5 mm	±10%	-	-	-	-	60
			ON REQUEST					
MKT 467	loose in box	lead length 19.0 mm	±10%	51	53	55	57	-
			±5%	52	54	56	58	-
	taped on reel		±10%	06	18	30	42	-
			±5%	07	19	31	43	-
MKT 468	loose in box	long leads	±10%	51	53	55	57	-
			±5%	52	54	56	58	-
	taped on reel		±10%	06	18	30	42	-
MKT 469	loose in box	lead length 4.0 mm	±10%	25	45	55	65	-
			±5%	26	46	56	66	-
		lead length 22.0 mm	±10%	21	41	51	61	-
			±5%	22	42	52	62	-
	taped on reel		±10%	28	48	58	68	-
			±5%	29	49	59	69	-

Metallized polyester film capacitors

MKT 467

MKT 467 GENERAL DATA

PITCH 10 mm (kinked leads)



Specific reference data for the 100 V DC capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle:			
$C \leq 0.1 \mu\text{F}$	$\leq 75 \times 10^{-4}$	$\leq 120 \times 10^{-4}$	$\leq 200 \times 10^{-4}$
$0.1 \mu\text{F} < C \leq 0.47 \mu\text{F}$	$\leq 75 \times 10^{-4}$	$\leq 120 \times 10^{-4}$	$\leq 225 \times 10^{-4}$
$0.47 \mu\text{F} < C \leq 1.0 \mu\text{F}$	$\leq 75 \times 10^{-4}$	$\leq 120 \times 10^{-4}$	—
Rated voltage pulse slope $(dU/dt)_R$ at 100 V (DC)	30 V/ μs		
RC between leads, for $C > 0.33 \mu\text{F}$ at 100 V; 1 minute	> 5000 s		
R between interconnecting leads and casing; 100 V; 1 minute	> 30000 M Ω		
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	160 V; 1 minute		
Withstanding (DC) voltage between leads and case	200 V; 1 minute		

Available 100 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 3.5 \pm 0.5$ mm	$\pm 10\%$	2222 467 04...	preferred
		$\pm 5\%$	2222 467 05...	preferred
	$l_t = 19.0 \pm 4.0$ mm	$\pm 10\%$	2222 467 51...	on request
		$\pm 5\%$	2222 467 52...	on request
Taped on reel	$H = 16.0$ mm; $P_0 = 12.7$ mm	$\pm 10\%$	2222 467 06...	on request
		$\pm 5\%$	2222 467 07...	on request

Metallized polyester film capacitors**MKT 467** $U_{Rdc} = 100 \text{ V}; U_{Rac} = 63 \text{ V}$

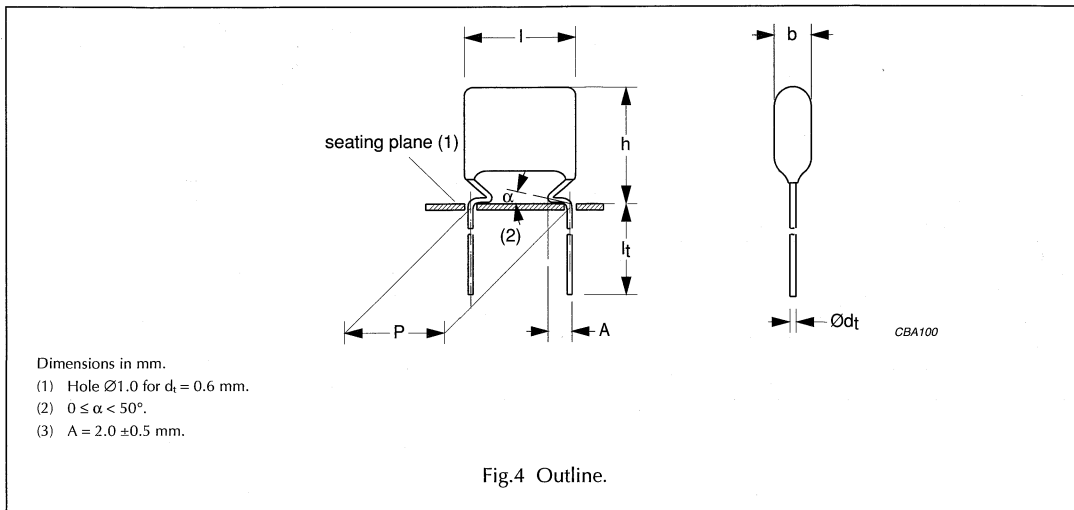
C (μF)	DIMENSIONS $b_{\max} \times h_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER	
			LOOSE IN BOX	
			$l_t = 3.5 \pm 0.5 \text{ mm}$	
			C-tol = $\pm 10\%$	C-tol = $\pm 5\%$
			catalogue number	last 5 digits
Pitch = $10.0 \pm 0.4 \text{ mm}; d_t = 0.60 \pm 0.06 \text{ mm}$				
0.056	4.0 × 13.0 × 12.5	0.4	2222 467 04563	.. 05563
0.068			2222 467 04683	.. 05683
0.082			2222 467 04823	.. 05823
0.1			2222 467 04104	.. 05104
0.12	4.3 × 13.3 × 12.5	0.5	2222 467 04124	.. 05124
0.15	4.0 × 13.0 × 12.5	0.4	2222 467 04154	.. 05154
0.18	4.2 × 13.2 × 12.5	0.4	2222 467 04184	.. 05184
0.22	4.5 × 13.6 × 12.5	0.5	2222 467 04224	.. 05224
0.27	4.2 × 13.2 × 12.5	0.4	2222 467 04274	.. 05274
0.33	4.6 × 13.6 × 12.5	0.5	2222 467 04334	.. 05334
0.39	4.0 × 13.0 × 12.5	0.4	2222 467 04394	.. 05394
0.47	4.2 × 13.2 × 12.5	0.4	2222 467 04474	.. 05474
0.56	4.6 × 13.6 × 12.5	0.5	2222 467 04564	.. 05564
0.68	5.0 × 14.0 × 12.5	0.5	2222 467 04684	.. 05684
0.82	5.5 × 14.5 × 12.5	0.6	2222 467 04824	.. 05824
1.0	6.0 × 15.0 × 12.5	0.6	2222 467 04105	.. 05105

Metallized polyester film capacitors

MKT 467

MKT 467 GENERAL DATA

PITCH 10 mm (kinked leads)



Specific reference data for the 250 V DC capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle: $C \leq 0.1 \mu\text{F}$ $0.1 \mu\text{F} < C \leq 0.22 \mu\text{F}$	$\leq 75 \times 10^{-4}$ $\leq 75 \times 10^{-4}$	$\leq 120 \times 10^{-4}$ $\leq 120 \times 10^{-4}$	$\leq 220 \times 10^{-4}$ $\leq 225 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 250 V (DC)	120 V/ μs		
R between leads, for $C \leq 0.33 \mu\text{F}$ at 100 V; 1 minute	$> 30000 \text{ M}\Omega$		
R between interconnecting leads and casing; 100 V; 1 minute	$> 30000 \text{ M}\Omega$		
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	400 V; 1 minute		
Withstanding (DC) voltage between leads and case	500 V; 1 minute		

Available 250 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 3.5 \pm 0.5$ mm	$\pm 10\%$	2222 467 16...	preferred
		$\pm 5\%$	2222 467 17...	preferred
	$l_t = 19.0 \pm 4.0$ mm	$\pm 10\%$	2222 467 53...	on request
		$\pm 5\%$	2222 467 54...	on request
Taped on reel	$H = 16.0$ mm; $P_0 = 12.7$ mm	$\pm 10\%$	2222 467 18...	on request
		$\pm 5\%$	2222 467 19...	on request

Metallized polyester film capacitors**MKT 467** $U_{Rdc} = 250 \text{ V}$; $U_{Rac} = 160 \text{ V}$

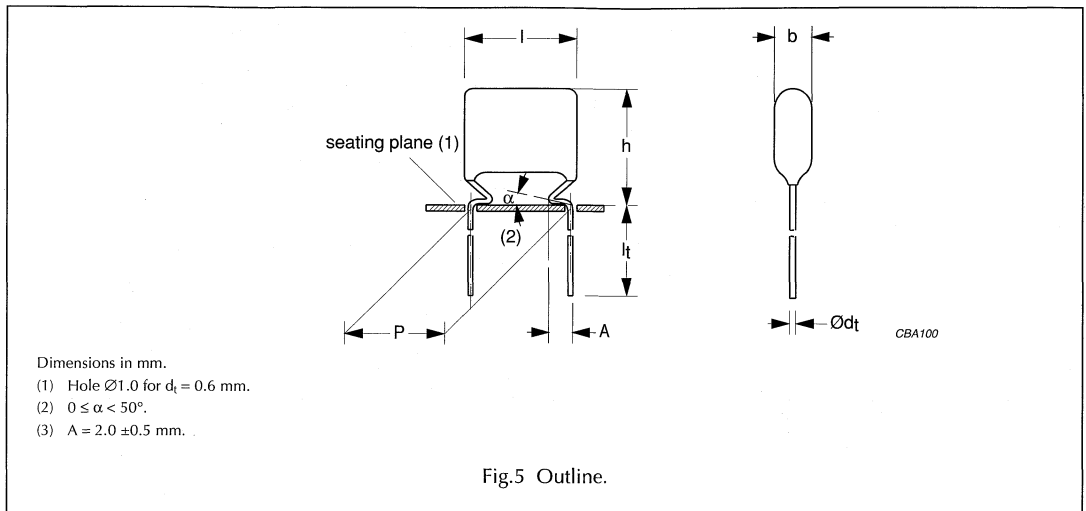
C (μF)	DIMENSIONS $b_{\max} \times h_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER	
			LOOSE IN BOX	
			$l_t = 3.5 \pm 0.5 \text{ mm}$	
			C-tol = $\pm 10\%$	C-tol = $\pm 5\%$
			catalogue number	last 5 digits
Pitch = $10.0 \pm 0.4 \text{ mm}$; $d_t = 0.60 \pm 0.06 \text{ mm}$				
0.027	$4.2 \times 13.2 \times 12.5$	0.4	2222 467 16273	.. 17273
0.033	$4.6 \times 13.6 \times 12.5$	0.5	2222 467 16333	.. 17333
0.039	$4.0 \times 13.0 \times 12.5$	0.4	2222 467 16393	.. 17393
0.047	$4.1 \times 13.1 \times 12.5$	0.4	2222 467 16473	.. 17473
0.056	$4.0 \times 13.0 \times 12.5$	0.4	2222 467 16563	.. 17563
0.068	$4.1 \times 13.1 \times 12.5$	0.4	2222 467 16683	.. 17683
0.082	$4.4 \times 13.4 \times 12.5$	0.5	2222 467 16823	.. 17823
0.1	$4.0 \times 13.0 \times 12.5$	0.4	2222 467 16104	.. 17104
0.12	$4.3 \times 13.3 \times 12.5$	0.5	2222 467 16124	.. 17124
0.15	$4.8 \times 13.8 \times 12.5$	0.5	2222 467 16154	.. 17154
0.18	$5.2 \times 14.2 \times 12.5$	0.5	2222 467 16184	.. 17184
0.22	$5.8 \times 14.8 \times 12.5$	0.6	2222 467 16224	.. 17224

Metallized polyester film capacitors

MKT 467

MKT 467 GENERAL DATA

PITCH 10 mm (kinked leads)



Specific reference data for the 400 V DC capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle: $C \leq 0.1 \mu\text{F}$	$\leq 75 \times 10^{-4}$	$\leq 120 \times 10^{-4}$	$\leq 200 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 400 V (DC)	170 V/ μs		
R between leads, for $C \leq 0.33 \mu\text{F}$ at 100 V; 1 minute	$>30000 \text{ M}\Omega$		
R between interconnecting leads and casing; 100 V; 1 minute	$>30000 \text{ M}\Omega$		
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	640 V; 1 minute		
Withstanding (DC) voltage between leads and case	800 V; 1 minute		

Available 400 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 3.5 \pm 0.5$ mm	$\pm 10\%$	2222 467 28...	preferred
		$\pm 5\%$	2222 467 29...	preferred
	$l_t = 19.0 \pm 4.0$ mm	$\pm 10\%$	2222 467 55...	on request
		$\pm 5\%$	2222 467 56...	on request
Taped on reel	$H = 16.0$ mm; $P_0 = 12.7$ mm	$\pm 10\%$	2222 467 30...	on request
		$\pm 5\%$	2222 467 31...	on request

Metallized polyester film capacitors

MKT 467

 $U_{Rdc} = 400 \text{ V}$; $U_{Rac} = 200 \text{ V}$

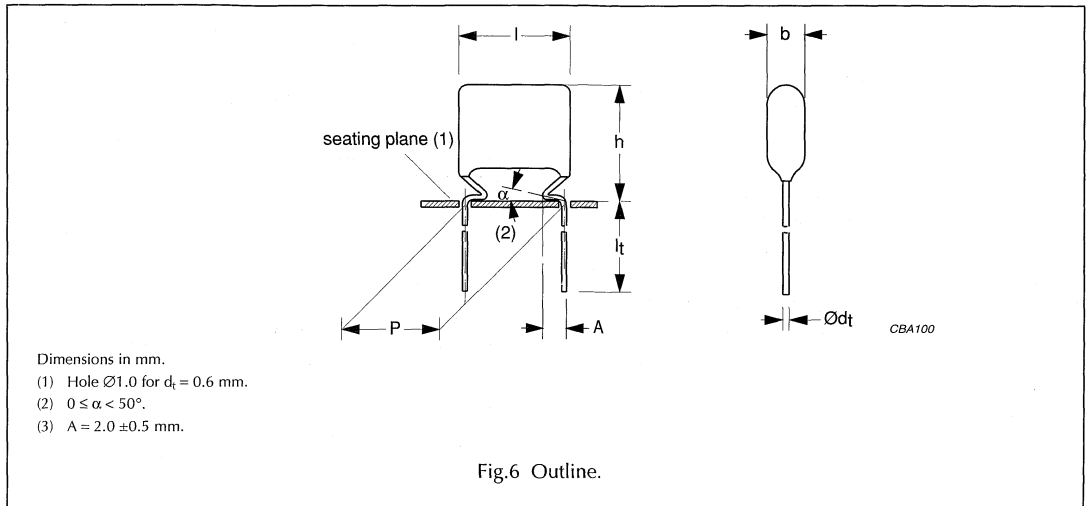
C (μF)	DIMENSIONS $b_{\max} \times h_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER	
			LOOSE IN BOX	
			$l_t = 3.5 \pm 0.5 \text{ mm}$	
			C-tol = $\pm 10\%$	C-tol = $\pm 5\%$
			catalogue number	last 5 digits
Pitch = $10.0 \pm 0.4 \text{ mm}$; $d_t = 0.60 \pm 0.06 \text{ mm}$				
0.001	4.5 × 13.5 × 12.5	0.5	2222 467 28102	.. 29102
0.0012			2222 467 28122	.. 29122
0.0015			2222 467 28152	.. 29152
0.0018			2222 467 28182	.. 29182
0.0022	4.0 × 13.0 × 12.5	0.4	2222 467 28222	.. 29222
0.0027	4.3 × 13.3 × 12.5	0.5	2222 467 28272	.. 29272
0.0033	4.6 × 13.6 × 12.5	0.5	2222 467 28332	.. 29332
0.0039	4.0 × 13.0 × 12.5	0.4	2222 467 28392	.. 29392
0.0047	4.1 × 13.2 × 12.5	0.4	2222 467 28472	.. 29472
0.0056	4.6 × 13.6 × 12.5	0.5	2222 467 28562	.. 29562
0.0068	4.2 × 13.2 × 12.5	0.4	2222 467 28682	.. 29682
0.0082	4.6 × 13.6 × 12.5	0.5	2222 467 28822	.. 29822
0.01	4.1 × 13.1 × 12.5	0.4	2222 467 28103	.. 29103
0.012	4.5 × 13.5 × 12.5	0.5	2222 467 28123	.. 29123
0.015	4.1 × 13.1 × 12.5	0.4	2222 467 28153	.. 29153
0.018	4.5 × 13.5 × 12.5	0.5	2222 467 28183	.. 29183
0.022	4.0 × 13.0 × 12.5	0.4	2222 467 28223	.. 29223
0.027	4.2 × 13.2 × 12.5	0.4	2222 467 28273	.. 29273
0.033	4.6 × 13.7 × 12.5	0.5	2222 467 28333	.. 29333
0.039	5.0 × 13.9 × 12.5	0.5	2222 467 28393	.. 29393
0.047	4.1 × 13.1 × 12.5	0.4	2222 467 28473	.. 29473
0.056	4.4 × 13.4 × 12.5	0.5	2222 467 28563	.. 29563
0.068	4.8 × 13.8 × 12.5	0.5	2222 467 28683	.. 29683
0.082	5.4 × 14.3 × 12.5	0.6	2222 467 28823	.. 29823
0.1	5.7 × 14.7 × 12.5	0.6	2222 467 28104	.. 29104

Metallized polyester film capacitors

MKT 467

MKT 467 GENERAL DATA

PITCH 10 mm (kinked leads)



Specific reference data for the 630 V DC capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle: $C \leq 0.033 \mu\text{F}$	$\leq 75 \times 10^{-4}$	$\leq 120 \times 10^{-4}$	$\leq 200 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 630 V (DC)	120 V/ μs		
R between leads, for $C \leq 0.33 \mu\text{F}$ at 500 V; 1 minute	$> 30000 \text{ M}\Omega$		
R between interconnecting leads and casing; 100 V; 1 minute	$> 30000 \text{ M}\Omega$		
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	1 008 V; 1 minute		
Withstanding (DC) voltage between leads and case	1 260 V; 1 minute		

Available 630 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 3.5 \pm 0.5$ mm	$\pm 10\%$	2222 467 40...	preferred
		$\pm 5\%$	2222 467 41...	preferred
	$l_t = 19.0 \pm 4.0$ mm	$\pm 10\%$	2222 467 57...	on request
		$\pm 5\%$	2222 467 58...	on request
Taped on reel	$H = 16.0$ mm; $P_0 = 12.7$ mm	$\pm 10\%$	2222 467 42...	on request
		$\pm 5\%$	2222 467 43...	on request

Metallized polyester film capacitors**MKT 467** $U_{Rdc} = 630 \text{ V}$; $U_{Rac} = 250 \text{ V}$

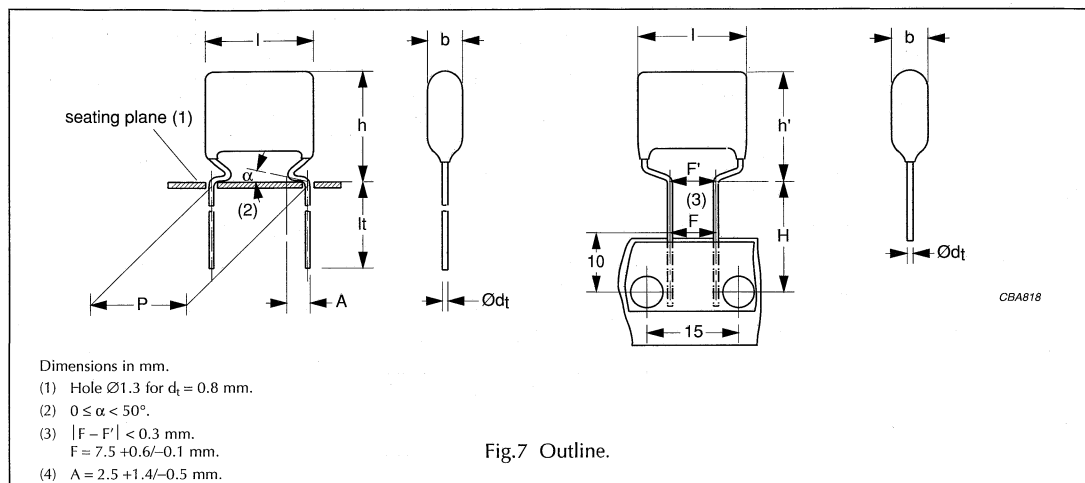
C (μF)	DIMENSIONS $b_{\text{max}} \times h_{\text{max}} \times l_{\text{max}}$ (mm)	MASS (g)	CATALOGUE NUMBER	
			LOOSE IN BOX	
			$l_t = 3.5 \pm 0.5 \text{ mm}$	
			C-tol = $\pm 10\%$	C-tol = $\pm 5\%$
			catalogue number	last 5 digits
Pitch = $10.0 \pm 0.4 \text{ mm}$; $d_t = 0.60 \pm 0.06 \text{ mm}$				
0.01	$4.1 \times 13.1 \times 12.5$	0.4	2222 467 40103	.. 41103
0.012	$4.5 \times 13.5 \times 12.5$	0.5	2222 467 40123	.. 41123
0.015	$4.9 \times 13.9 \times 12.5$	0.5	2222 467 40153	.. 41153
0.018	$5.4 \times 14.4 \times 12.5$	0.6	2222 467 40183	.. 41183
0.022	$4.8 \times 13.8 \times 12.5$	0.5	2222 467 40223	.. 41223
0.027	$5.3 \times 14.3 \times 12.5$	0.6	2222 467 40273	.. 41273
0.033	$5.9 \times 14.9 \times 12.5$	0.6	2222 467 40333	.. 41333

Metallized polyester film capacitors

MKT 468

MKT 468 GENERAL DATA

PITCH 15/22.5 mm
PITCH 7.5 mm (bent back leads)



Specific reference data for the 100 V DC capacitors

DESCRIPTION	VALUE	
	at 1 kHz	at 10 kHz
Tangent of loss angle: $C \leq 10.0 \mu\text{F}$	$\leq 75 \times 10^{-4}$	$\leq 120 \times 10^{-4}$
Rated voltage pulse slope (dU/dt) _R at 100 V (DC): $I_{\text{max}} = 17.5$ mm $I_{\text{max}} = 26.0$ mm	20 V/ μs 10 V/ μs	
RC between leads, for $C > 0.33 \mu\text{F}$ at 100 V; 1 minute	> 5000 s	
R between interconnecting leads and casing; 100 V; 1 minute	> 30000 M Ω	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	160 V; 1 minute	
Withstanding (DC) voltage between leads and case	200 V; 1 minute	

Available 100 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 3.5 \pm 0.5$ mm	$\pm 10\%$	2222 468 04...	preferred
		$\pm 5\%$	2222 468 05...	preferred
	long leads; note 1	$\pm 10\%$	2222 468 51...	on request
		$\pm 5\%$	2222 468 52...	on request
Taped on reel	$H = 16.0$ mm; $P_0 = 12.7$ mm	$\pm 10\%$	2222 468 06...	on request
		$\pm 5\%$	2222 468 07...	on request
Taped on reel (bent back)	$H = 16.0$ mm; $P_0 = 15.0$ mm	$\pm 10\%$	2222 468 61...	preferred
		$\pm 5\%$	2222 468 62...	preferred

Note

1. Length of long leads:

- $l_t = 19.0 \pm 4.0$ mm for lead pitch = 15.0 mm.
- $l_t = 25.0 \pm 4.0$ mm for lead pitch = 22.5 mm.

Metallized polyester film capacitors

MKT 468

 $U_{Rdc} = 100 \text{ V}$; $U_{Rac} = 63 \text{ V}$

C (μF)	DIMENSIONS ⁽¹⁾ $b_{\text{max}} \times h$ (h') _{max} \times l_{max} (mm)	MASS (g)	CATALOGUE NUMBER			
			LOOSE IN BOX		REEL DIAMETER = 500 mm	
			short leads		H = 16.0 mm; P ₀ = 15.0 mm	
			C-tol = $\pm 10\%$	C-tol = $\pm 5\%$	C-tol = $\pm 10\%$	C-tol = $\pm 5\%$
		catalogue number		last 5 digits		
Pitch = 15.0 \pm 0.4 mm; d_t = 0.80 \pm 0.08 mm					pitch = 7.5 mm (bent back)	
1.2	5.5 \times 14.5 (16.0) \times 17.5	0.7	2222 468 04125	.. 05125	.. 61125	.. 62125
1.5	6.0 \times 15.0 (16.5) \times 17.5	0.9	2222 468 04155	.. 05155	.. 61155	.. 62155
1.8	6.5 \times 15.5 (17.0) \times 17.5	1.0	2222 468 04185	.. 05185	.. 61185	.. 62185
2.2	7.0 \times 16.0 (17.5) \times 17.5	1.2	2222 468 04225	.. 05225	.. 61225	.. 62225
2.7	8.0 \times 17.0 (18.5) \times 17.5	1.4	2222 468 04275	.. 05275	.. 61275	.. 62275
3.3	8.5 \times 17.5 (19.0) \times 17.5	1.5	2222 468 04335	.. 05335	.. 61335	.. 62335
Pitch = 22.5 \pm 0.4 mm; d_t = 0.80 \pm 0.08 mm					pitch = 7.5 mm (bent back)	
3.9	6.5 \times 18.5 \times 26.0	2.8	2222 468 04395	.. 05395	not available	
4.7	7.0 \times 19.5 \times 26.0	3.2	2222 468 04475	.. 05475		
5.6	7.5 \times 20.0 \times 26.0	3.5	2222 468 04565	.. 05565		
6.8	8.5 \times 21.5 \times 26.0	4.1	2222 468 04685	.. 05685		
8.2	9.5 \times 22.5 \times 26.0	4.8	2222 468 04825	.. 05825		
10.0	10.5 \times 23.5 \times 26.0	5.5	2222 468 04106	.. 05106		

Note

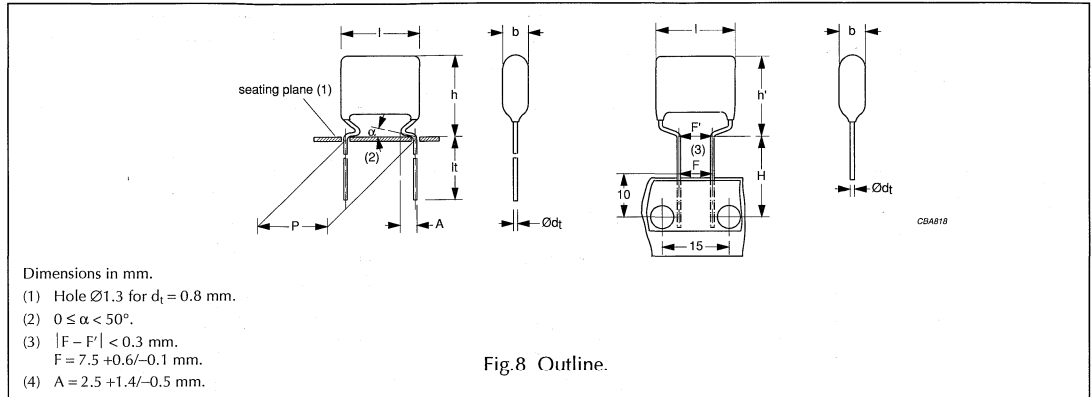
1. Dimensions in brackets for bent back leads.

Metallized polyester film capacitors

MKT 468

MKT 468 GENERAL DATA

PITCH 15/22.5/27.5 mm
PITCH 7.5 mm (bent back leads)



Specific reference data for the 250 V DC capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle: $C \leq 0.47 \mu\text{F}$ $C > 0.47 \mu\text{F}$	$\leq 75 \times 10^{-4}$ $\leq 75 \times 10^{-4}$	$\leq 120 \times 10^{-4}$ $\leq 120 \times 10^{-4}$	$\leq 225 \times 10^{-4}$ -
Rated voltage pulse slope $(dU/dt)_R$ at 250 V (DC): $l_{\text{max}} = 17.5$ mm $l_{\text{max}} = 26.0$ mm $l_{\text{max}} = 30.0$ mm	45 V/ μs 20 V/ μs 15 V/ μs		
R between leads, for $C \leq 0.33 \mu\text{F}$ at 100 V; 1 minute	>30000 M Ω		
RC between leads, for $C > 0.33 \mu\text{F}$ at 100 V; 1 minute	>10000 s		
R between interconnecting leads and casing; 100 V; 1 minute	>30000 M Ω		
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	400 V; 1 minute		
Withstanding (DC) voltage between leads and case	500 V; 1 minute		

Available 250 V DC versions

PACKAGING ⁽¹⁾	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 3.5 \pm 0.5$ mm	$\pm 10\%$	2222 468 16...	preferred
		$\pm 5\%$	2222 468 17...	preferred
	long leads; note 2	$\pm 10\%$	2222 468 53...	on request
		$\pm 5\%$	2222 468 54...	on request
Taped on reel	$H = 16.0$ mm; $P_0 = 12.7$ mm	$\pm 10\%$	2222 468 18...	on request
		$\pm 5\%$	2222 468 19...	on request
Taped on reel (bent back)	$H = 16.0$ mm; $P_0 = 15.0$ mm	$\pm 10\%$	2222 468 63...	preferred
		$\pm 5\%$	2222 468 64...	preferred

Notes

1. Taped on reel pitch = 27.5 mm is not available.
2. Length of long leads:
 - a) $l_t = 19.0 \pm 4.0$ mm for lead pitch = 15.0 mm.
 - b) $l_t = 25.0 \pm 4.0$ mm for lead pitch = 22.5 mm.
 - c) $l_t = 24.0 \pm 4.0$ mm for lead pitch = 27.5 mm.

Metallized polyester film capacitors

MKT 468

 $U_{Rdc} = 250 \text{ V}$; $U_{Rac} = 160 \text{ V}$

C (μF)	DIMENSIONS ⁽¹⁾ $b_{\text{max}} \times h \text{ (h')}_{\text{max}} \times l_{\text{max}}$ (mm)	MASS (g)	CATALOGUE NUMBER			
			LOOSE IN BOX		REEL DIAMETER = 500 mm	
			short leads		H = 16.0 mm; P ₀ = 15.0 mm	
			C-tol = $\pm 10\%$	C-tol = $\pm 5\%$	C-tol = $\pm 10\%$	C-tol = $\pm 5\%$
		catalogue number		last 5 digits		
Pitch = 15.0 \pm 0.4 mm; d_t = 0.80 \pm 0.08 mm			pitch = 7.5 mm (bent back)			
0.27	5.0 \times 14.0 (15.5) \times 17.5	0.6	2222 468 16274	.. 17274	.. 63274	.. 64274
0.33	5.5 \times 14.5 (16.0) \times 17.5	0.7	2222 468 16334	.. 17334	.. 63334	.. 64334
0.39	6.0 \times 15.0 (16.5) \times 17.5	0.9	2222 468 16394	.. 17394	.. 63394	.. 64394
0.47	6.5 \times 15.5 (17.0) \times 17.5	1.0	2222 468 16474	.. 17474	.. 63474	.. 64474
0.56	7.5 \times 16.5 (18.0) \times 17.5	1.3	2222 468 16564	.. 17564	.. 63564	.. 64564
0.68	8.0 \times 17.0 (18.5) \times 17.5	1.4	2222 468 16684	.. 17684	.. 63684	.. 64684
0.82	8.5 \times 17.5 (19.0) \times 17.5	1.5	2222 468 16824	.. 17824	.. 63824	.. 64824
1.0	8.0 \times 20.0 (21.5) \times 17.5	1.7	2222 468 16105	.. 17105	.. 63105	.. 64105
Pitch = 22.5 \pm 0.4 mm; d_t = 0.80 \pm 0.08 mm			pitch = 7.5 mm (bent back)			
1.2	7.0 \times 19.0 \times 26.0	3.2	2222 468 16125	.. 17125	not available	
1.5	8.0 \times 21.0 \times 26.0	3.8	2222 468 16155	.. 17155		
1.8	9.0 \times 22.0 \times 26.0	4.1	2222 468 16185	.. 17185		
2.2	9.8 \times 23.0 \times 26.0	4.8	2222 468 16225	.. 17225		
2.7	11.0 \times 24.0 \times 26.0	5.9	2222 468 16275	.. 17275		
3.3	12.5 \times 25.5 \times 26.0	6.9	2222 468 16335	.. 17335		
3.9	13.5 \times 26.5 \times 26.0	7.5	2222 468 16395	.. 17395		
4.7	14.9 \times 28.0 \times 26.0	8.6	2222 468 16475	.. 17475		
Pitch = 27.5 \pm 0.4 mm; d_t = 0.80 \pm 0.08 mm			pitch = 7.5 mm (bent back)			
5.6	15.0 \times 28.0 \times 30.0	9.1	2222 468 16565	.. 17565	not available	

Note

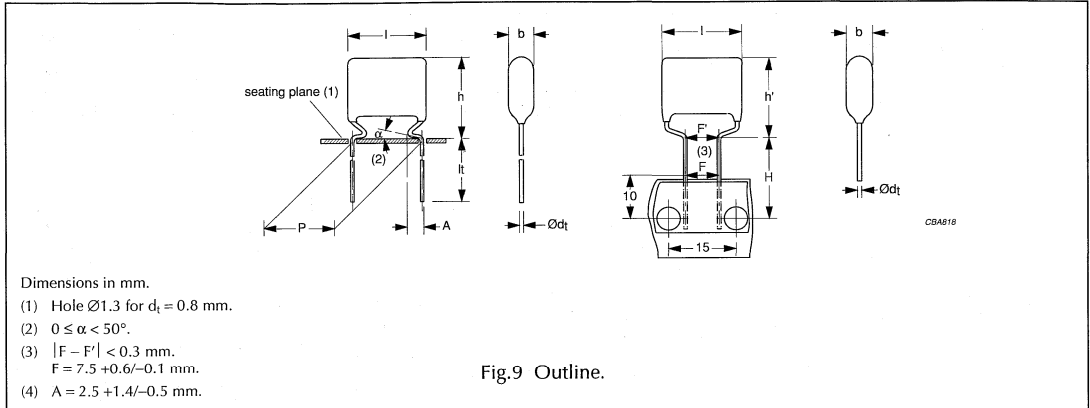
1. Dimensions in brackets for bent back leads.

Metallized polyester film capacitors

MKT 468

MKT 468 GENERAL DATA

PITCH 15/22.5/27.5 mm
PITCH 7.5 mm (bent back leads)



Specific reference data for the 400 V DC capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle: $C \leq 0.47 \mu\text{F}$ $C > 0.47 \mu\text{F}$	$\leq 75 \times 10^{-4}$ $\leq 75 \times 10^{-4}$	$\leq 120 \times 10^{-4}$ $\leq 120 \times 10^{-4}$	$\leq 225 \times 10^{-4}$ -
Rated voltage pulse slope $(dU/dt)_R$ at 400 V (DC): $I_{\text{max}} = 17.5$ mm $I_{\text{max}} = 26.0$ mm $I_{\text{max}} = 30.0$ mm	65 V/ μs 30 V/ μs 25 V/ μs		
R between leads, for $C \leq 0.33 \mu\text{F}$ at 100 V; 1 minute	$> 30000 \text{ M}\Omega$		
RC between leads, for $C > 0.33 \mu\text{F}$ at 100 V; 1 minute	$> 10000 \text{ s}$		
R between interconnecting leads and casing; 100 V; 1 minute	$> 30000 \text{ M}\Omega$		
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	640 V; 1 minute		
Withstanding (DC) voltage between leads and case	800 V; 1 minute		

Available 400 V DC versions

PACKAGING ⁽¹⁾	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 3.5 \pm 0.5$ mm	$\pm 10\%$	2222 468 28...	preferred
		$\pm 5\%$	2222 468 29...	preferred
	long leads; note 2	$\pm 10\%$	2222 468 55...	on request
		$\pm 5\%$	2222 468 56...	on request
Taped on reel	$H = 16.0$ mm; $P_0 = 12.7$ mm	$\pm 10\%$	2222 468 30...	on request
		$\pm 5\%$	2222 468 31...	on request
Taped on reel (bent back)	$H = 16.0$ mm; $P_0 = 15.0$ mm	$\pm 10\%$	2222 468 65...	preferred
		$\pm 5\%$	2222 468 66...	preferred

Notes

- Taped on reel pitch = 27.5 mm is not available.
- Length of long leads:
 - $l_t = 19.0 \pm 4.0$ mm for lead pitch = 15.0 mm.
 - $l_t = 25.0 \pm 4.0$ mm for lead pitch = 22.5 mm.
 - $l_t = 24.0 \pm 4.0$ mm for lead pitch = 27.5 mm.

Metallized polyester film capacitors

MKT 468

 $U_{Rdc} = 400 \text{ V}$; $U_{Rac} = 200 \text{ V}$

C (μF)	DIMENSIONS ⁽¹⁾ $b_{\text{max}} \times h \text{ (h')}_{\text{max}} \times l_{\text{max}}$ (mm)	MASS (g)	CATALOGUE NUMBER			
			LOOSE IN BOX		REEL DIAMETER = 500 mm	
			short leads		H = 16.0 mm; P ₀ = 15.0 mm	
			C-tol = $\pm 10\%$	C-tol = $\pm 5\%$	C-tol = $\pm 10\%$	C-tol = $\pm 5\%$
catalogue number		last 5 digits		last 5 digits		
Pitch = 15.0 \pm 0.4 mm; d_t = 0.80 \pm 0.08 mm			pitch = 7.5 mm (bent back)			
0.12	5.0 \times 14.0 (15.5) \times 17.5	0.6	2222 468 28124	.. 29124	.. 65124	.. 66124
0.15	5.8 \times 15.0 (16.5) \times 17.5	0.9	2222 468 28154	.. 29154	.. 65154	.. 66154
0.18	6.5 \times 15.5 (17.0) \times 17.5	1.0	2222 468 28184	.. 29184	.. 65184	.. 66184
0.22	7.0 \times 15.5 (17.5) \times 17.5	1.2	2222 468 28224	.. 29224	.. 65224	.. 66224
0.27	7.4 \times 16.5 (18.0) \times 17.5	1.3	2222 468 28274	.. 29274	.. 65274	.. 66274
0.33	8.5 \times 17.5 (19.0) \times 17.5	1.5	2222 468 28334	.. 29334	.. 65334	.. 66334
0.39	7.4 \times 19.5 (21.0) \times 17.5	1.3	2222 468 28394	.. 29394	.. 65394	.. 66394
0.47	8.4 \times 20.5 (22.0) \times 17.5	1.5	2222 468 28474	.. 29474	.. 65474	.. 66474
Pitch = 22.5 \pm 0.4 mm; d_t = 0.80 \pm 0.08 mm			pitch = 7.5 mm (bent back)			
0.56	7.5 \times 19.5 \times 26.0	3.2	2222 468 28564	.. 29564	not available	
0.68	8.0 \times 21.0 \times 26.0	3.8	2222 468 28684	.. 29684		
0.82	9.0 \times 22.0 \times 26.0	4.5	2222 468 28824	.. 29824		
1.0	9.9 \times 23.0 \times 26.0	5.2	2222 468 28105	.. 29105		
1.2	11.0 \times 24.0 \times 26.0	5.9	2222 468 28125	.. 29125		
Pitch = 27.5 \pm 0.4 mm; d_t = 0.80 \pm 0.08 mm			pitch = 7.5 mm (bent back)			
1.5	11.5 \times 24.5 \times 30.0	6.5	2222 468 28155	.. 29155	not available	
1.8	12.5 \times 25.5 \times 30.0	7.1	2222 468 28185	.. 29185		
2.2	14.0 \times 27.0 \times 30.0	8.2	2222 468 28225	.. 29225		

Note

1. Dimensions in brackets for bent back leads.

Metallized polyester film capacitors

MKT 468

MKT 468 GENERAL DATA

PITCH 15/22.5/27.5 mm
PITCH 7.5 mm (bent back leads)

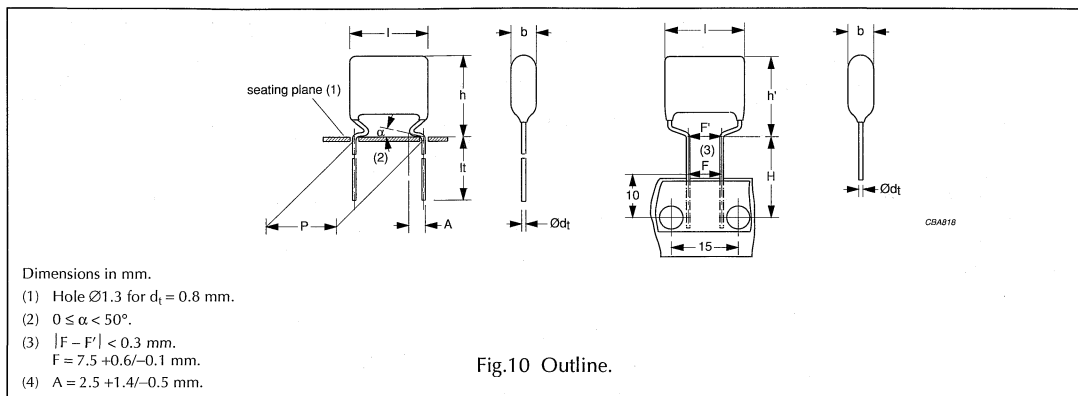


Fig.10 Outline.

Specific reference data for the 630 V DC capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle: $C \leq 0.1 \mu\text{F}$ $0.1 \mu\text{F} < C \leq 0.47 \mu\text{F}$ $C > 0.47 \mu\text{F}$	$\leq 75 \times 10^{-4}$ $\leq 75 \times 10^{-4}$ $\leq 75 \times 10^{-4}$	$\leq 120 \times 10^{-4}$ $\leq 120 \times 10^{-4}$ $\leq 120 \times 10^{-4}$	$\leq 200 \times 10^{-4}$ $\leq 225 \times 10^{-4}$ —
Rated voltage pulse slope $(dU/dt)_R$ at 630 V (DC): $I_{\text{max}} = 17.5$ mm $I_{\text{max}} = 26.0$ mm $I_{\text{max}} = 30.0$ mm	90 V/ μs 35 V/ μs 30 V/ μs		
R between leads, for $C \leq 0.33 \mu\text{F}$ at 500 V; 1 minute	$> 30000 \text{ M}\Omega$		
RC between leads, for $C > 0.33 \mu\text{F}$ at 500 V; 1 minute	$> 10000 \text{ s}$		
R between interconnecting leads and casing; 100 V; 1 minute	$> 30000 \text{ M}\Omega$		
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	1008 V; 1 minute		
Withstanding (DC) voltage between leads and case	1260 V; 1 minute		

Available 630 V DC versions

PACKAGING ⁽¹⁾	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 3.5 \pm 0.5$ mm	$\pm 10\%$	2222 468 40...	preferred
		$\pm 5\%$	2222 468 41...	preferred
	long leads; note 2	$\pm 10\%$	2222 468 57...	on request
		$\pm 5\%$	2222 468 58...	on request
Taped on reel	$H = 16.0$ mm; $P_0 = 12.7$ mm	$\pm 10\%$	2222 468 42...	on request
		$\pm 5\%$	2222 468 43...	on request
Taped on reel (bent back)	$H = 16.0$ mm; $P_0 = 15.0$ mm	$\pm 10\%$	2222 468 67...	preferred
		$\pm 5\%$	2222 468 68...	preferred

Notes

1. Taped on reel pitch = 27.5 mm is not available.
2. Length of long leads:
 - a) $l_t = 19.0 \pm 4.0$ mm for lead pitch = 15.0 mm.
 - b) $l_t = 25.0 \pm 4.0$ mm for lead pitch = 22.5 mm.
 - c) $l_t = 24.0 \pm 4.0$ mm for lead pitch = 27.5 mm.

Metallized polyester film capacitors

MKT 468

 $U_{Rdc} = 630 \text{ V}$; $U_{Rac} = 250 \text{ V}$

C (μF)	DIMENSIONS ⁽¹⁾ $b_{\max} \times h (h')_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER			
			LOOSE IN BOX		REEL DIAMETER = 500 mm	
			short leads		H = 16.0 mm; P ₀ = 15.0 mm	
			C-tol = $\pm 10\%$	C-tol = $\pm 5\%$	C-tol = $\pm 10\%$	C-tol = $\pm 5\%$
			catalogue number	last 5 digits	last 5 digits	
Pitch = 15.0 \pm 0.4 mm; d_t = 0.80 \pm 0.08 mm					pitch = 7.5 mm (bent back)	
0.039	5.0 \times 14.0 (15.5) \times 17.5	0.6	2222 468 40393	.. 41393	.. 67393	.. 68393
0.047	5.5 \times 14.5 (16.0) \times 17.5	0.7	2222 468 40473	.. 41473	.. 67473	.. 68473
0.056	5.9 \times 15.0 (16.5) \times 17.5	0.9	2222 468 40563	.. 41563	.. 67563	.. 68563
0.068	6.5 \times 16.0 (17.5) \times 17.5	1.2	2222 468 40683	.. 41683	.. 67683	.. 68683
0.082	7.3 \times 16.5 (18.0) \times 17.5	1.3	2222 468 40823	.. 41823	.. 67823	.. 68823
0.1	7.9 \times 17.0 (18.5) \times 17.5	1.4	2222 468 40104	.. 41104	.. 67104	.. 68104
0.12	7.5 \times 19.5 (21.0) \times 17.5	1.3	2222 468 40124	.. 41124	.. 67124	.. 68124
0.15	8.5 \times 20.5 (22.0) \times 17.5	1.5	2222 468 40154	.. 41154	.. 67154	.. 68154
Pitch = 22.5 \pm 0.4 mm; d_t = 0.80 \pm 0.08 mm					pitch = 7.5 mm (bent back)	
0.18	7.5 \times 19.5 \times 26.0	3.5	2222 468 40184	.. 41184	not available	
0.22	8.0 \times 21.0 \times 26.0	3.8	2222 468 40224	.. 41224		
0.27	9.0 \times 22.0 \times 26.0	4.5	2222 468 40274	.. 41274		
0.33	10.0 \times 23.0 \times 26.0	5.2	2222 468 40334	.. 41334		
0.39	11.5 \times 24.0 \times 26.0	5.9	2222 468 40394	.. 41394		
0.47	12.5 \times 25.5 \times 26.0	6.9	2222 468 40474	.. 41474		
0.56	13.5 \times 26.6 \times 26.0	7.5	2222 468 40564	.. 41564		
0.68	15.0 \times 28.0 \times 26.0	8.6	2222 468 40684	.. 41684		
Pitch = 27.5 \pm 0.4 mm; d_t = 0.80 \pm 0.08 mm					pitch = 7.5 mm (bent back)	
0.82	15.0 \times 28.0 \times 30.0	8.8	2222 468 40824	.. 41824	not available	

Note

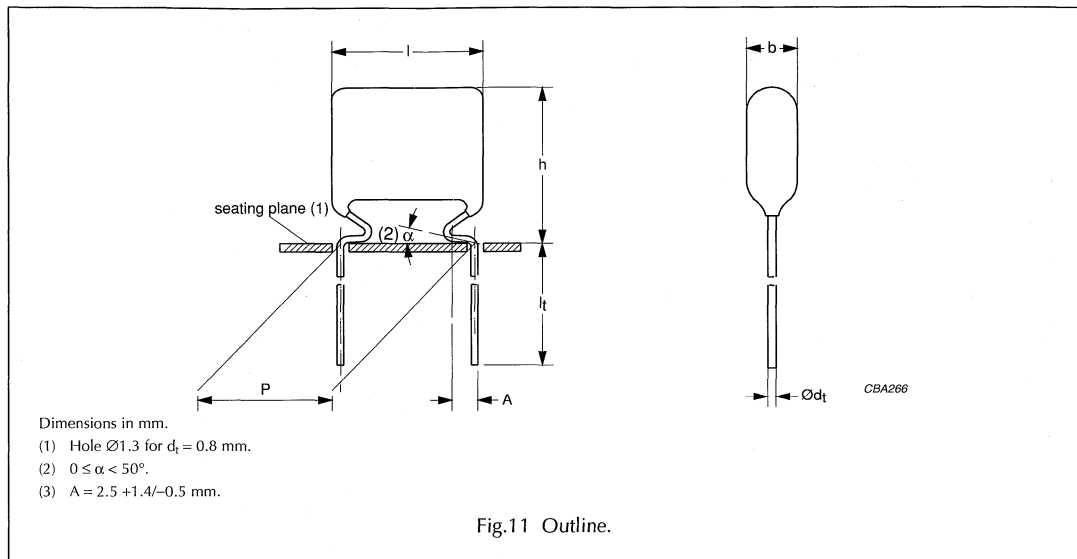
1. Dimensions in brackets for bent back leads.

Metallized polyester film capacitors

MKT/MKT 468

MKT/MKT 468 GENERAL DATA

PITCH 15/22.5/27.5 mm



Specific reference data for the 1000 V DC capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle: $C \leq 0.1 \mu\text{F}$ $0.1 \mu\text{F} < C \leq 0.22 \mu\text{F}$	$\leq 75 \times 10^{-4}$ $\leq 75 \times 10^{-4}$	$\leq 120 \times 10^{-4}$ $\leq 120 \times 10^{-4}$	$\leq 200 \times 10^{-4}$ $\leq 225 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 1000 V (DC) P = 15 mm P = 22.5 mm P = 27.5 mm	200 V/ms 120 V/ms 100 V/ms		
R between leads, for $C \leq 0.33 \mu\text{F}$ at 500 V; 1 minute	$> 30000 \text{ M}\Omega$		
R between interconnecting leads and casing; 100 V; 1 minute	$> 30000 \text{ M}\Omega$		
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	1600; 1 minute		
Withstanding (DC) voltage between leads and case	2000 V; 1 minute		

Available 1000 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 3.5 \pm 0.5$ mm	$\pm 10\%$	2222 468 60...	preferred

Metallized polyester film capacitors

MKT/MKT 468

 $U_{Rdc} = 1000 \text{ V}$; $U_{Rac} = 400 \text{ V}$

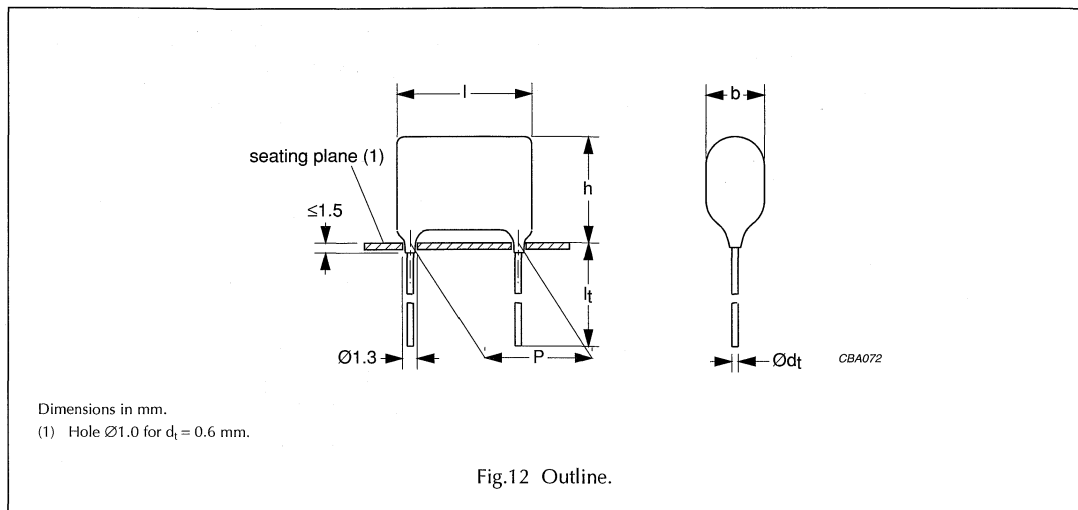
C (μF)	DIMENSIONS $b_{\max} \times h_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 3.5 \pm 0.5 \text{ mm}$
			C-tol = $\pm 10\%$
Pitch = $15.0 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.015	$6.0 \times 15.0 \times 17.5$	0.6	2222 468 60153
0.018	$6.5 \times 15.5 \times 17.5$	0.7	2222 468 60183
0.022	$7.2 \times 16.2 \times 17.5$	0.9	2222 468 60223
0.027	$8.0 \times 17.0 \times 17.5$	1.0	2222 468 60273
0.033	$8.8 \times 17.8 \times 17.5$	1.4	2222 468 60333
0.039	$9.6 \times 18.6 \times 17.5$	1.5	2222 468 60393
0.047	$10.6 \times 19.6 \times 17.5$	1.8	2222 468 60473
Pitch = $22.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.056	$7.0 \times 20.0 \times 26.0$	3.2	2222 468 60563
0.068	$8.0 \times 21.0 \times 26.0$	3.8	2222 468 60683
0.082	$8.5 \times 21.5 \times 26.0$	4.1	2222 468 60823
0.1	$9.5 \times 22.5 \times 26.0$	4.8	2222 468 60104
0.12	$10.5 \times 23.5 \times 26.0$	5.5	2222 468 60124
Pitch = $27.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.15	$10.5 \times 23.5 \times 30.0$	5.8	2222 468 60154
0.18	$11.5 \times 24.5 \times 30.0$	6.5	2222 468 60184
0.22	$13.0 \times 26.0 \times 30.0$	7.5	2222 468 60224

Metallized polyester film capacitors

MKT 469

MKT 469 GENERAL DATA

PITCH 10 mm (straight leads)



Specific reference data for the 100 V DC capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle:			
$C \leq 0.1 \mu\text{F}$	$\leq 75 \times 10^{-4}$	$\leq 120 \times 10^{-4}$	$\leq 200 \times 10^{-4}$
$0.1 \mu\text{F} < C \leq 0.47 \mu\text{F}$	$\leq 75 \times 10^{-4}$	$\leq 120 \times 10^{-4}$	$\leq 225 \times 10^{-4}$
$0.47 \mu\text{F} < C \leq 1.0 \mu\text{F}$	$\leq 75 \times 10^{-4}$	$\leq 120 \times 10^{-4}$	—
Rated voltage pulse slope $(dU/dt)_R$ at 100 V (DC)	30 V/ μs		
RC between leads, for $C > 0.33 \mu\text{F}$ at 100 V; 1 minute	>5000 s		
R between interconnecting leads and casing; 100 V; 1 minute	>30000 M Ω		
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	160 V; 1 minute		
Withstanding (DC) voltage between leads and case	200 V; 1 minute		

Available 100 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 4.0 + 1.0 / -0.5$ mm	$\pm 10\%$	2222 469 25...	on request
		$\pm 5\%$	2222 469 26...	on request
	$l_t = 22.0 \pm 4.0$ mm	$\pm 10\%$	2222 469 21...	on request
		$\pm 5\%$	2222 469 22...	on request
Taped on reel	$H = 18.5$ mm; $P_0 = 12.7$ mm	$\pm 10\%$	2222 469 28...	on request
		$\pm 5\%$	2222 469 29...	on request

Metallized polyester film capacitors**MKT 469** $U_{Rdc} = 100 \text{ V}; U_{Rac} = 63 \text{ V}$

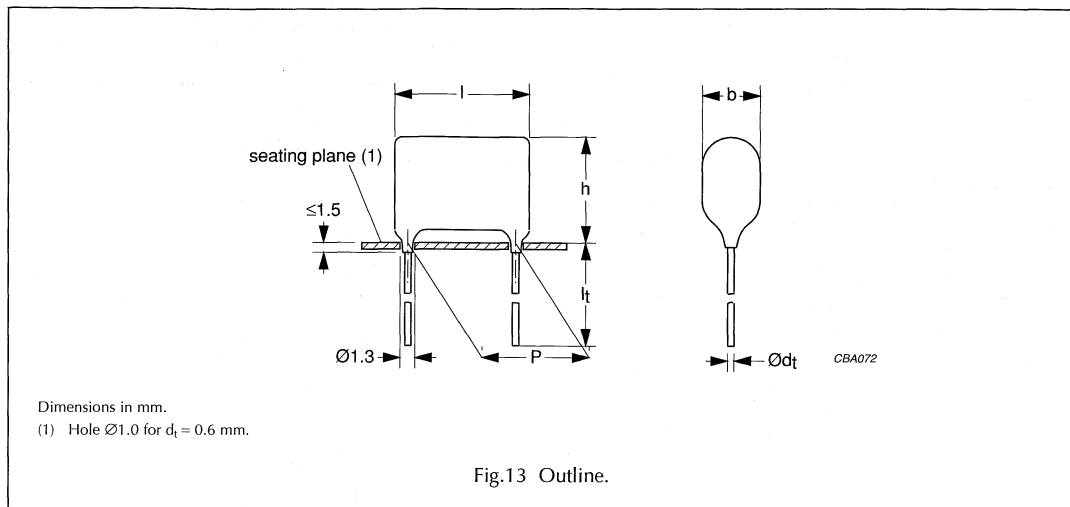
C (μF)	DIMENSIONS $b_{\max} \times h_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 4.0 +1.0/-0.5 \text{ mm}$
			C-tol = $\pm 10\%$
Pitch = $10.0 \pm 0.4 \text{ mm}; d_t = 0.60 \pm 0.06 \text{ mm}$			
0.056	4.0 × 9.3 × 12.5	0.4	2222 469 25 563
0.068			2222 469 25 683
0.082			2222 469 25 823
0.1			2222 469 25 104
0.12	4.3 × 9.7 × 12.5	0.5	2222 469 25 124
0.15	3.9 × 9.2 × 12.5	0.4	2222 469 25 154
0.18	4.2 × 9.5 × 12.5	0.4	2222 469 25 184
0.22	4.5 × 9.9 × 12.5	0.5	2222 469 25 224
0.27	4.2 × 9.5 × 12.5	0.4	2222 469 25 274
0.33	4.6 × 9.9 × 12.5	0.5	2222 469 25 334
0.39	4.0 × 9.3 × 12.5	0.4	2222 469 25 394
0.47	4.2 × 9.5 × 12.5	0.4	2222 469 25 474
0.56	4.6 × 9.9 × 12.5	0.5	2222 469 25 564
0.68	5.0 × 10.3 × 12.5	0.5	2222 469 25 684
0.82	5.5 × 10.8 × 12.5	0.6	2222 469 25 824
1.0	6.0 × 11.3 × 12.5	0.6	2222 469 25 105

Metallized polyester film capacitors

MKT 469

MKT 469 GENERAL DATA

PITCH 10 mm (straight leads)



Specific reference data for the 250 V DC capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle: $C \leq 0.1 \mu\text{F}$ $0.1 \mu\text{F} < C \leq 0.22 \mu\text{F}$	$\leq 75 \times 10^{-4}$ $\leq 75 \times 10^{-4}$	$\leq 120 \times 10^{-4}$ $\leq 120 \times 10^{-4}$	$\leq 220 \times 10^{-4}$ $\leq 225 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 250 V (DC)	120 V/ μs		
R between leads, for $C \leq 0.33 \mu\text{F}$ at 100 V; 1 minute	>30000 M Ω		
R between interconnecting leads and casing; 100 V; 1 minute	>30000 M Ω		
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	400 V; 1 minute		
Withstanding (DC) voltage between leads and case	500 V; 1 minute		

Available 250 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 4.0 \pm 1.0 / -0.5$ mm	$\pm 10\%$	2222 469 45...	on request
		$\pm 5\%$	2222 469 46...	on request
	$l_t = 22.0 \pm 4.0$ mm	$\pm 10\%$	2222 469 41...	on request
		$\pm 5\%$	2222 469 42...	on request
Taped on reel	$H = 18.5$ mm; $P_0 = 12.7$ mm	$\pm 10\%$	2222 469 48...	on request
		$\pm 5\%$	2222 469 49...	on request

Metallized polyester film capacitors**MKT 469** $U_{Rdc} = 250 \text{ V}$; $U_{Rac} = 160 \text{ V}$

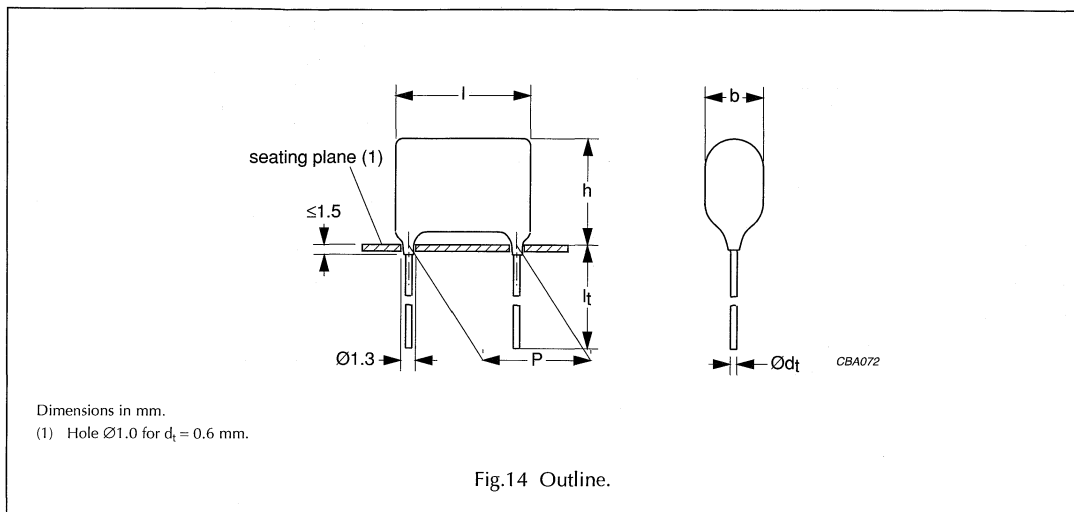
C (μF)	DIMENSIONS $b_{\text{max}} \times h_{\text{max}} \times l_{\text{max}}$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 4.0 +1.0/-0.5 \text{ mm}$
			C-tol = $\pm 10\%$
Pitch = $10.0 \pm 0.4 \text{ mm}$; $d_t = 0.60 \pm 0.06 \text{ mm}$			
0.027	$4.2 \times 9.5 \times 12.5$	0.4	2222 469 45273
0.033	$4.6 \times 9.9 \times 12.5$	0.5	2222 469 45333
0.039	$4.0 \times 9.3 \times 12.5$	0.4	2222 469 45393
0.047	$4.1 \times 9.4 \times 12.5$	0.4	2222 469 45473
0.056	$4.0 \times 9.3 \times 12.5$	0.4	2222 469 45563
0.068	$4.1 \times 9.4 \times 12.5$	0.4	2222 469 45683
0.082	$4.4 \times 9.7 \times 12.5$	0.5	2222 469 45823
0.1	$4.0 \times 9.3 \times 12.5$	0.4	2222 469 45104
0.12	$4.3 \times 9.7 \times 12.5$	0.5	2222 469 45124
0.15	$4.8 \times 10.1 \times 12.5$	0.5	2222 469 45154
0.18	$5.2 \times 10.5 \times 12.5$	0.5	2222 469 45184
0.22	$5.8 \times 11.1 \times 12.5$	0.6	2222 469 45224

Metallized polyester film capacitors

MKT 469

MKT 469 GENERAL DATA

PITCH 10 mm (straight leads)



Specific reference data for the 400 V DC capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle: $C \leq 0.1 \mu\text{F}$	$\leq 75 \times 10^{-4}$	$\leq 120 \times 10^{-4}$	$\leq 200 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 400 V (DC)	170 V/ μs		
R between leads, for $C \leq 0.33 \mu\text{F}$ at 100 V; 1 minute	$>30000 \text{ M}\Omega$		
R between interconnecting leads and casing; 100 V; 1 minute	$>30000 \text{ M}\Omega$		
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	640 V; 1 minute		
Withstanding (DC) voltage between leads and case	800 V; 1 minute		

Available 400 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 4.0 + 1.0 / -0.5 \text{ mm}$	$\pm 10\%$	2222 469 55...	on request
		$\pm 5\%$	2222 469 56...	on request
	$l_t = 22.0 \pm 4.0 \text{ mm}$	$\pm 10\%$	2222 469 51...	on request
		$\pm 5\%$	2222 469 52...	on request
Taped on reel	$H = 18.5 \text{ mm}; P_0 = 12.7 \text{ mm}$	$\pm 10\%$	2222 469 58...	on request
		$\pm 5\%$	2222 469 59...	on request

Metallized polyester film capacitors**MKT 469** $U_{Rdc} = 400 \text{ V}; U_{Rac} = 200 \text{ V}$

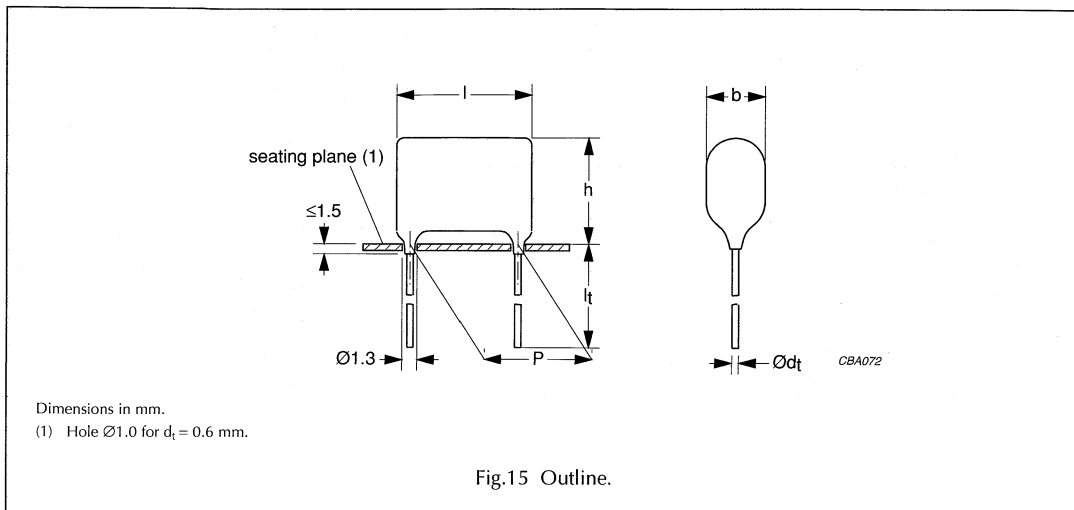
C (μF)	DIMENSIONS $b_{\text{max}} \times h_{\text{max}} \times l_{\text{max}}$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_1 = 4.0 +1.0/-0.5 \text{ mm}$
			C-tol = $\pm 10\%$
Pitch = $10.0 \pm 0.4 \text{ mm}$; $d_1 = 0.60 \pm 0.06 \text{ mm}$			
0.001	4.5 × 9.9 × 12.5	0.5	2222 469 55102
0.0012			2222 469 55122
0.0015			2222 469 55152
0.0018			2222 469 55182
0.0022	4.0 × 9.3 × 12.5	0.4	2222 469 55222
0.0027	4.3 × 9.7 × 12.5	0.5	2222 469 55272
0.0033	4.6 × 9.9 × 12.5	0.5	2222 469 55332
0.0039	4.0 × 9.3 × 12.5	0.4	2222 469 55392
0.0047	4.1 × 9.5 × 12.5	0.4	2222 469 55472
0.0056	4.6 × 9.9 × 12.5	0.5	2222 469 55562
0.0068	4.2 × 9.5 × 12.5	0.4	2222 469 55682
0.0082	4.6 × 9.9 × 12.5	0.5	2222 469 55822
0.01	4.1 × 9.4 × 12.5	0.4	2222 469 55103
0.012	4.5 × 9.9 × 12.5	0.5	2222 469 55123
0.015	4.1 × 9.4 × 12.5	0.4	2222 469 55153
0.018	4.5 × 9.9 × 12.5	0.5	2222 469 55183
0.022	4.0 × 9.3 × 12.5	0.4	2222 469 55223
0.027	4.2 × 9.5 × 12.5	0.4	2222 469 55273
0.033	4.6 × 9.9 × 12.5	0.5	2222 469 55333
0.039	5.0 × 10.3 × 12.5	0.5	2222 469 55393
0.047	4.1 × 9.4 × 12.5	0.4	2222 469 55473
0.056	4.4 × 9.7 × 12.5	0.5	2222 469 55563
0.068	4.8 × 10.1 × 12.5	0.5	2222 469 55683
0.082	5.4 × 10.8 × 12.5	0.6	2222 469 55823
0.1	5.7 × 11.0 × 12.5	0.6	2222 469 55104

Metallized polyester film capacitors

MKT 469

MKT 469 GENERAL DATA

PITCH 10 mm (straight leads)



Specific reference data for the 630 V DC capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle: $C \leq 0.033 \mu\text{F}$	$\leq 75 \times 10^{-4}$	$\leq 120 \times 10^{-4}$	$\leq 200 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 630 V (DC)	120 V/ μs		
R between leads, for $C < 0.33 \mu\text{F}$ at 500 V; 1 minute	$> 30000 \text{ M}\Omega$		
R between interconnecting leads and casing; 100 V; 1 minute	$> 30000 \text{ M}\Omega$		
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	1008 V; 1 minute		
Withstanding (DC) voltage between leads and case	1260 V; 1 minute		

Available 630 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 4.0 + 1.0 / -0.5$ mm	$\pm 10\%$	2222 469 65...	on request
		$\pm 5\%$	2222 469 66...	on request
	$l_t = 22.0 \pm 4.0$ mm	$\pm 10\%$	2222 469 61...	on request
		$\pm 5\%$	2222 469 62...	on request
Taped on reel	$H = 18.5$ mm; $P_0 = 12.7$ mm	$\pm 10\%$	2222 469 68...	on request
		$\pm 5\%$	2222 469 69...	on request

Metallized polyester film capacitors**MKT 469** $U_{Rdc} = 630 \text{ V}$; $U_{Rac} = 250 \text{ V}$

C (μF)	DIMENSIONS $b_{\max} \times h_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 4.0 +1.0/-0.5 \text{ mm}$
			C-tol = $\pm 10\%$
Pitch = $10.0 \pm 0.4 \text{ mm}$; $d_t = 0.60 \pm 0.06 \text{ mm}$			
0.01	$4.1 \times 9.4 \times 12.5$	0.4	2222 469 65103
0.012	$4.5 \times 9.9 \times 12.5$	0.5	2222 469 65123
0.015	$4.9 \times 10.2 \times 12.5$	0.5	2222 469 65153
0.018	$5.4 \times 10.8 \times 12.5$	0.6	2222 469 65183
0.022	$4.8 \times 10.1 \times 12.5$	0.5	2222 469 65223
0.027	$5.3 \times 10.7 \times 12.5$	0.6	2222 469 65273
0.033	$5.9 \times 11.2 \times 12.5$	0.6	2222 469 65333

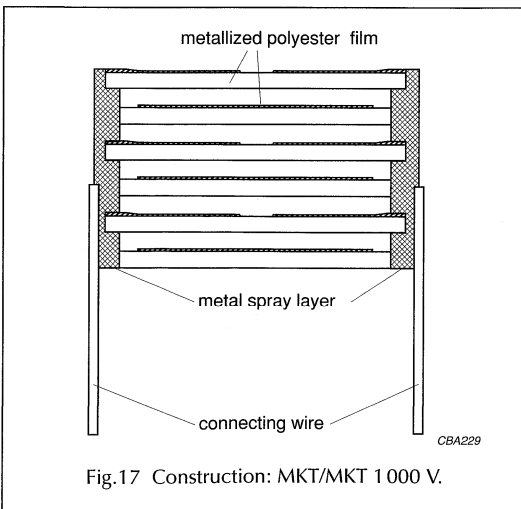
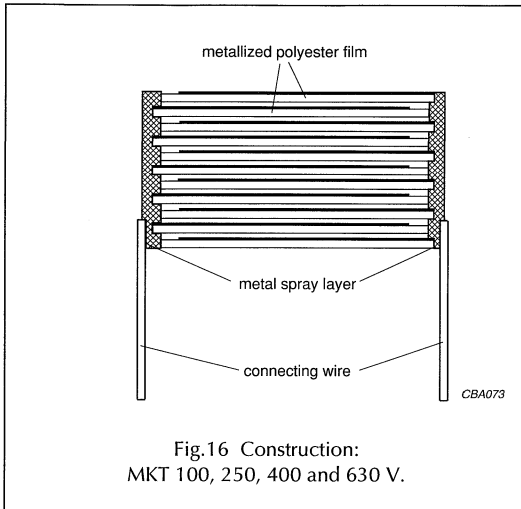
Metallized polyester film capacitors

MKT 467/468/469
MKT/MKT 468

CONSTRUCTION

Description

- Low-inductive wound cell of metallized polyethylene terephthalate 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 tape specifications refer to this handbook, chapter "Packaging information".

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 crimps are in good contact with the printed-circuit board:

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

Storage temperature

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

RATINGS AND CHARACTERISTICS REFERENCE CONDITIONS

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 $50 \pm 2\%$.

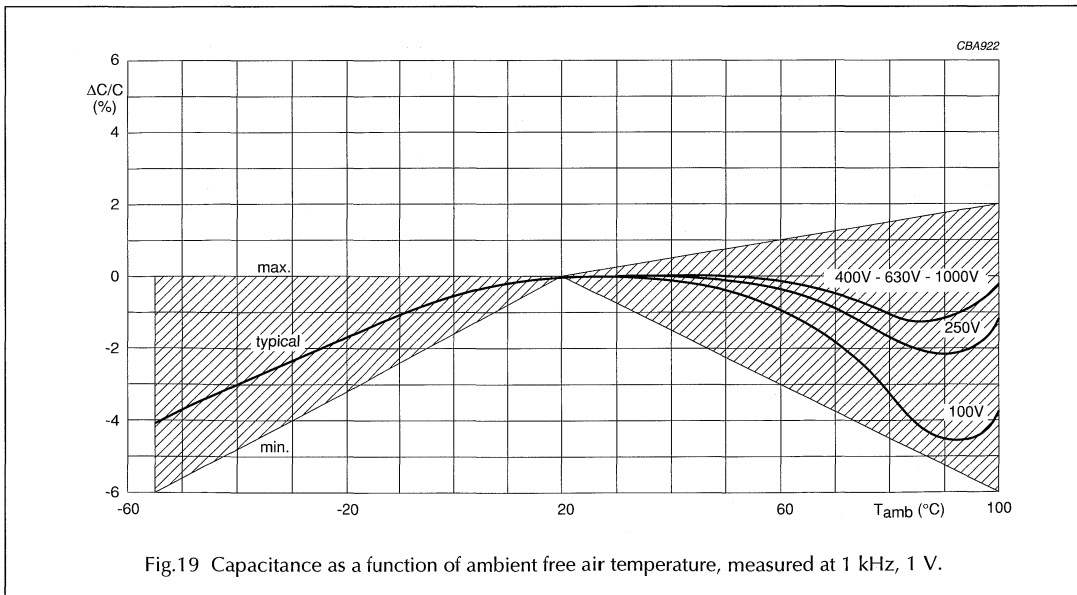
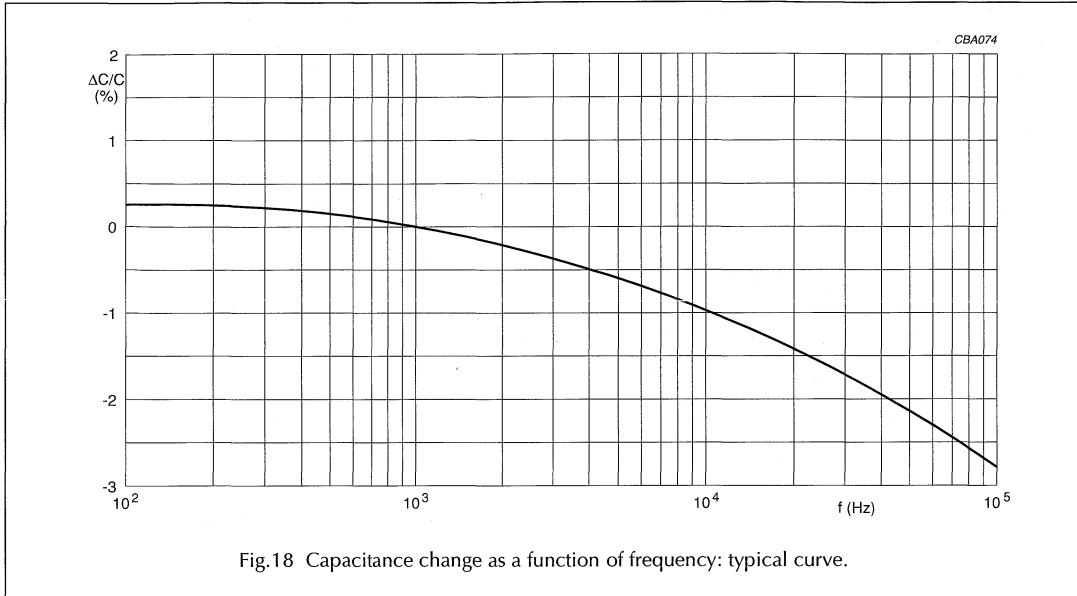
For reference testing, a conditioning period shall be applied over 96 ± 4 hours by heating the products in a circulating air oven at the rated temperature and a relative humidity not exceeding 20%.

Metallized polyester film capacitors

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CHARACTERISTICS

Capacitance



Metallized polyester film capacitors

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Impedance

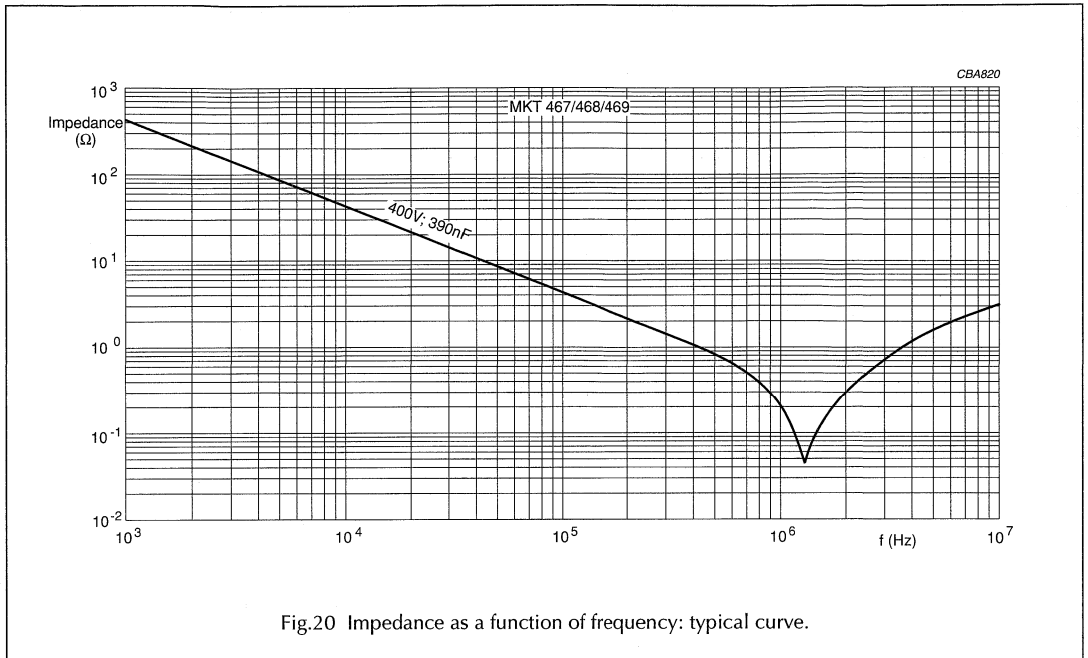


Fig.20 Impedance as a function of frequency: typical curve.

Maximum DC and AC voltage as a function of temperature

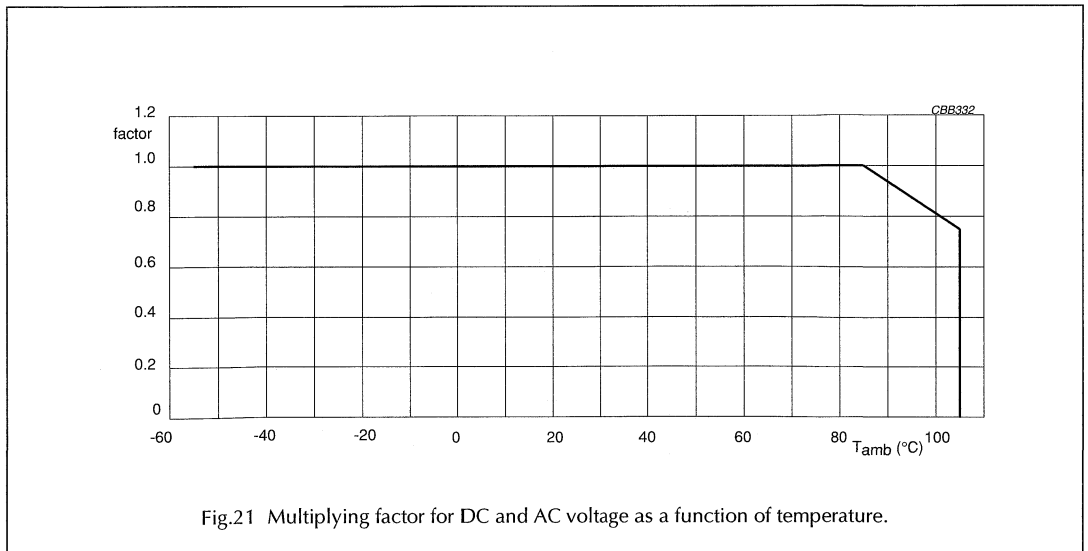
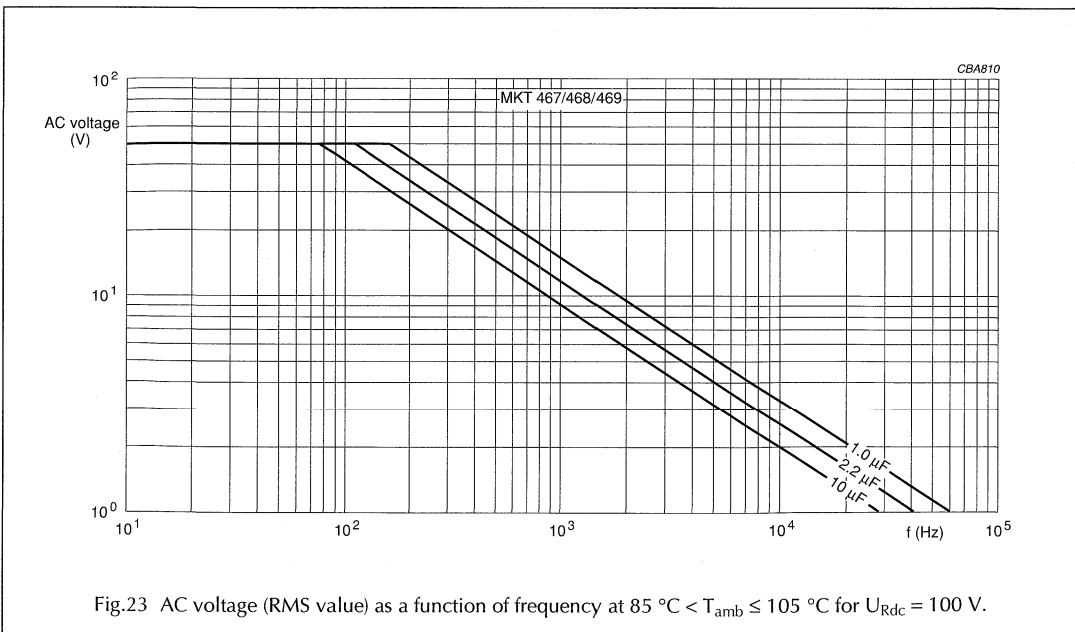
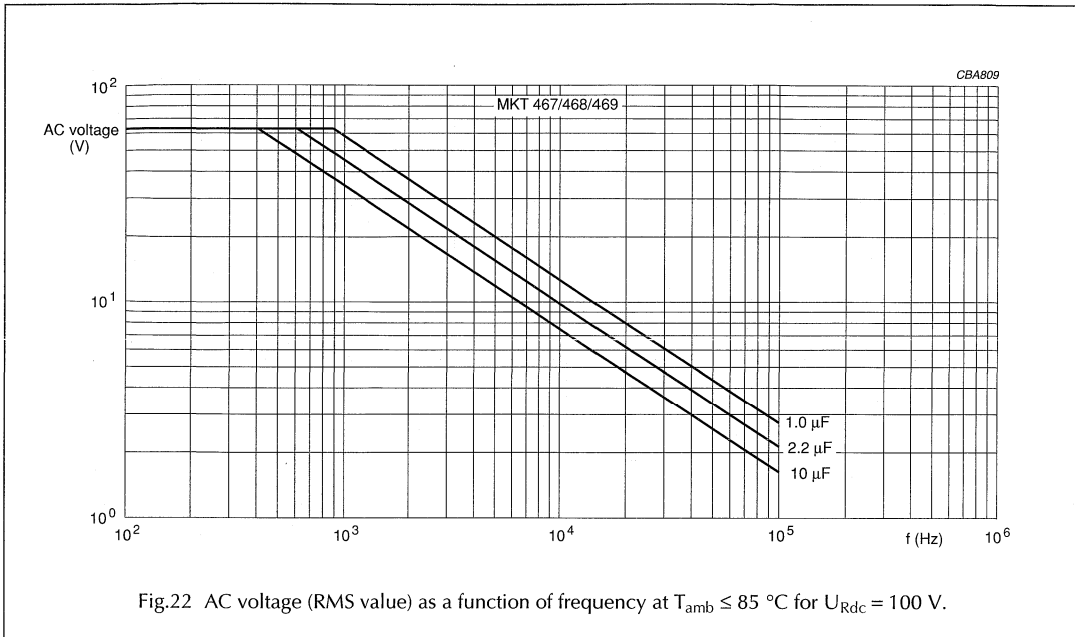


Fig.21 Multiplying factor for DC and AC voltage as a function of temperature.

Metallized polyester film capacitors

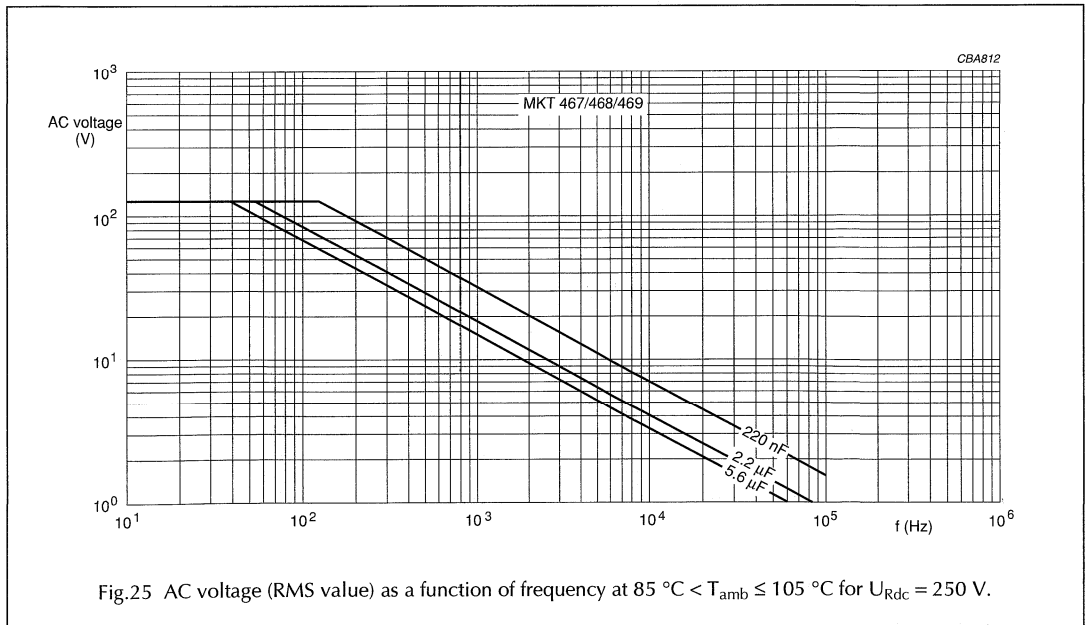
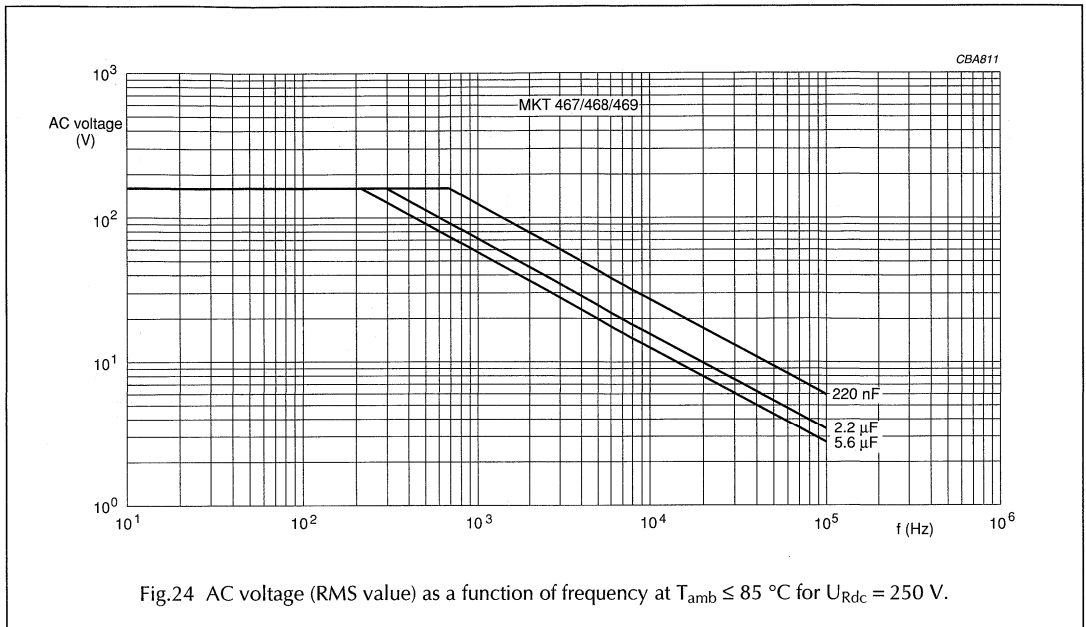
**MKT 467/468/469
MKT/MKT 468**

Maximum RMS voltage and AC current (sinewave) as a function of frequency



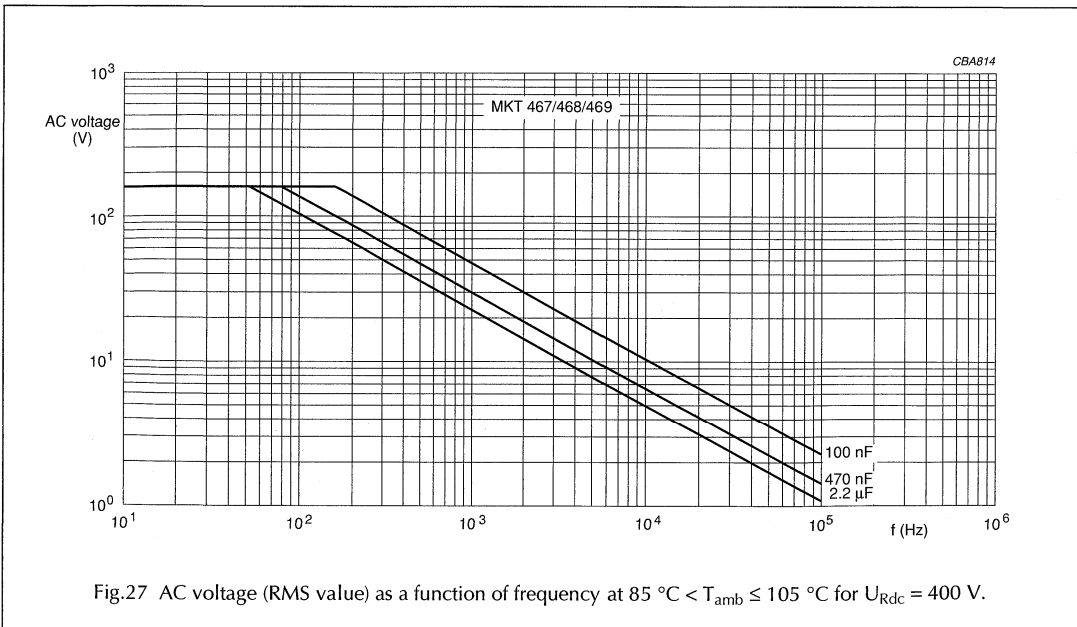
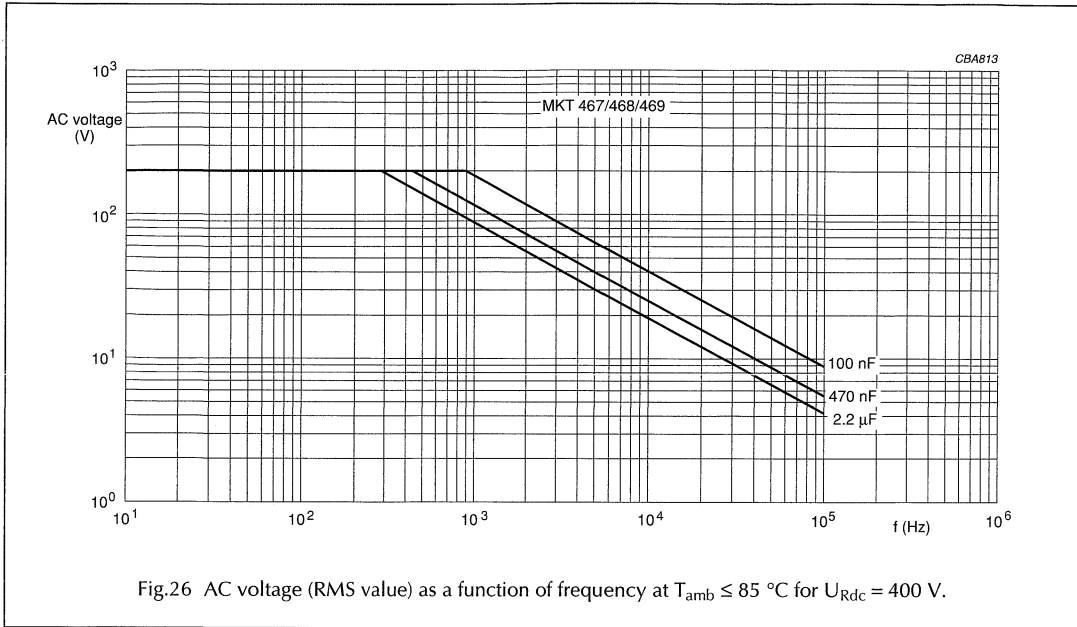
Metallized polyester film capacitors

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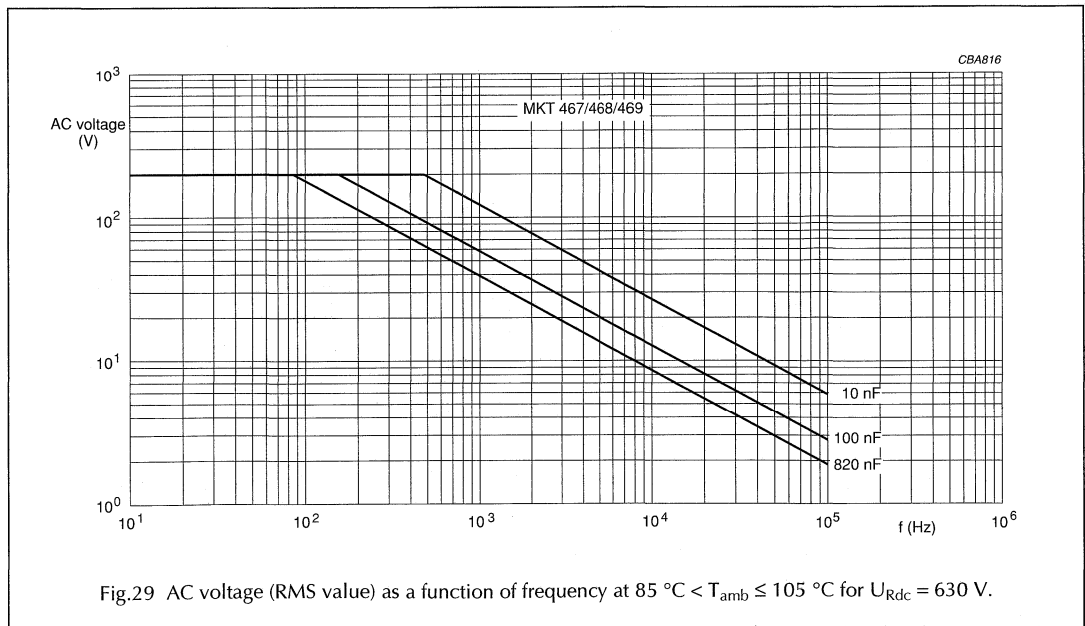
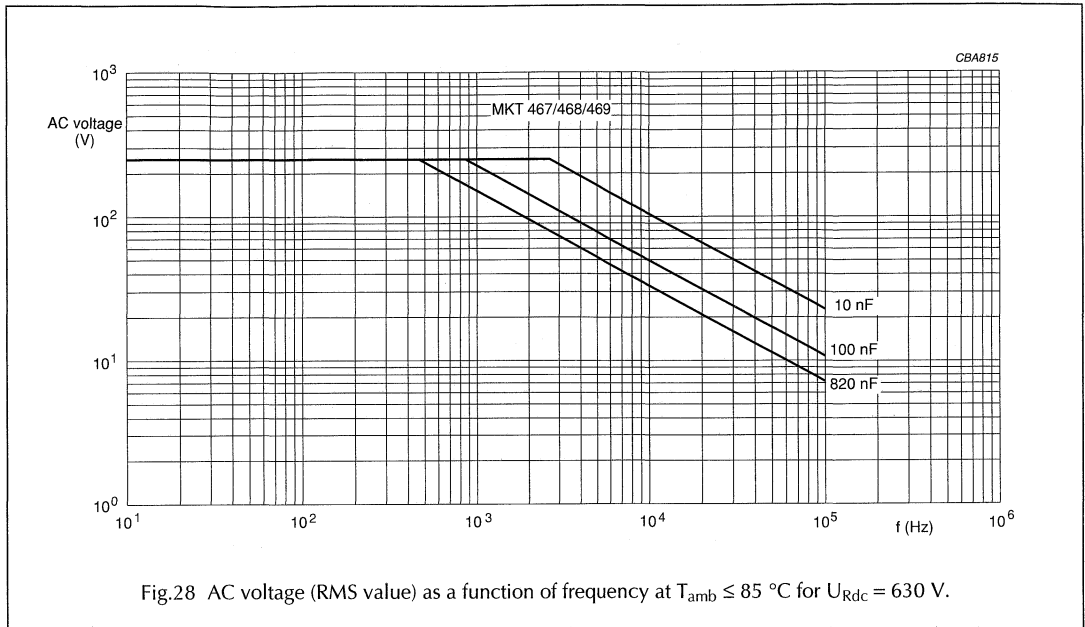


Metallized polyester film capacitors

**MKT 467/468/469
MKT/MKT 468**

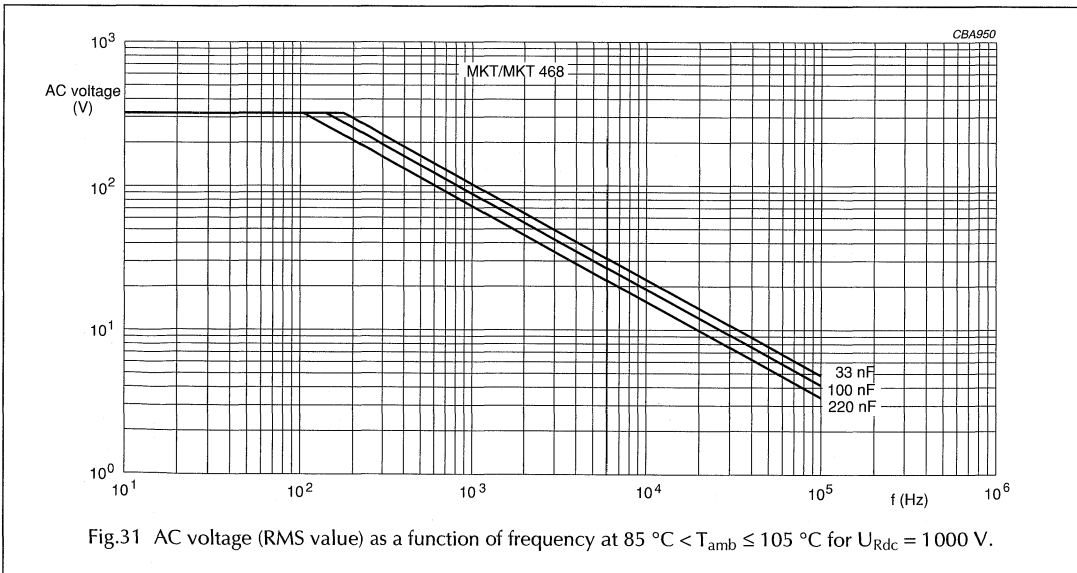
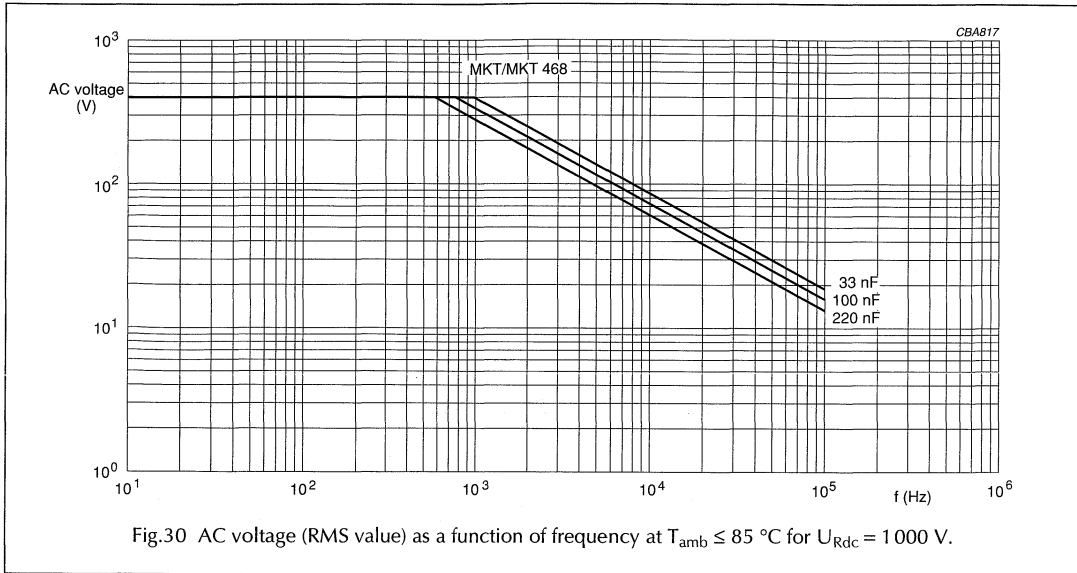


Metallized polyester film capacitors

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Metallized polyester film capacitors

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Maximum RMS current (sinewave) as a function of frequency

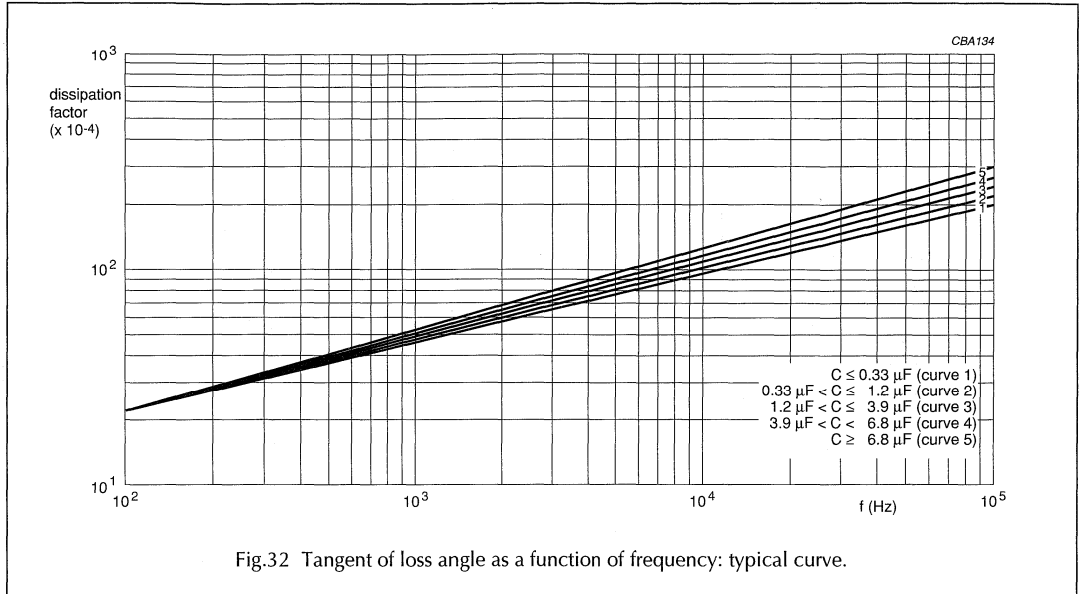
The maximum RMS current is defined by $I_{ac} = \omega \times C \times U_{ac}$.

U_{ac} is the maximum AC voltage depending on the ambient temperature in Figs 22 to 31.

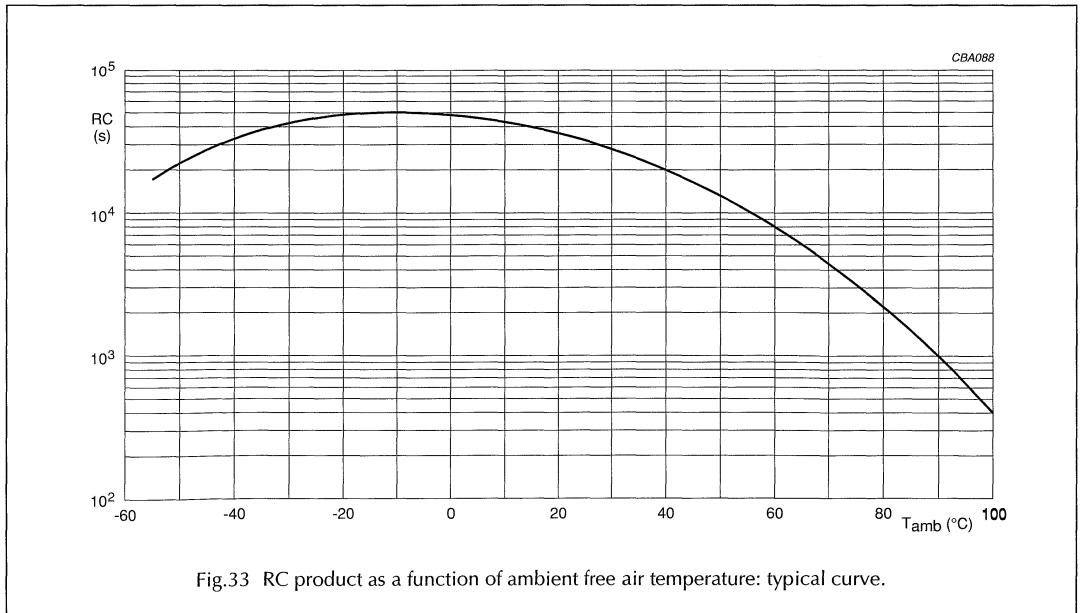
Metallized polyester film capacitors

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Tangent of loss angle



Insulation resistance



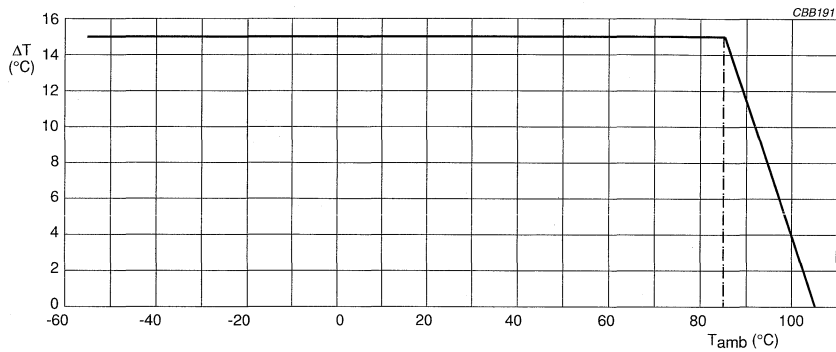
Metallized polyester film capacitors**MKT 467/468/469**
MKT/MKT 468Maximum allowed component temperature rise (ΔT) as a function of the ambient temperature (T_{amb})

Fig.34 Maximum allowed component temperature rise as a function of the ambient temperature.

Metallized polyester film capacitors

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Heat conductivity (G) as a function of pitch and capacitor body thickness in mW/°C

Table 1 Heat conductivity

b _{max} (mm)	ORIGINAL PITCH (mm)			
	10	15	22.5	27.5
4.0	4.0	5.0	–	–
4.5	4.5	6.0	–	–
5.0	5.0	6.0	12.0	13.0
5.5	6.0	6.5	13.0	15.0
6.0	6.0	6.5	13.0	15.0
6.5	6.5	8.0	15.0	17.0
7.0	–	8.0	15.0	17.0
7.5	–	9.0	17.0	18.0
8.0	–	9.0	17.0	20.0
8.5	–	11.0	18.0	20.0
9.0	–	11.0	18.0	22.0
9.5	–	12.0	20.0	22.0
10.0	–	12.0	20.0	23.0
10.5	–	–	22.0	25.0
11.0	–	–	–	25.0
11.5	–	–	–	27.0
12.0	–	–	–	27.0
12.5	–	–	–	30.0
13.0	–	–	–	30.0
13.5	–	–	–	30.0
14.0	–	–	–	30.0
14.5	–	–	–	33.0
15.0	–	–	–	33.0
15.5	–	–	–	37.0
16.0	–	–	–	37.0

Power dissipation and maximum component temperature rise

The power dissipation must be limited in order not to exceed the maximum allowed component temperature rise as a function of the free air ambient temperature.

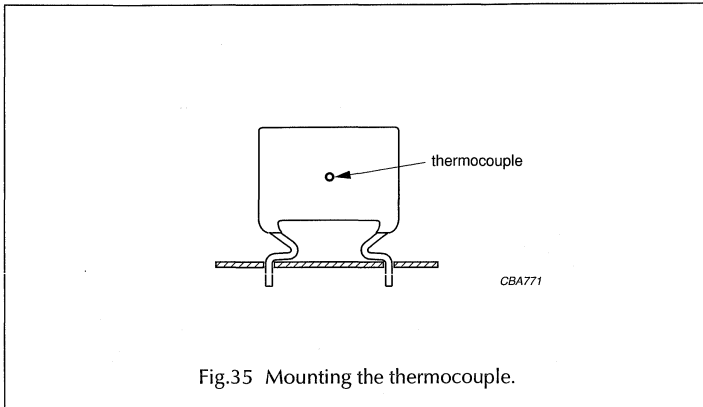
The power dissipation can be calculated according chapter "Introduction", section "Maximum power dissipation".

The component temperature rise (ΔT) can be measured (see section "Measuring the component temperature" for more details) or calculated by $\Delta T = P/G$:

- ΔT = component temperature rise (°C).
- P = power dissipation of the component (mW).
- G = heat conductivity of the component (mW/°C).

Metallized polyester film capacitors**MKT 467/468/469**
MKT/MKT 468**Measuring the component temperature**

A thermocouple must be attached to the capacitor body as in Fig.35.



The temperature is measured in unloaded (T_{amb}) and maximum loaded condition (T_c).

The temperature rise is given by $\Delta T = T_c - T_{amb}$.

To avoid radiation or convection, the capacitor should be tested in a wind-free box.

Metallized polyester film capacitors

MKT 467/468/469
MKT/MKT 468

Application note and limiting conditions

These capacitors are not suitable for mains applications as across-the-line capacitors without additional protection, as described hereunder. These mains applications are strictly regulated in safety standards and therefore electromagnetic interference suppression capacitors conforming the standards must be used.

To select the capacitor for a certain application, the following 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 the maximum U_{p-p} to avoid the ionisation inception level.
3. The voltage pulse slope (dU/dt) shall not exceed the rated voltage pulse slope in an RC-circuit at rated voltage and without ringing. If the pulse voltage is lower than the rated DC voltage, the rated voltage pulse slope may be multiplied by U_{Rdc} and divided by the applied voltage.

For all other pulses following equation must be fulfilled:

$$2 \times \int_0^T \left(\frac{dU}{dt} \right)^2 \times dt < U_{Rdc} \times \left(\frac{dU}{dt} \right)_{rated}$$

T is the pulse duration.

The rated voltage pulse slope is valid for ambient temperatures up to 85 °C. For higher temperatures a derating factor of 3% per K shall be applied.

4. The maximum component surface temperature rise must be lower than the limits in Fig.34.
5. Since in circuits used at voltages over 280 V peak-to-peak the risk for an intrinsically active flammability after a capacitor breakdown (short circuit) increases, it is recommended that the power to the component is limited to 100 times the values mentioned in Table 1 "Heat conductivity".
6. When using these capacitors as across-the-line capacitor in the input filter for mains applications or as series connected with an impedance to the mains the applicant must guarantee that following conditions are fulfilled in any case (spikes and surge voltages from the mains included):

VOLTAGE CONDITIONS FOR 6 ABOVE

ALLOWED VOLTAGES	$T_{amb} \leq 85 \text{ °C}$	$85 \text{ °C} < T_{amb} \leq 105 \text{ °C}$
Maximum continuous RMS voltage	U_{Rac}	$0.8 \times U_{Rac}$
Maximum temporary RMS -overvoltage (<24 hours)	$1.25 \times U_{Rac}$	$1.0 \times U_{Rac}$
Maximum peak voltage (V_{o-p}) (<2 s)	$1.6 \times U_{Rdc}$	$1.3 \times U_{Rdc}$

MKT 467/468/469 MKT/MKT 468

Example

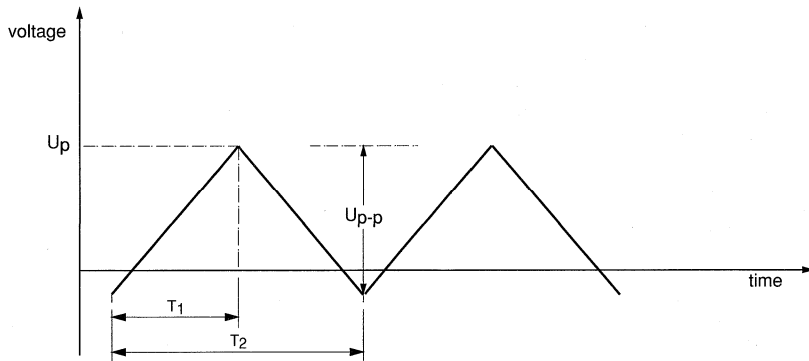
$C = 3300 \text{ nF}$ - 100 V used for the voltage signal shown in Fig.36.

$$U_{p-p} = 80 \text{ V}; U_p = 70 \text{ V}; T_1 = 0.5 \text{ ms}; T_2 = 1 \text{ ms}.$$

The ambient temperature is 35 °C.

Checking the conditions:

1. The peak voltage $U_p = 70 \text{ V}$ is lower than 100 V (DC).
2. The peak-to-peak voltage 80 V is lower than $2 \times \sqrt{2} \times 63 \text{ V(AC)} = 178 U_{p-p}$.
3. The voltage pulse slope $dU/dt = 80 \text{ V}/500 \mu\text{s} = 0.16 \text{ V}/\mu\text{s}$.
This is lower than 20 V/ μs (see specific reference data for each version).
4. The dissipated power is 60 mW as calculated with Fourier terms.
The temperature rise for $b_{\text{max}} = 8.5 \text{ mm}$ and pitch = 15 mm will be $\frac{60 \text{ mW}}{11 \text{ mW}/^\circ\text{C}} = 5.5 \text{ }^\circ\text{C}$.
This is lower than 15 °C temperature rise at 35 °C; see Fig.34.
5. Not applicable.
6. Not applicable.



CBA865

Fig.36 Voltage signal.

Metallized polyester film capacitors

MKT 467/468/469
MKT/MKT 468

MARKING

Product marking

STYLE MKT 467/468/469

Capacitors with original pitch = 10 mm

The capacitors are marked on the top or on the side (for typical example see Fig.37), with the following information:

1. Rated capacitance code in nF, μ F or in accordance with "IEC 60062"
2. Tolerance on rated capacitance: K = $\pm 10\%$; J = $\pm 5\%$
3. Rated voltage (DC).

Capacitors with original pitch = 15, 22.5 and 27.5 mm

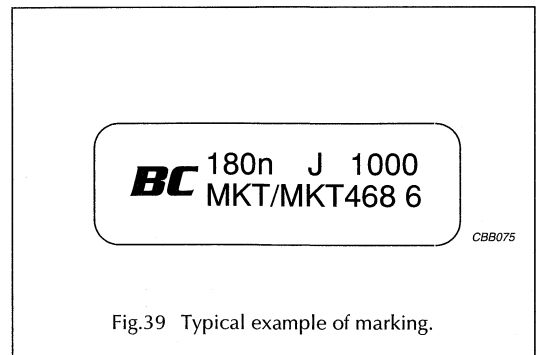
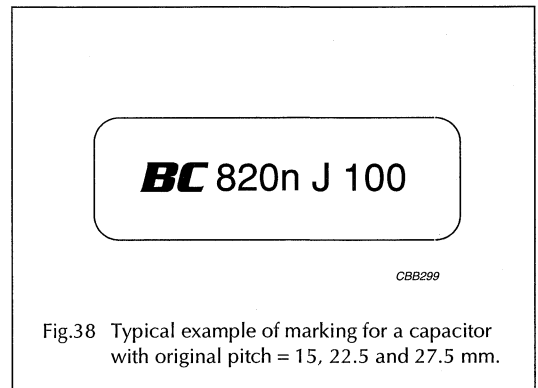
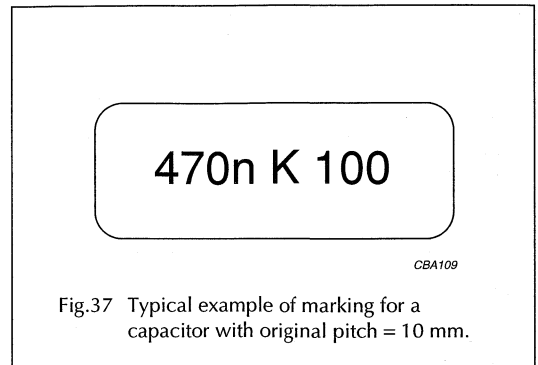
The capacitors are marked on the top or on the side (for typical examples see Fig.38), with the following information:

1. Manufacturer's symbol
2. Rated capacitance code in nF, μ F or in accordance with "IEC 60062"
3. Tolerance on rated capacitance: K = $\pm 10\%$; J = $\pm 5\%$
4. Rated voltage (DC).

STYLE MKT/MKT 468

The capacitors are marked on the top or on the side (for typical example see Fig.39) with the following information:

1. Manufacturer's symbol.
2. Rated capacitance code in nF, μ F or in accordance with "IEC 60062"
3. Tolerance on rated capacitance: K = $\pm 10\%$; J = $\pm 5\%$
4. Rated voltage (DC)
5. Code for dielectric material and construction (MKT/MKT).



Metallized polyester film capacitors**MKT 467/468/469****MKT/MKT 468****QUICK REFERENCE TEST REQUIREMENTS**

TEST	PROCEDURE (quick reference)	REQUIREMENTS
Robustness of leads		
Tensile: "IEC 60068-2-21"	load 10 N; 10 s	no visible damage legible marking $ \Delta C/C \leq 2\%$ $\Delta \tan \delta \leq 30 \times 10^{-4}$; note 1
Bending: "IEC 60068-2-21"	load 5 N; $4 \times 90^\circ$	
Resistance to soldering heat "IEC 60068-2-20"	solder bath: 260 °C; 10 s	
Resistance to solvents	isopropyl alcohol; 23 °C; 5 minutes	
Robustness of component		
Vibration: "IEC 60068-2-6"	10 to 55 Hz; amplitude 0.75 mm or acceleration 98 m/s ² ; 6 hours	$ \Delta C/C \leq 3\%$ $\Delta \tan \delta \leq 30 \times 10^{-4}$; note 1
Shock: "IEC 60068-2-27"	half sinewave; 490 m/s ² ; 11 ms	
Climatic sequence		
Dry heat: "IEC 60068-2-2"	16 hours; 105 °C	$ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 50 \times 10^{-4}$; note 1 $R_{ins} \geq 50\%$ of specified value
Damp heat cyclic, test Db, first cycle: "IEC 60068-2-30"		
Cold: "IEC 60068-2-1"	2 hours; -55 °C	
Damp heat cyclic, test Db, remaining cycles: "IEC 60068-2-30"		
Other applicable tests		
Damp heat, steady state: "IEC 60068-2-3"	56 days; 40 °C; 90 to 95% RH	$ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 50 \times 10^{-4}$; note 1 $R_{ins} \geq 50\%$ of specified value
Endurance (DC): "IEC 60384-2"	2000 hours: $1.25 \times U_{Rdc}$; 85 °C $1 \times U_{Rdc}$; 105 °C	
Heat storage: "IEC 60384-2"	2000 hours; 105 °C	$ \Delta C/C \leq 3\%$ $\Delta \tan \delta \leq 30 \times 10^{-4}$; note 1
Resistance to soldering heat with preheating: "IEC 60384-2"	body temperature: 100 °C; bath temperature: 260 °C; dwell time: 10 s	

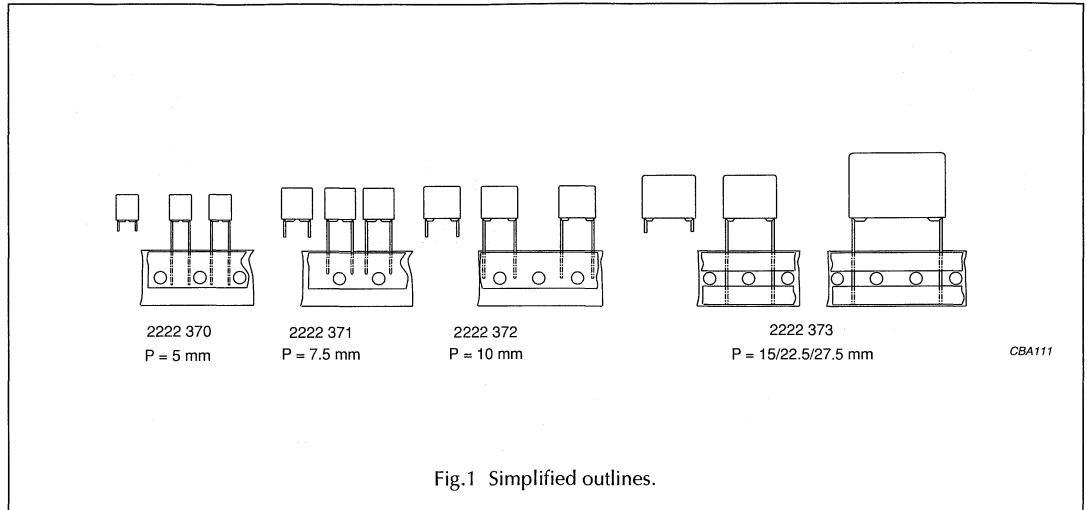
Note

1. Measuring frequency 10 kHz.

Metallized polyester film capacitors MKT 370/371/372/373

MKT RADIAL POTTED TYPE

PITCH 5/7.5/10/15/22.5/27.5 mm



FEATURES

- Low-inductive wound cell of metallized (PETP) film
- Potted with epoxy resin in a flame-retardant case
- Radial leads of solder-coated wire
- Withstands solvents and rinsing liquids
- Small stand-off pips to allow removal of solder flux
- Suitable for high density packaging.

APPLICATIONS

- Blocking and coupling
- Bypass and energy reservoir.

DETAIL SPECIFICATION

For more detailed data and test requirements see "Type detail specification HQN-384-02/103".

QUICK REFERENCE DATA

DESCRIPTION	VALUE
Capacitance range (E12 series)	0.001 to 15 μ F
Capacitance tolerance	$\pm 10\%$; $\pm 5\%$
Rated (DC) voltage	63 V; 100 V; 250 V; 400 V; 630 V
Rated (AC) voltage	40 V; 63 V; 160 V; 220 V; 250 V
Climatic category	55/105/56
Rated temperature	85 °C
Maximum application temperature	105 °C
Reference specification	IEC 60384-2
Performance grade	grade 1 (long life)
Materials	qualified in accordance with UL94 V-0

Metallized polyester film capacitors

MKT 370

COMPOSITION OF CATALOGUE NUMBER

TYPE AND PITCHES	
370	5.08 mm

MULTIPLIER (nF)	
0.1	2
1	3
10	4
100	5

CAPACITANCE
(numerically)

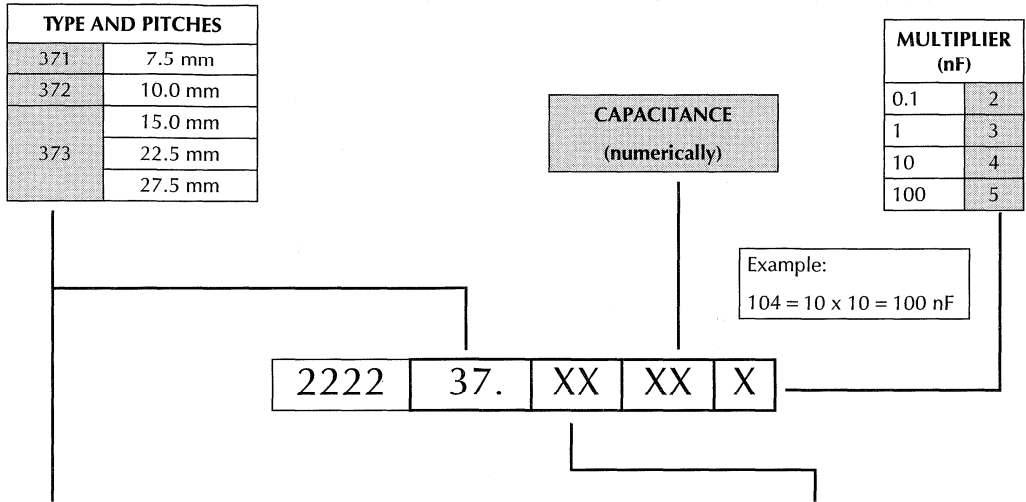
Example:
104 = 10 × 10 = 100 nF

2222 370 XX XX X

TYPE	PACKAGING	LEAD CONFIGURATION	PREFERRED TYPES				
			C-TOL	63 V	100 V	250 V	400 V
370	ammopack		±10%	75	85	35	65
			±5%	76	86	36	66
			ON REQUEST				
370	loose in box	lead length 4.0 mm	±10%	11	21	41	51
			±5%	12	22	42	52
	taped on reel	lead length 26.0 mm	±10%	15	25	45	55
			±5%	16	26	46	56
taped on reel			±10%	18	28	48	58
			±5%	19	29	49	59

Metallized polyester film capacitors

MKT 371/372/373



TYPE	PACKAGING	LEAD CONFIGURATION	PREFERRED TYPES					
			C-TOL	63 V	100 V	250 V	400 V	630 V
371	loose in box	lead length 4.0 mm	±10%	11	21	41	51	–
			±5%	12	22	42	52	–
	ammopack		±10%	38	68	78	88	–
			±5%	39	69	79	89	–
372	loose in box	lead length 4.0 mm	±10%	–	21	41	51	61
373	loose in box	lead length 5.0 mm	±10%	–	23	43	53	63
			ON REQUEST					
371	loose in box	lead length 26.0 mm	±10%	15	25	45	55	–
			±5%	16	26	46	56	–
	taped on reel		±10%	35	65	75	85	–
			±5%	36	66	76	86	–
372	loose in box	lead length 4.0 mm	±5%	–	22	42	52	62
			±10%	–	25	45	55	65
	taped on reel		±5%	–	26	46	56	66
			±10%	–	28	48	58	68
ammopack		±5%	–	29	49	59	69	
		±10%	–	27	47	57	67	
373	loose in box	lead length 5.0 mm	±5%	–	24	44	54	64
			±10%	–	27	47	57	67
	taped on reel		±5%	–	28	48	58	68

Metallized polyester film capacitors

MKT 370

MKT 370 GENERAL DATA

PITCH 5 mm

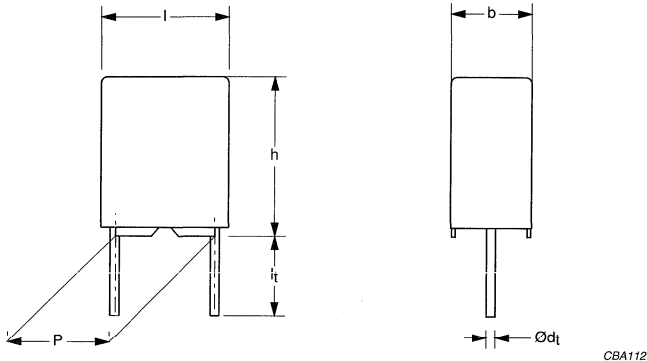


Fig.4 Outline.

Specific reference data for the 63 V DC capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle:			
$C \leq 0.1 \mu\text{F}$	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 250 \times 10^{-4}$
$0.1 \mu\text{F} < C \leq 0.47 \mu\text{F}$	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 300 \times 10^{-4}$
$0.47 \mu\text{F} < C \leq 1.5 \mu\text{F}$	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	–
Rated voltage pulse slope $(dU/dt)_R$ at 63 V (DC)	60 V/ μs		
R between leads, for $C \leq 0.33 \mu\text{F}$ at 10 V; 1 minute	>15000 M Ω		
RC between leads, for:			
$0.33 \mu\text{F} < C \leq 1.0 \mu\text{F}$ at 10 V; 1 minute	>5000 s		
$C > 1.0 \mu\text{F}$ at 10 V; 1 minute	>1000 s		
R between interconnected leads and case (foil method)	>30000 M Ω		
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	100 V; 1 minute		
Withstanding (DC) voltage between leads and case	200 V; 1 minute		

Available 63 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Ammopack	$H = 18.5 \text{ mm}; P_0 = 12.7 \text{ mm}$	$\pm 10\%$	2222 370 75...	preferred
		$\pm 5\%$	2222 370 76...	preferred
Loose in box	$l_t = 4.0 +1.0/-0.5 \text{ mm}$	$\pm 10\%$	2222 370 11...	on request
		$\pm 5\%$	2222 370 12...	on request
	$l_t = 26.0 \pm 2.0 \text{ mm}$	$\pm 10\%$	2222 370 15...	on request
		$\pm 5\%$	2222 370 16...	on request
Taped on reel	$H = 18.5 \text{ mm}; P_0 = 12.7 \text{ mm}$	$\pm 10\%$	2222 370 18...	on request
		$\pm 5\%$	2222 370 19...	on request

Metallized polyester film capacitors

MKT 370

 $U_{Rdc} = 63 \text{ V}$; $U_{Rac} = 40 \text{ V}$

C (μF)	DIMENSIONS $b \times h \times l$ (mm)	MASS (g)	CATALOGUE NUMBER	
			AMMOPACK	
			H = 18.5 mm; P ₀ = 12.7 mm	
			C-tol = $\pm 10\%$	C-tol = $\pm 5\%$
			catalogue number	last 5 digits
Pitch = 5.08 \pm 0.30 mm; d_i = 0.50 \pm 0.05 mm				
0.056	2.5 \times 6.5 \times 7.2	0.25	2222 370 75563	.. 76563
0.068			2222 370 75683	.. 76683
0.082			2222 370 75823	.. 76823
0.1			2222 370 75104	.. 76104
0.12			2222 370 75124	.. 76124
0.15			2222 370 75154	.. 76154
0.18			2222 370 75184	.. 76184
0.22	3.5 \times 8.0 \times 7.2	0.35	2222 370 75224	.. 76224
0.27			2222 370 75274	.. 76274
0.33			2222 370 75334	.. 76334
0.39			2222 370 75394	.. 76394
0.47			2222 370 75474	.. 76474
0.56	4.5 \times 9.0 \times 7.2	0.45	2222 370 75564	.. 76564
0.68			2222 370 75684	.. 76684
0.82	6.0 \times 11.0 \times 7.2	0.60	2222 370 75824	.. 76824
1			2222 370 75105	.. 76105
1.2 ⁽¹⁾			2222 370 75125	.. 76125
1.5 ⁽¹⁾			2222 370 75155	.. 76155

Note

1. For C = 1.2 μF and C = 1.5 μF : $U_{Rdc} = 50 \text{ V}$ and $U_{Rac} = 32 \text{ V}$.

Metallized polyester film capacitors

MKT 370

MKT 370 GENERAL DATA

PITCH 5 mm

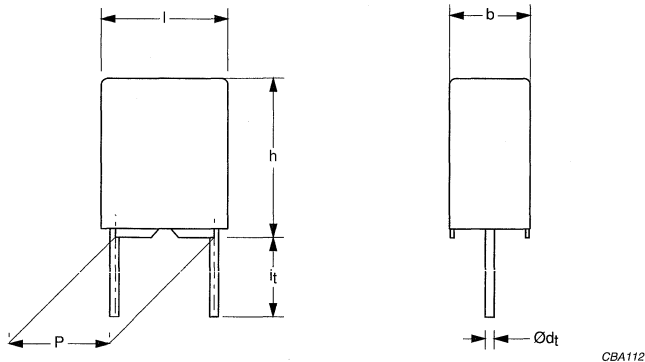


Fig.5 Outline.

Specific reference data for the 100 V DC capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle:			
$C \leq 0.1 \mu\text{F}$	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 250 \times 10^{-4}$
$0.1 \mu\text{F} < C \leq 0.47 \mu\text{F}$	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 300 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 100 V (DC)	110 V/ μs		
R between leads, for $C \leq 0.33 \mu\text{F}$ at 100 V; 1 minute	$>15000 \text{ M}\Omega$		
RC between leads, for $C > 0.33 \mu\text{F}$ at 100 V; 1 minute	$>5000 \text{ s}$		
R between interconnected leads and case (foil method)	$>30000 \text{ M}\Omega$		
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	160 V; 1 minute		
Withstanding (DC) voltage between leads and case	200 V; 1 minute		

Available 100 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Ammopack	$H = 18.5 \text{ mm}; P_0 = 12.7 \text{ mm}$	$\pm 10\%$	2222 370 85...	preferred
		$\pm 5\%$	2222 370 86...	preferred
Loose in box	$l_t = 4.0 +1.0/-0.5 \text{ mm}$	$\pm 10\%$	2222 370 21...	on request
		$\pm 5\%$	2222 370 22...	on request
	$l_t = 26.0 \pm 2.0 \text{ mm}$	$\pm 10\%$	2222 370 25...	on request
		$\pm 5\%$	2222 370 26...	on request
Taped on reel	$H = 18.5 \text{ mm}; P_0 = 12.7 \text{ mm}$	$\pm 10\%$	2222 370 28...	on request
		$\pm 5\%$	2222 370 29...	on request

Metallized polyester film capacitors

MKT 370

 $U_{Rdc} = 100 \text{ V}$; $U_{Rac} = 63 \text{ V}$

C (μF)	DIMENSIONS $b \times h \times l$ (mm)	MASS (g)	CATALOGUE NUMBER	
			AMMOPACK	
			H = 18.5 mm; P ₀ = 12.7 mm	
			C-tol = $\pm 10\%$	C-tol = $\pm 5\%$
			catalogue number	last 5 digits
Pitch = $5.08 \pm 0.30 \text{ mm}$; $d_t = 0.50 \pm 0.05 \text{ mm}$				
0.012	$2.5 \times 6.5 \times 7.2$	0.25	2222 370 85123	.. 86123
0.015			2222 370 85153	.. 86153
0.018			2222 370 85183	.. 86183
0.022			2222 370 85223	.. 86223
0.027			2222 370 85273	.. 86273
0.033			2222 370 85333	.. 86333
0.039			2222 370 85393	.. 86393
0.047			2222 370 85473	.. 86473
0.056			2222 370 85563	.. 86563
0.068			2222 370 85683	.. 86683
0.082	2222 370 85823	.. 86823		
0.10	$3.5 \times 8.0 \times 7.2$	0.35	2222 370 85104	.. 86104
0.12			2222 370 85124	.. 86124
0.15			2222 370 85154	.. 86154
0.18			2222 370 85184	.. 86184
0.22	$4.5 \times 9.0 \times 7.2$	0.45	2222 370 85224	.. 86224
0.27			2222 370 85274	.. 86274
0.33			2222 370 85334	.. 86334
0.39	$6.0 \times 11.0 \times 7.2$	0.65	2222 370 85394	.. 86394
0.47			2222 370 85474	.. 86474

Metallized polyester film capacitors

MKT 370

MKT 370 GENERAL DATA

PITCH 5 mm

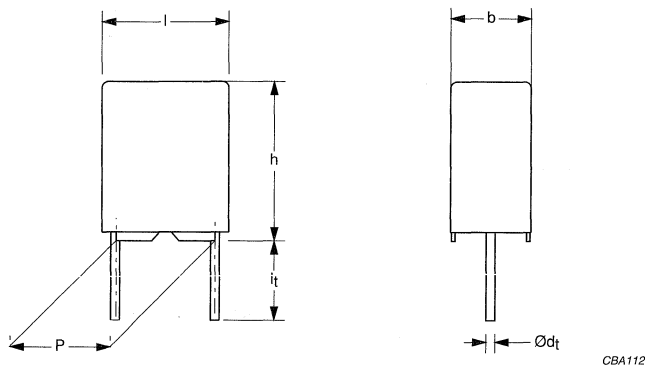


Fig.6 Outline.

Specific reference data for the 250 V DC capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 250 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 250 V (DC)	330 V/ μ s		
R between leads at 100 V; 1 minute	>30000 M Ω		
R between interconnected leads and case (foil method)	>30000 M Ω		
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	400 V; 1 minute		
Withstanding (DC) voltage between leads and case	500 V; 1 minute		

Available 250 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Ammopack	H = 18.5 mm; P ₀ = 12.7 mm	±10%	2222 370 35...	preferred
		±5%	2222 370 36...	preferred
Loose in box	l _t = 4.0 +1.0/-0.5 mm	±10%	2222 370 41...	on request
		±5%	2222 370 42...	on request
	l _t = 26.0 ±2.0 mm	±10%	2222 370 45...	on request
		±5%	2222 370 46...	on request
Taped on reel	H = 18.5 mm; P ₀ = 12.7 mm	±10%	2222 370 48...	on request
		±5%	2222 370 49...	on request

Metallized polyester film capacitors

MKT 370

 $U_{Rdc} = 250 \text{ V}$; $U_{Rac} = 160 \text{ V}$

C (μF)	DIMENSIONS $b \times h \times l$ (mm)	MASS (g)	CATALOGUE NUMBER	
			AMMOPACK	
			H = 18.5 mm; P ₀ = 12.7 mm	
			C-tol = $\pm 10\%$	C-tol = $\pm 5\%$
			catalogue number	last 5 digits
Pitch = $5.08 \pm 0.30 \text{ mm}$; $d_t = 0.50 \pm 0.05 \text{ mm}$				
0.0039	2.5 × 6.5 × 7.2	0.25	2222 370 35392	.. 36392
0.0047			2222 370 35472	.. 36472
0.0056			2222 370 35562	.. 36562
0.0068			2222 370 35682	.. 36682
0.0082			2222 370 35822	.. 36822
0.01			2222 370 35103	.. 36103
0.012			2222 370 35123	.. 36123
0.015			2222 370 35153	.. 36153
0.018			2222 370 35183	.. 36183
0.022	3.5 × 8.0 × 7.2	0.35	2222 370 35223	.. 36223
0.027			2222 370 35273	.. 36273
0.033			2222 370 35333	.. 36333
0.039	4.5 × 9.0 × 7.2	0.45	2222 370 35393	.. 36393
0.047			2222 370 35473	.. 36473
0.056			2222 370 35563	.. 36563
0.068	6.0 × 11.0 × 7.2	0.60	2222 370 35683	.. 36683
0.082			2222 370 35823	.. 36823
0.1			2222 370 35104	.. 36104

Metallized polyester film capacitors

MKT 370

MKT 370 GENERAL DATA

PITCH 5 mm

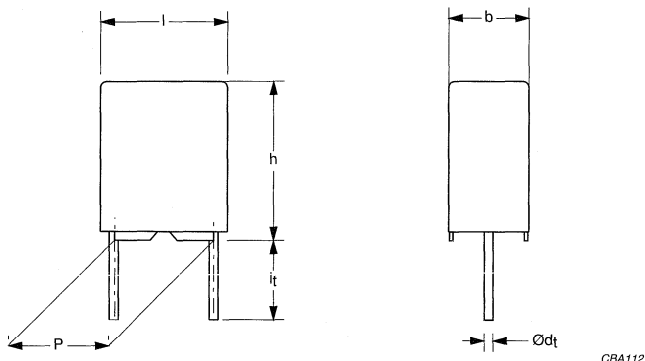


Fig.7 Outline.

Specific reference data for the 400 V DC capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 250 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 400 V (DC)	630 V/ μ s		
R between leads at 100 V; 1 minute	>30000 M Ω		
R between interconnected leads and case (foil method)	>30000 M Ω		
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	640 V; 1 minute		
Withstanding (DC) voltage between leads and case	800 V; 1 minute		

Available 400 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Ammopack	H = 18.5 mm; P ₀ = 12.7 mm	±10%	2222 370 65...	preferred
		±5%	2222 370 66...	preferred
Loose in box	l _t = 4.0 +1.0/-0.5 mm	±10%	2222 370 51...	on request
		±5%	2222 370 52...	on request
	l _t = 26.0 ±2.0 mm	±10%	2222 370 55...	on request
		±5%	2222 370 56...	on request
Taped on reel	H = 18.5 mm; P ₀ = 12.7 mm	±10%	2222 370 58...	on request
		±5%	2222 370 59...	on request

Metallized polyester film capacitors

MKT 370

 $U_{Rdc} = 400 \text{ V}; U_{Rac} = 220 \text{ V}$

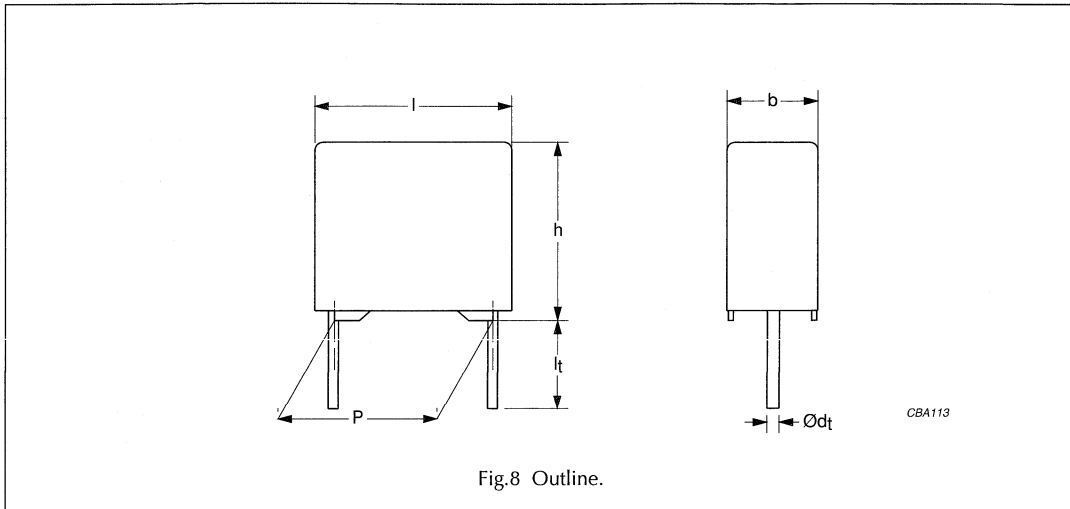
C (μF)	DIMENSIONS $b \times h \times l$ (mm)	MASS (g)	CATALOGUE NUMBER	
			AMMOPACK	
			H = 18.5 mm; P ₀ = 12.7 mm	
			C-tol = $\pm 10\%$	C-tol = $\pm 5\%$
			catalogue number	last 5 digits
Pitch = 5.08 \pm 0.30 mm; d_t = 0.50 \pm 0.05 mm				
0.001	2.5 \times 6.5 \times 7.2	0.25	2222 370 65102	.. 66102
0.0012			2222 370 65122	.. 66122
0.0015			2222 370 65152	.. 66152
0.0018			2222 370 65182	.. 66182
0.0022			2222 370 65222	.. 66222
0.0027			2222 370 65272	.. 66272
0.0033			2222 370 65332	.. 66332
0.0039			2222 370 65392	.. 66392
0.0047			2222 370 65472	.. 66472
0.0056			2222 370 65562	.. 66562
0.0068			2222 370 65682	.. 66682
0.0082			2222 370 65822	.. 66822
0.01			3.5 \times 8.0 \times 7.2	0.35
0.012	2222 370 65123	.. 66123		
0.015	2222 370 65153	.. 66153		
0.018	4.5 \times 9.0 \times 7.2	0.45	2222 370 65183	.. 66183
0.022			2222 370 65223	.. 66223
0.027			2222 370 65273	.. 66273
0.033	6.0 \times 11.0 \times 7.2	0.60	2222 370 65333	.. 66333
0.039			2222 370 65393	.. 66393
0.047			2222 370 65473	.. 66473

Metalized polyester film capacitors

MKT 371

MKT 371 GENERAL DATA

PITCH 7.5 mm



Specific reference data for the 63 V DC capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle: C ≤ 0.1 µF	≤75 × 10 ⁻⁴	≤130 × 10 ⁻⁴	≤250 × 10 ⁻⁴
0.1 µF < C ≤ 0.47 µF	≤75 × 10 ⁻⁴	≤130 × 10 ⁻⁴	≤300 × 10 ⁻⁴
0.47 µF < C ≤ 1.0 µF	≤75 × 10 ⁻⁴	≤130 × 10 ⁻⁴	–
Rated voltage pulse slope (dU/dt) _R at 63 V (DC)	18 V/µs		
R between leads, for C ≤ 0.33 µF at 10 V; 1 minute	>15000 MΩ		
RC between leads, for C > 0.33 µF at 10 V; 1 minute	>5000 s		
R between interconnected leads and case (foil method)	>30000 MΩ		
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	100 V; 1 minute		
Withstanding (DC) voltage between leads and case	200 V; 1 minute		

Available 63 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	l _t = 4.0 +1.0/-0.5 mm	±10%	2222 371 11...	preferred
		±5%	2222 371 12...	preferred
Ammopack	H = 18.5 mm; P ₀ = 12.7 mm	±10%	2222 371 38...	preferred
		±5%	2222 371 39...	preferred
Loose in box	l _t = 26.0 ±2.0 mm	±10%	2222 371 15...	on request
		±5%	2222 371 16...	on request
Taped on reel	H = 18.5 mm; P ₀ = 12.7 mm	±10%	2222 371 35...	on request
		±5%	2222 371 36...	on request

Metallized polyester film capacitors

MKT 371

 $U_{Rdc} = 63 \text{ V}$; $U_{Rac} = 40 \text{ V}$

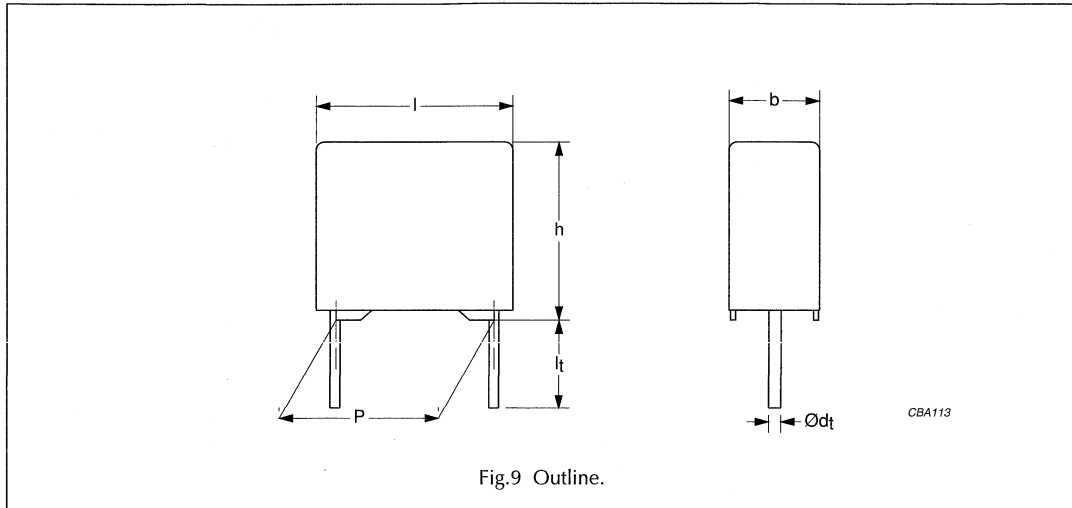
C (μF)	DIMENSIONS $b \times h \times l$ (mm)	MASS (g)	CATALOGUE NUMBER			
			LOOSE IN BOX		AMMOPACK	
			$l_t = 4.0 +1.0/-0.5 \text{ mm}$		$H = 18.5 \text{ mm}$; $P_0 = 12.7 \text{ mm}$	
			C-tol = $\pm 10\%$	C-tol = $\pm 5\%$	C-tol = $\pm 10\%$	C-tol = $\pm 5\%$
			catalogue number	last 5 digits	last 5 digits	
Pitch = $7.62 +0.30/-0.40 \text{ mm}$; $d_t = 0.50 \pm 0.05 \text{ mm}$						
0.056	2.5 × 6.5 × 10.0	0.3	2222 371 11563	.. 12563	.. 38563	.. 39563
0.068			2222 371 11683	.. 12683	.. 38683	.. 39683
0.082			2222 371 11823	.. 12823	.. 38823	.. 39823
0.1			2222 371 11104	.. 12104	.. 38104	.. 39104
0.12	3.0 × 8.0 × 10.0	0.4	2222 371 11124	.. 12124	.. 38124	.. 39124
0.15			2222 371 11154	.. 12154	.. 38154	.. 39154
0.18			2222 371 11184	.. 12184	.. 38184	.. 39184
0.22			2222 371 11224	.. 12224	.. 38224	.. 39224
0.27	4.0 × 9.0 × 10.0	0.5	2222 371 11274	.. 12274	.. 38274	.. 39274
0.33			2222 371 11334	.. 12334	.. 38334	.. 39334
0.39			2222 371 11394	.. 12394	.. 38394	.. 39394
0.47			2222 371 11474	.. 12474	.. 38474	.. 39474
0.56			2222 371 11564	.. 12564	.. 38564	.. 39564
0.68			2222 371 11684	.. 12684	.. 38684	.. 39684
0.82	5.0 × 10.5 × 10.0	0.7	2222 371 11824	.. 12824	.. 38824	.. 39824
1.0			2222 371 11105	.. 12105	.. 38105	.. 39105

Metallized polyester film capacitors

MKT 371

MKT 371 GENERAL DATA

PITCH 7.5 mm



Specific reference data for the 100 V DC capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle: C ≤ 0.1 μF	≤75 × 10 ⁻⁴	≤130 × 10 ⁻⁴	≤250 × 10 ⁻⁴
0.1 μF < C ≤ 0.47 μF	≤75 × 10 ⁻⁴	≤130 × 10 ⁻⁴	≤300 × 10 ⁻⁴
Rated voltage pulse slope (dU/dt) _R at 100 V (DC)	36 V/μs		
R between leads, for C ≤ 0.33 μF at 100 V; 1 minute	>15000 MΩ		
RC between leads, for C > 0.33 μF at 100 V; 1 minute	>5000 s		
R between interconnected leads and case (foil method)	>30000 MΩ		
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	160 V; 1 minute		
Withstanding (DC) voltage between leads and case	200 V; 1 minute		

Available 100 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	l _t = 4.0 +1.0/-0.5 mm	±10%	2222 371 21...	preferred
		±5%	2222 371 22...	preferred
Ammopack	H = 18.5 mm; P ₀ = 12.7 mm	±10%	2222 371 68...	preferred
		±5%	2222 371 69...	preferred
Loose in box	l _t = 26.0 ±2.0 mm	±10%	2222 371 25...	on request
		±5%	2222 371 26...	on request
Taped on reel	H = 18.5 mm; P ₀ = 12.7 mm	±10%	2222 371 65...	on request
		±5%	2222 371 66...	on request

Metallized polyester film capacitors

MKT 371

 $U_{Rdc} = 100 \text{ V}$; $U_{Rac} = 63 \text{ V}$

C (μF)	DIMENSIONS $b \times h \times l$ (mm)	MASS (g)	CATALOGUE NUMBER			
			LOOSE IN BOX		AMMOPACK	
			$l_t = 4.0 +1.0/-0.5 \text{ mm}$		$H = 18.5 \text{ mm}$; $P_0 = 12.7 \text{ mm}$	
			C-tol = $\pm 10\%$	C-tol = $\pm 5\%$	C-tol = $\pm 10\%$	C-tol = $\pm 5\%$
			catalogue number	last 5 digits	last 5 digits	
Pitch = $7.62 +0.30/-0.40 \text{ mm}$; $d_t = 0.50 \pm 0.05 \text{ mm}$						
0.018	2.5 × 6.5 × 10.0	0.3	2222 371 21183	.. 22183	.. 68183	.. 69183
0.022			2222 371 21223	.. 22223	.. 68223	.. 69223
0.027			2222 371 21273	.. 22273	.. 68273	.. 69273
0.033			2222 371 21333	.. 22333	.. 68333	.. 69333
0.039			2222 371 21393	.. 22393	.. 68393	.. 69393
0.047			2222 371 21473	.. 22473	.. 68473	.. 69473
0.056	3.0 × 8.0 × 10.0	0.4	2222 371 21563	.. 22563	.. 68563	.. 69563
0.068			2222 371 21683	.. 22683	.. 68683	.. 69683
0.082			2222 371 21823	.. 22823	.. 68823	.. 69823
0.1			2222 371 21104	.. 22104	.. 68104	.. 69104
0.12	4.0 × 9.0 × 10.0	0.5	2222 371 21124	.. 22124	.. 68124	.. 69124
0.15			2222 371 21154	.. 22154	.. 68154	.. 69154
0.18			2222 371 21184	.. 22184	.. 68184	.. 69184
0.22			2222 371 21224	.. 22224	.. 68224	.. 69224
0.27	5.0 × 10.5 × 10.0	0.7	2222 371 21274	.. 22274	.. 68274	.. 69274
0.33			2222 371 21334	.. 22334	.. 68334	.. 69334
0.39			2222 371 21394	.. 22394	.. 68394	.. 69394
0.47			2222 371 21474	.. 22474	.. 68474	.. 69474

Metallized polyester film capacitors

MKT 371

MKT 371 GENERAL DATA

PITCH 7.5 mm

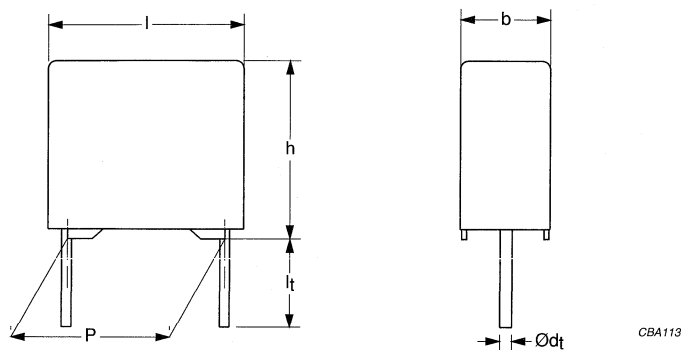


Fig.10 Outline.

Specific reference data for the 250 V DC capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle:			
$C \leq 0.1 \mu\text{F}$	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 250 \times 10^{-4}$
$0.1 \mu\text{F} < C \leq 0.12 \mu\text{F}$	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 300 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 250 V (DC)	70 V/ μs		
R between leads at 100 V; 1 minute	>30000 M Ω		
R between interconnected leads and case (foil method)	>30000 M Ω		
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	400 V; 1 minute		
Withstanding (DC) voltage between leads and case	500 V; 1 minute		

Available 250 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 4.0 +1.0/-0.5$ mm	$\pm 10\%$	2222 371 41...	preferred
		$\pm 5\%$	2222 371 42...	preferred
Ammopack	$H = 18.5$ mm; $P_0 = 12.7$ mm	$\pm 10\%$	2222 371 78...	preferred
		$\pm 5\%$	2222 371 79...	preferred
Loose in box	$l_t = 26.0 \pm 2.0$ mm	$\pm 10\%$	2222 371 45...	on request
		$\pm 5\%$	2222 371 46...	on request
Taped on reel	$H = 18.5$ mm; $P_0 = 12.7$ mm	$\pm 10\%$	2222 371 75...	on request
		$\pm 5\%$	2222 371 76...	on request

Metallized polyester film capacitors

MKT 371

 $U_{Rdc} = 250 \text{ V}$; $U_{Rac} = 160 \text{ V}$

C (μF)	DIMENSIONS $b \times h \times l$ (mm)	MASS (g)	CATALOGUE NUMBER			
			LOOSE IN BOX		AMMOPACK	
			$l_t = 4.0 +1.0/-0.5 \text{ mm}$		$H = 18.5 \text{ mm}$; $P_0 = 12.7 \text{ mm}$	
			C-tol = $\pm 10\%$	C-tol = $\pm 5\%$	C-tol = $\pm 10\%$	C-tol = $\pm 5\%$
			catalogue number	last 5 digits	last 5 digits	
Pitch = $7.62 +0.30/-0.40 \text{ mm}$; $d_t = 0.50 \pm 0.05 \text{ mm}$						
0.0082	2.5 × 6.5 × 10.0	0.3	2222 371 41822	.. 42822	.. 78822	.. 79822
0.01			2222 371 41103	.. 42103	.. 78103	.. 79103
0.012			2222 371 41123	.. 42123	.. 78123	.. 79123
0.015			2222 371 41153	.. 42153	.. 78153	.. 79153
0.018	3.0 × 8.0 × 10.0	0.4	2222 371 41183	.. 42183	.. 78183	.. 79183
0.022			2222 371 41223	.. 42223	.. 78223	.. 79223
0.027			2222 371 41273	.. 42273	.. 78273	.. 79273
0.033			2222 371 41333	.. 42333	.. 78333	.. 79333
0.039			2222 371 41393	.. 42393	.. 78393	.. 79393
0.047			2222 371 41473	.. 42473	.. 78473	.. 79473
0.056	4.0 × 9.0 × 10.0	0.5	2222 371 41563	.. 42563	.. 78563	.. 79563
0.068			2222 371 41683	.. 42683	.. 78683	.. 79683
0.082			2222 371 41823	.. 42823	.. 78823	.. 79823
0.1			2222 371 41104	.. 42104	.. 78104	.. 79104
0.12	5.0 × 10.5 × 10.0	0.7	2222 371 41124	.. 42124	.. 78124	.. 79124

Metallized polyester film capacitors

MKT 371

MKT 371 GENERAL DATA

PITCH 7.5 mm

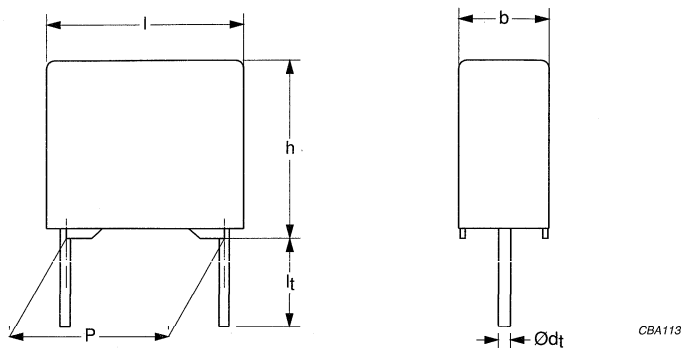


Fig.11 Outline.

Specific reference data for the 400 V DC capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 250 \times 10^{-4}$
Rated voltage pulse slope (dU/dt) _R at 400 V (DC)	190 V/μs		
R between leads at 100 V; 1 minute	>30000 MΩ		
R between interconnected leads and case (foil method)	>30000 MΩ		
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	640 V; 1 minute		
Withstanding (DC) voltage between leads and case	800 V; 1 minute		

Available 400 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 4.0 +1.0/-0.5$ mm	±10%	2222 371 51...	preferred
		±5%	2222 371 52...	preferred
Ammopack	H = 18.5 mm; P ₀ = 12.7 mm	±10%	2222 371 88...	preferred
		±5%	2222 371 89...	preferred
Loose in box	$l_t = 26.0 \pm 2.0$ mm	±10%	2222 371 55...	on request
		±5%	2222 371 56...	on request
Taped on reel	H = 18.5 mm; P ₀ = 12.7 mm	±10%	2222 371 85...	on request
		±5%	2222 371 86...	on request

Metallized polyester film capacitors

MKT 371

 $U_{Rdc} = 400 \text{ V}$; $U_{Rac} = 220 \text{ V}$

C (μF)	DIMENSIONS $b \times h \times l$ (mm)	MASS (g)	CATALOGUE NUMBER			
			LOOSE IN BOX		AMMOPACK	
			$l_t = 4.0 +1.0/-0.5 \text{ mm}$		$H = 18.5 \text{ mm}$; $P_0 = 12.7 \text{ mm}$	
			C-tol = $\pm 10\%$	C-tol = $\pm 5\%$	C-tol = $\pm 10\%$	C-tol = $\pm 5\%$
			catalogue number	last 5 digits	last 5 digits	
Pitch = $7.62 +0.30/-0.40 \text{ mm}$; $d_t = 0.50 \pm 0.05 \text{ mm}$						
0.0039	2.5 × 6.5 × 10.0	0.3	2222 371 51392	.. 52392	.. 88392	.. 89392
0.0047			2222 371 51472	.. 52472	.. 88472	.. 89472
0.0056			2222 371 51562	.. 52562	.. 88562	.. 89562
0.0068			2222 371 51682	.. 52682	.. 88682	.. 89682
0.0082	3.0 × 8.0 × 10.0	0.4	2222 371 51822	.. 52822	.. 88822	.. 89822
0.01			2222 371 51103	.. 52103	.. 88103	.. 89103
0.012	4.0 × 9.0 × 10.0	0.5	2222 371 51123	.. 52123	.. 88123	.. 89123
0.015			2222 371 51153	.. 52153	.. 88153	.. 89153
0.018	5.0 × 10.5 × 10.0	0.7	2222 371 51183	.. 52183	.. 88183	.. 89183
0.022			2222 371 51223	.. 52223	.. 88223	.. 89223
0.027			2222 371 51273	.. 52273	.. 88273	.. 89273
0.033			2222 371 51333	.. 52333	.. 88333	.. 89333
0.039			2222 371 51393	.. 52393	.. 88393	.. 89393

Metallized polyester film capacitors

MKT 372

MKT 372 GENERAL DATA

PITCH 10 mm

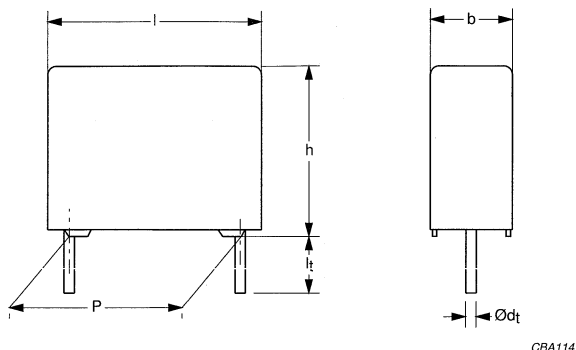


Fig.12 Outline.

Specific reference data for the 100 V DC capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle: $C \leq 0.1 \mu\text{F}$	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 250 \times 10^{-4}$
$0.1 \mu\text{F} < C \leq 0.68 \mu\text{F}$	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 300 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 100 V (DC)	34 V/ μs		
R between leads, for $C \leq 0.33 \mu\text{F}$ at 100 V; 1 minute	>15000 M Ω		
RC between leads, for $C > 0.33 \mu\text{F}$ at 100 V; 1 minute	>5000 s		
R between interconnected leads and case (foil method)	>30000 M Ω		
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	160 V; 1 minute		
Withstanding (DC) voltage between leads and case	200 V; 1 minute		

Available 100 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 4.0 +1.0/-0.5 \text{ mm}$	$\pm 10\%$	2222 372 21...	preferred
		$\pm 5\%$	2222 372 22...	on request
Taped on reel	$H = 18.5 \text{ mm}; P_0 = 12.7 \text{ mm}$	$\pm 10\%$	2222 372 25...	on request
		$\pm 5\%$	2222 372 26...	on request
Ammopack	$H = 18.5 \text{ mm}; P_0 = 12.7 \text{ mm}$	$\pm 10\%$	2222 372 28...	on request
		$\pm 5\%$	2222 372 29...	on request

Metallized polyester film capacitors**MKT 372** $U_{Rdc} = 100V$; $U_{Rac} = 63 V$

C (μF)	DIMENSIONS $b \times h \times l$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 4.0 +1.0/-0.5$ mm
			C-tol = $\pm 10\%$
Pitch = 10.0 ± 0.4 mm; $d_t = 0.60 \pm 0.06$ mm			
0.1	4.0 × 10.0 × 12.5	0.7	2222 372 21104
0.12			2222 372 21124
0.15			2222 372 21154
0.18			2222 372 21184
0.22			2222 372 21224
0.27			2222 372 21274
0.33			2222 372 21334
0.39	5.0 × 11.0 × 12.5	0.9	2222 372 21394
0.47			2222 372 21474
0.56	6.0 × 12.0 × 12.5	1.0	2222 372 21564
0.68			2222 372 21684

Metallized polyester film capacitors

MKT 372

MKT 372 GENERAL DATA

PITCH 10 mm

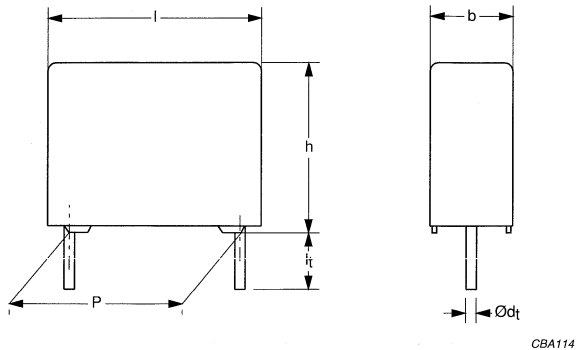


Fig.13 Outline.

Specific reference data for the 250 V DC capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle:			
$C \leq 0.1 \mu\text{F}$	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 250 \times 10^{-4}$
$0.1 \mu\text{F} < C \leq 0.22 \mu\text{F}$	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 300 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 250 V (DC)	50 V/ μs		
R between leads at 100 V; 1 minute	$>30000 \text{ M}\Omega$		
R between interconnected leads and case (foil method)	$>30000 \text{ M}\Omega$		
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	400 V; 1 minute		
Withstanding (DC) voltage between leads and case	500 V; 1 minute		

Available 250 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 4.0 +1.0/-0.5 \text{ mm}$	$\pm 10\%$	2222 372 41...	preferred
		$\pm 5\%$	2222 372 42...	on request
Taped on reel	$H = 18.5 \text{ mm}; P_0 = 12.7 \text{ mm}$	$\pm 10\%$	2222 372 45...	on request
		$\pm 5\%$	2222 372 46...	on request
Ammopack	$H = 18.5 \text{ mm}; P_0 = 12.7 \text{ mm}$	$\pm 10\%$	2222 372 48...	on request
		$\pm 5\%$	2222 372 49...	on request

Metallized polyester film capacitors**MKT 372** $U_{Rdc} = 250 \text{ V}$; $U_{Rac} = 160 \text{ V}$

C (μF)	DIMENSIONS $b \times h \times l$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 4.0 +1.0/-0.5 \text{ mm}$
			C-tol = $\pm 10\%$
Pitch = $10.0 \pm 0.4 \text{ mm}$; $d_t = 0.60 \pm 0.06 \text{ mm}$			
0.047	$4.0 \times 10.0 \times 12.5$	0.7	2222 372 41473
0.056			2222 372 41563
0.068			2222 372 41683
0.082			2222 372 41823
0.1			2222 372 41104
0.12	$5.0 \times 11.0 \times 12.5$	0.9	2222 372 41124
0.15			2222 372 41154
0.18	$6.0 \times 12.0 \times 12.5$	1.0	2222 372 41184
0.22			2222 372 41224

Metallized polyester film capacitors

MKT 372

MKT 372 GENERAL DATA

PITCH 10 mm

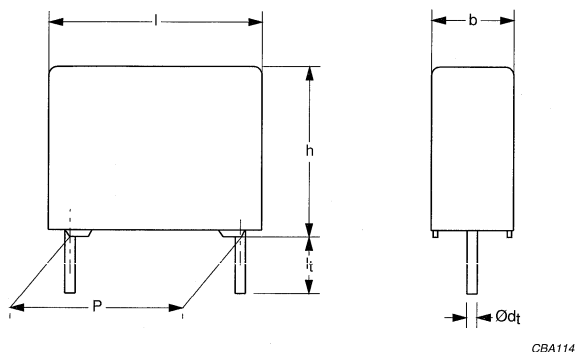


Fig.14 Outline.

Specific reference data for the 400 V DC capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 250 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 400 V (DC)	80 V/ μ s		
R between leads at 100 V; 1 minute	>30000 M Ω		
R between interconnected leads and case (foil method)	>30000 M Ω		
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	640 V; 1 minute		
Withstanding (DC) voltage between leads and case	800 V; 1 minute		

Available 400 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 4.0 +1.0/-0.5$ mm	$\pm 10\%$	2222 372 51...	preferred
		$\pm 5\%$	2222 372 52...	on request
Taped on reel	$H = 18.5$ mm; $P_0 = 12.7$ mm	$\pm 10\%$	2222 372 55...	on request
		$\pm 5\%$	2222 372 56...	on request
Ammopack	$H = 18.5$ mm; $P_0 = 12.7$ mm	$\pm 10\%$	2222 372 58...	on request
		$\pm 5\%$	2222 372 59...	on request

Metallized polyester film capacitors

MKT 372

 $U_{Rdc} = 400 \text{ V}$; $U_{Rac} = 220 \text{ V}$

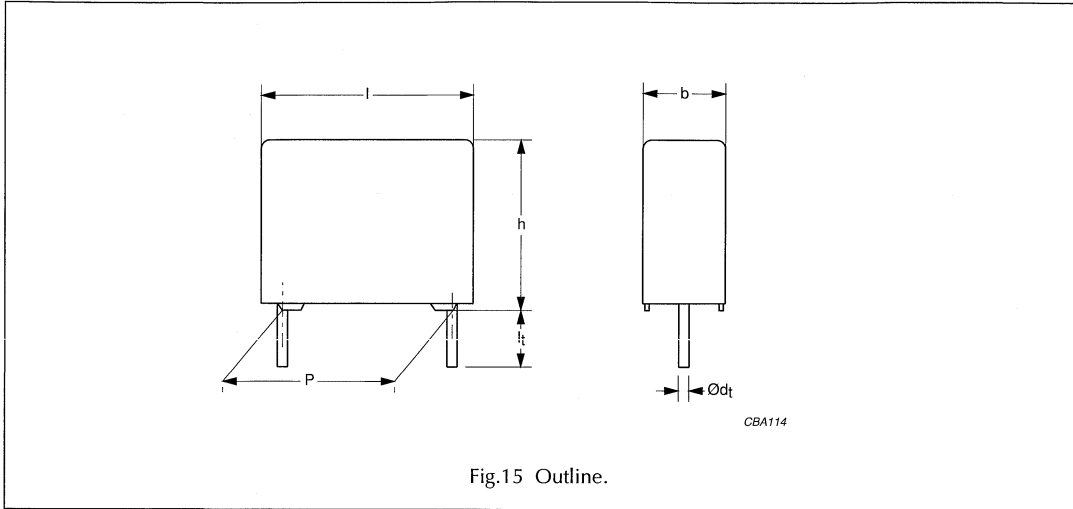
C (μF)	DIMENSIONS $b \times h \times l$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 4.0 +1.0/-0.5 \text{ mm}$
			C-tol = $\pm 10\%$
Pitch = $10.0 \pm 0.4 \text{ mm}$; $d_t = 0.60 \pm 0.06 \text{ mm}$			
0.0047	$4.0 \times 10.0 \times 12.5$	0.7	2222 372 51472
0.0056			2222 372 51562
0.0068			2222 372 51682
0.0082			2222 372 51822
0.01			2222 372 51103
0.012			2222 372 51123
0.015			2222 372 51153
0.018			2222 372 51183
0.022			2222 372 51223
0.027			2222 372 51273
0.033	2222 372 51333		
0.039	$5.0 \times 11.0 \times 12.5$	0.9	2222 372 51393
0.047			2222 372 51473
0.056			2222 372 51563
0.068	$6.0 \times 12.0 \times 12.5$	1.0	2222 372 51683
0.082			2222 372 51823

Metalized polyester film capacitors

MKT 372

MKT 372 GENERAL DATA

PITCH 10 mm



Specific reference data for the 630 V DC capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 250 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 400 (DC)	120 V/ μ s		
R between leads at 500 V; 1 minute	>30000 M Ω		
R between interconnected leads and case (foil method)	>30000 M Ω		
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	1008 V; 1 minute		
Withstanding (DC) voltage between leads and case	1260 V; 1 minute		

Available 630 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 4.0 +1.0/-0.5$ mm	$\pm 10\%$	2222 372 61...	preferred
		$\pm 5\%$	2222 372 62...	on request
Taped on reel	$H = 18.5$ mm; $P_0 = 12.7$ mm	$\pm 10\%$	2222 372 65...	on request
		$\pm 5\%$	2222 372 66...	on request
Ammopack	$H = 18.5$ mm; $P_0 = 12.7$ mm	$\pm 10\%$	2222 372 68...	on request
		$\pm 5\%$	2222 372 69...	on request

Metallized polyester film capacitors**MKT 372** $U_{Rdc} = 630 \text{ V}$; $U_{Rac} = 250 \text{ V}$

C (μF)	DIMENSIONS $b \times h \times l$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			It = 4.0 +1.0/-0.5 mm
			C-tol = $\pm 10\%$
Pitch = 10.0 \pm 0.4 mm; d_t = 0.60 \pm 0.06 mm			
0.01	4.0 \times 10.0 \times 12.5	0.6	2222 372 61103
0.012			2222 372 61123
0.015			2222 372 61153
0.018			2222 372 61183
0.022			2222 372 61223
0.027	5.0 \times 11.0 \times 12.5	0.9	2222 372 61273
0.033			2222 372 61333
0.039	6.0 \times 12.0 \times 12.5	1.0	2222 372 61393
0.047			2222 372 61473

Metallized polyester film capacitors

MKT 373

MKT 373 GENERAL DATA

PITCH 15 mm (COMPACT SIZE)

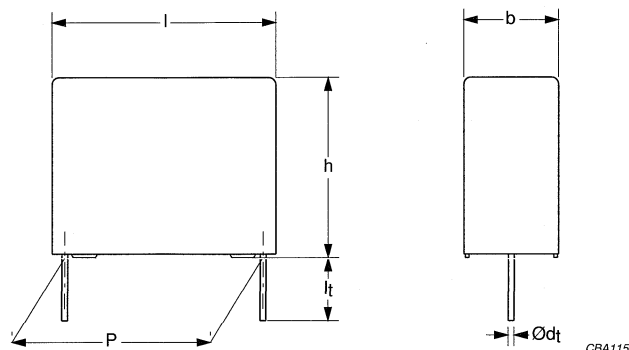


Fig.16 Outline.

Specific reference data for the 100 V DC capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle:			
0.33 μF < C \leq 0.47 μF	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 300 \times 10^{-4}$
0.47 μF < C \leq 1.0 μF	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	–
1.0 μF < C \leq 2.2 μF	$\leq 75 \times 10^{-4}$	$\leq 150 \times 10^{-4}$	–
Rated voltage pulse slope (dU/dt) _R at 100 V (DC):	14 V/ μs		
R between leads, for C \leq 0.33 μF at 100 V; 1 minute	>15000 M Ω		
RC between leads, for C > 0.33 μF at 100 V; 1 minute	>5000 s		
R between interconnected leads and case (foil method)	>30000 M Ω		
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	160 V; 1 minute		
Withstanding (DC) voltage between leads and case	200 V; 1 minute		

Available 100 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 5.0 \pm 1.0$ mm	$\pm 10\%$	2222 373 23...	preferred
		$\pm 5\%$	2222 373 24...	on request
Taped on reel	H = 18.5 mm; P ₀ = 12.7 mm	$\pm 10\%$	2222 373 27...	on request
		$\pm 5\%$	2222 373 28...	on request

Metallized polyester film capacitors**MKT 373** $U_{Rdc} = 100 \text{ V}$; $U_{Rac} = 63 \text{ V}$ **(COMPACT SIZE)**

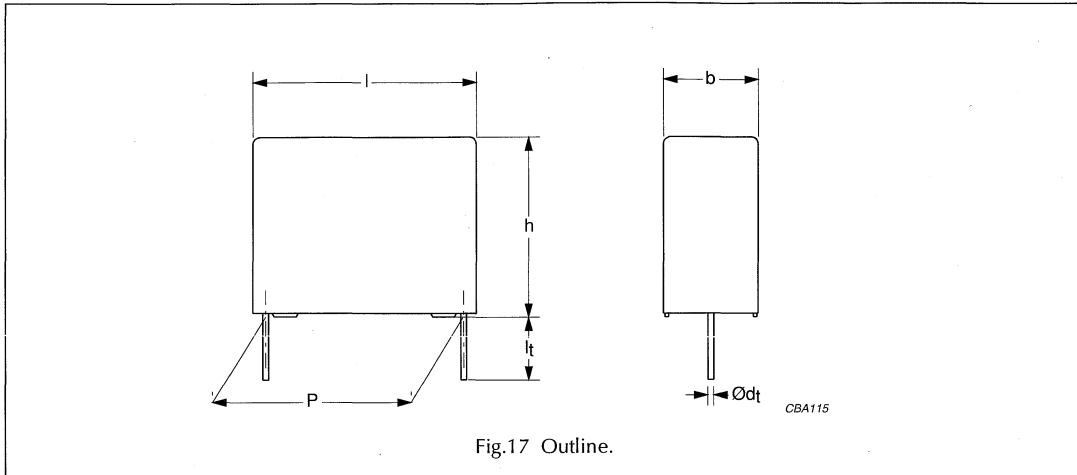
C (μF)	DIMENSIONS $b \times h \times l$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 5.0 \pm 1.0 \text{ mm}$
			C-tol = $\pm 10\%$
Pitch = $15.0 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.33	5.0 × 11.0 × 17.5	1.1	2222 373 23334
0.39			2222 373 23394
0.47			2222 373 23474
0.56			2222 373 23564
0.68			2222 373 23684
0.82			2222 373 23824
1			2222 373 23105
1.2			2222 373 23125
1.5			2222 373 23155
1.8			2222 373 23185
2.2	6.0 × 12.0 × 17.5	1.4	2222 373 23225

Metallized polyester film capacitors

MKT 373

MKT 373 GENERAL DATA

PITCH 15/22.5/27.5 mm (COMPACT SIZE)



Specific reference data for the 250 V DC capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle:			
0.15 μF < C \leq 0.47 μF	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 300 \times 10^{-4}$
0.47 μF < C \leq 1.0 μF	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	–
1.0 μF < C \leq 4.7 μF	$\leq 75 \times 10^{-4}$	$\leq 150 \times 10^{-4}$	–
Rated voltage pulse slope (dU/dt) _R at 250 V (DC):			
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 \leq 0.33 μF at 100 V; 1 minute	>30000 M Ω		
RC between leads, for C > 0.33 μF at 100 V; 1 minute	>10000 s		
R between interconnected leads and case (foil method)	>30000 M Ω		
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	400 V; 1 minute		
Withstanding (DC) voltage between leads and case	500 V; 1 minute		

Available 250 V DC versions

PACKAGING ⁽¹⁾	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 5.0 \pm 1.0$ mm	$\pm 10\%$	2222 373 43...	preferred
		$\pm 5\%$	2222 373 44...	on request
Taped on reel	H = 18.5 mm; P ₀ = 12.7 mm	$\pm 10\%$	2222 373 47...	on request
		$\pm 5\%$	2222 373 48...	on request

Note

1. Taped on reel pitch = 27.5 mm is not available.

Metallized polyester film capacitors**MKT 373** $U_{Rdc} = 250 \text{ V}$; $U_{Rac} = 160 \text{ V}$ **(COMPACT SIZE)**

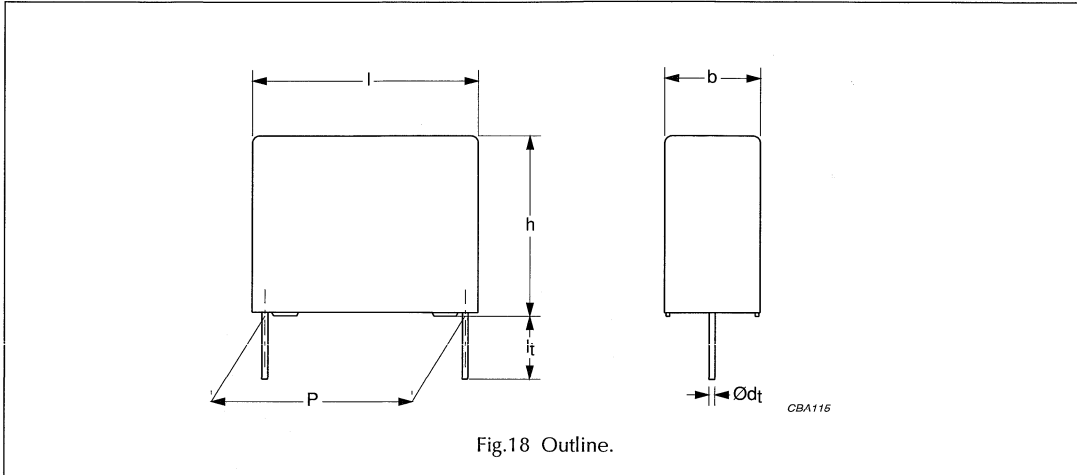
C (μF)	DIMENSIONS $b \times h \times l$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 5.0 \pm 1.0 \text{ mm}$
			C-tol = $\pm 10\%$
Pitch = $15.0 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.15	5.0 × 11.0 × 17.5	1.1	2222 373 43154
0.18			2222 373 43184
0.22			2222 373 43224
0.27			2222 373 43274
0.33			2222 373 43334
0.39	6.0 × 12.0 × 17.5	1.4	2222 373 43394
0.47			2222 373 43474
0.56	7.0 × 13.5 × 17.5	1.9	2222 373 43564
0.68			2222 373 43684
0.82	8.5 × 15.0 × 17.5	2.6	2222 373 43824
1.0			2222 373 43105
1.2	10.0 × 16.5 × 17.5	3.1	2222 373 43125
Pitch = $22.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
1.5	8.5 × 18.0 × 26.0	4.4	2222 373 43155
1.8			2222 373 43185
2.2	10.0 × 19.5 × 26.0	5.5	2222 373 43225
2.7			2222 373 43275
Pitch = $27.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
3.3	11.0 × 21.0 × 31.0	7.8	2222 373 43335
3.9	13.0 × 23.0 × 31.0	10.4	2222 373 43395
4.7			2222 373 43475

Metalized polyester film capacitors

MKT 373

MKT 373 GENERAL DATA

PITCH 15/22.5/27.5 mm (COMPACT SIZE)



Specific reference data for the 400 V DC capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle:			
$C \leq 0.1 \mu\text{F}$	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 250 \times 10^{-4}$
$0.1 \mu\text{F} < C \leq 0.47 \mu\text{F}$	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 300 \times 10^{-4}$
$0.47 \mu\text{F} < C \leq 1.0 \mu\text{F}$	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	–
$1.0 \mu\text{F} < C \leq 1.5 \mu\text{F}$	$\leq 75 \times 10^{-4}$	$\leq 150 \times 10^{-4}$	–
Rated voltage pulse slope (dU/dt) _R at 400 V (DC):			
P = 15 mm			34 V/μs
P = 22.5 mm			14 V/μs
P = 27.5 mm			12 V/μs
R between leads, for $C \leq 0.33 \mu\text{F}$ at 100 V; 1 minute			>30000 MΩ
RC between leads, for $C > 0.33 \mu\text{F}$ at 100 V; 1 minute			>10000 s
R between interconnected leads and case (foil method)			>30000 MΩ
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s			640 V; 1 minute
Withstanding (DC) voltage between leads and case			800 V; 1 minute

Available 400 V DC versions

PACKAGING ⁽¹⁾	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 5.0 \pm 1.0 \text{ mm}$	±10%	2222 373 53...	preferred
		±5%	2222 373 54...	on request
Taped on reel	H = 18.5 mm; P ₀ = 12.7 mm	±10%	2222 373 57...	on request
		±5%	2222 373 58...	on request

Note

1. Taped on reel pitch = 27.5 mm is not available.

Metallized polyester film capacitors**MKT 373** $U_{Rdc} = 400 \text{ V}$; $U_{Rac} = 220 \text{ V}$ **(COMPACT SIZE)**

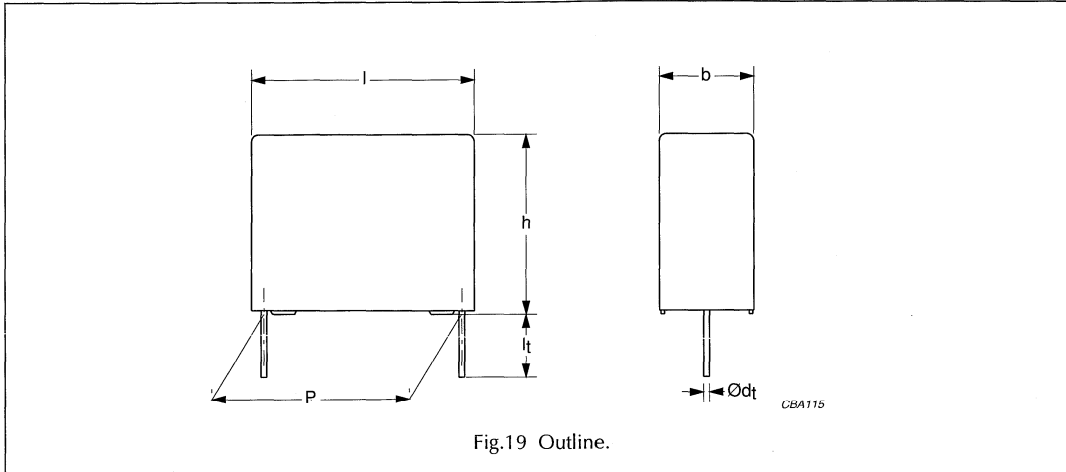
C (μF)	DIMENSIONS $b \times h \times l$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 5.0 \pm 1.0 \text{ mm}$
			C-tol = $\pm 10\%$
Pitch = $15.0 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.047	5.0 × 11.0 × 17.5	1.1	2222 373 53473
0.056			2222 373 53563
0.068			2222 373 53683
0.082			2222 373 53823
0.1			2222 373 53104
0.12			2222 373 53124
0.15			2222 373 53154
0.18	6.0 × 12.0 × 17.5	1.4	2222 373 53184
0.22			2222 373 53224
0.27	7.0 × 13.5 × 17.5	1.9	2222 373 53274
0.33			2222 373 53334
0.39	8.5 × 15.0 × 17.5	2.6	2222 373 53394
0.47			2222 373 53474
0.56	10.0 × 16.5 × 17.5	3.2	2222 373 53564
Pitch = $22.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.68	8.5 × 18.0 × 26.0	4.4	2222 373 53684
0.82			2222 373 53824
1	10.0 × 19.5 × 26.0	5.5	2222 373 53105
1.2			2222 373 53125
Pitch = $27.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
1.5	11.0 × 21.0 × 31.0	7.8	2222 373 53155

Metallized polyester film capacitors

MKT 373

MKT 373 GENERAL DATA

PITCH 15/22.5/27.5 mm (COMPACT SIZE)



Specific reference data for the 630 V DC capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle:			
$C \leq 0.1 \mu\text{F}$	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 250 \times 10^{-4}$
$0.1 \mu\text{F} < C \leq 0.47 \mu\text{F}$	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 300 \times 10^{-4}$
$0.47 \mu\text{F} < C \leq 1.0 \mu\text{F}$	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	–
Rated voltage pulse slope $(dU/dt)_R$ at 630 V _{dc} :			
P = 15 mm		90 V/ μs	
P = 22.5 mm		35 V/ μs	
P = 27.5 mm		30 V/ μs	
R between leads, for $C \leq 0.33 \mu\text{F}$ at 500 V; 1 minute		>30000 M Ω	
RC between leads, for $C > 0.33 \mu\text{F}$ at 500 V; 1 minute		>10000 s	
R between interconnected leads and case (foil method)		>30000 M Ω	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s		1008 V; 1 minute	
Withstanding (DC) voltage between leads and case		1260 V; 1 minute	

Available 630 V DC versions

PACKAGING ⁽¹⁾	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 5.0 \pm 1.0 \text{ mm}$	$\pm 10\%$	2222 373 63...	preferred
		$\pm 5\%$	2222 373 64...	on request
Taped on reel	$H = 18.5 \text{ mm}; P_0 = 12.7 \text{ mm}$	$\pm 10\%$	2222 373 67...	on request
		$\pm 5\%$	2222 373 68...	on request

Note

1. Taped on reel pitch = 27.5 mm is not available.

Metallized polyester film capacitors**MKT 373** $U_{Rdc} = 630 \text{ V}$; $U_{Rac} = 250 \text{ V}$ **(COMPACT SIZE)**

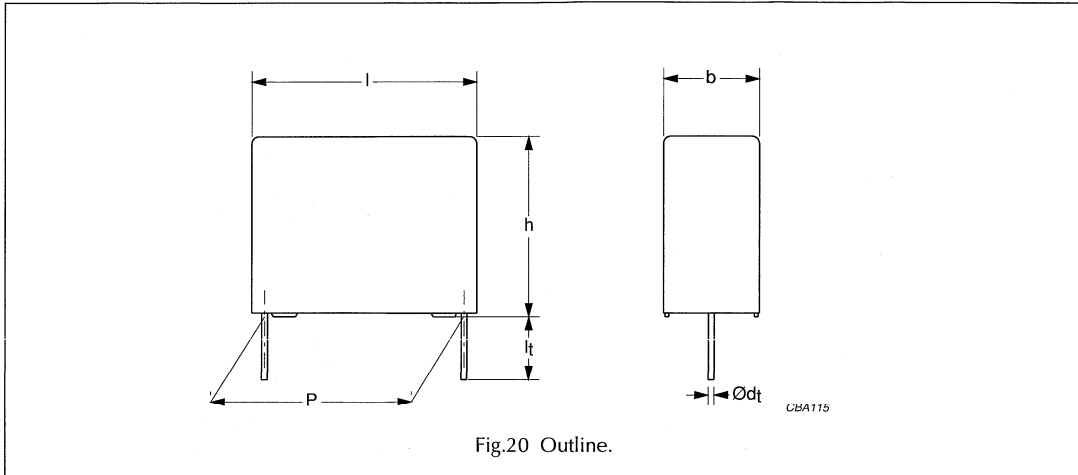
C (μF)	DIMENSIONS $b \times h \times l$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 5.0 \pm 1.0 \text{ mm}$
			C-tol = $\pm 10\%$
Pitch = $15.0 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.056	$5.0 \times 11.0 \times 17.5$	1.1	2222 373 63563
0.068	$6.0 \times 12.0 \times 17.5$	1.4	2222 373 63683
0.082			2222 373 63823
0.1	$7.0 \times 13.5 \times 17.5$	1.9	2222 373 63104
0.12			2222 373 63124
0.15	$8.5 \times 15.0 \times 17.5$	2.6	2222 373 63154
0.18			2222 373 63184
0.22	$10.0 \times 16.5 \times 17.5$	3.2	2222 373 63224
Pitch = $22.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.27	$8.5 \times 18.0 \times 26.0$	4.4	2222 373 63274
0.33			2222 373 63334
0.39	$10.0 \times 19.5 \times 26.0$	5.5	2222 373 63394
0.47			2222 373 63474
Pitch = $27.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.56	$11.0 \times 21.0 \times 31.0$	7.8	2222 373 63564
0.68	$13.0 \times 23.0 \times 31.0$	10.5	2222 373 63684
0.82			2222 373 63824
1	$15.0 \times 25.0 \times 31.0$	7.8	2222 373 63105

Metallized polyester film capacitors

MKT 373

MKT 373 GENERAL DATA

PITCH 15/22.5/27.5 mm (STANDARD SIZE)



Specific reference data for the 100 V DC capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle:			
0.33 μF < C \leq 0.47 μF	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 300 \times 10^{-4}$
0.47 μF < C \leq 1.0 μF	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	–
1.0 μF < C \leq 10 μF	$\leq 75 \times 10^{-4}$	$\leq 150 \times 10^{-4}$	–
C > 10 μF	$\leq 75 \times 10^{-4}$	–	–
Rated voltage pulse slope (dU/dt) _R at 100 V (DC):			
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 \leq 0.33 μF at 100 V; 1 minute		>15000 M Ω	
RC between leads, for C > 0.33 μF at 100 V; 1 minute		>5000 s	
R between interconnected leads and case (foil method)		>30000 M Ω	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s		160 V; 1 minute	
Withstanding (DC) voltage between leads and case		200 V; 1 minute	

Available 100 V DC versions

PACKAGING ⁽¹⁾	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 5.0 \pm 1.0$ mm	$\pm 10\%$	2222 373 21...	on request
		$\pm 5\%$	2222 373 22...	on request
Taped on reel	H = 18.5 mm; P ₀ = 12.7 mm	$\pm 10\%$	2222 373 25...	on request
		$\pm 5\%$	2222 373 26...	on request

Note

1. Taped on reel pitch = 27.5 mm is not available.

Metallized polyester film capacitors

MKT 373

 $U_{Rdc} = 100 \text{ V}$; $U_{Rac} = 63 \text{ V}$

(STANDARD SIZE)

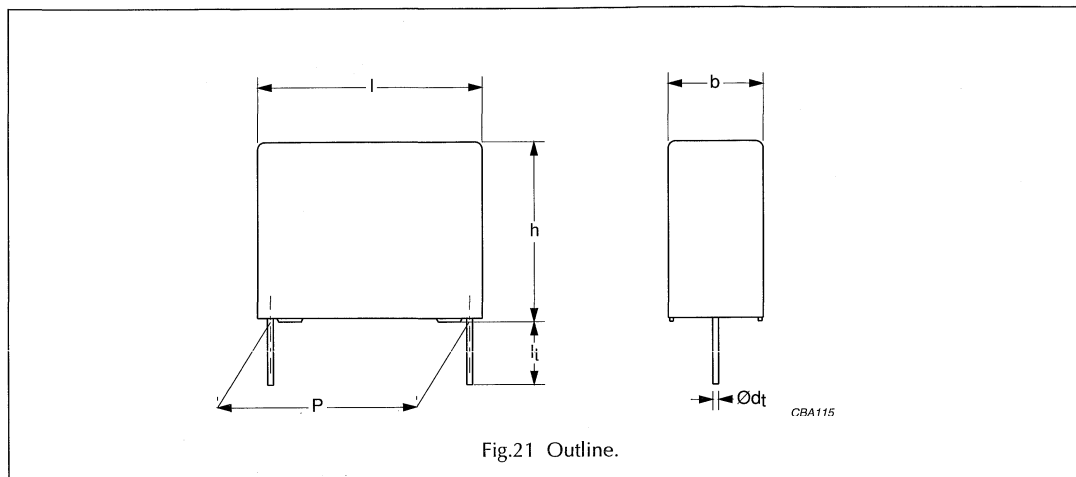
C (μF)	DIMENSIONS $b \times h \times l$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$I_t = 5.0 \pm 1.0 \text{ mm}$
			C-tol = $\pm 10\%$
Pitch = $15.0 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.33	5.0 × 11.0 × 17.5	1.1	2222 373 21334
0.39			2222 373 21394
0.47			2222 373 21474
0.56			2222 373 21564
0.68			2222 373 21684
0.82	6.0 × 12.0 × 17.5	1.4	2222 373 21824
1			2222 373 21105
1.2	7.0 × 13.5 × 17.5	1.9	2222 373 21125
1.5			2222 373 21155
1.8	8.5 × 15.0 × 17.5	2.6	2222 373 21185
2.2			2222 373 21225
Pitch = $22.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
2.7	8.5 × 18.0 × 26.0	4.4	2222 373 21275
3.3			2222 373 21335
3.9	10.0 × 19.5 × 26.0	5.5	2222 373 21395
4.7			2222 373 21475
Pitch = $27.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
5.6	11.0 × 21.0 × 31.0	8.0	2222 373 21565
6.8			2222 373 21685
8.2	13.0 × 23.0 × 31.0	10.5	2222 373 21825
10			2222 373 21106
12	18.0 × 28.0 × 31.0	17.5	2222 373 21126
15			2222 373 21156

Metallized polyester film capacitors

MKT 370/371/372/373

MKT 373 GENERAL DATA

PITCH 15/22.5/27.5 mm (STANDARD SIZE)



Specific reference data for the 250 V DC capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle:			
0.15 μF < C \leq 0.47 μF	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 300 \times 10^{-4}$
0.47 μF < C \leq 1.0 μF	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	–
1.0 μF < C \leq 4.7 μF	$\leq 75 \times 10^{-4}$	$\leq 150 \times 10^{-4}$	–
Rated voltage pulse slope (dU/dt) _R at 250 V (DC):			
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 \leq 0.33 μF at 100 V; 1 minute	>30000 M Ω		
RC between leads, for C > 0.33 μF at 100 V; 1 minute	>10000 s		
R between interconnected leads and case (foil method)	>30000 M Ω		
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	400 V; 1 minute		
Withstanding (DC) voltage between leads and case	500 V; 1 minute		

Available 250 V DC versions

PACKAGING ⁽¹⁾	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_1 = 5.0 \pm 1.0$ mm	$\pm 10\%$	2222 373 41...	on request
		$\pm 5\%$	2222 373 42...	on request
Taped on reel	H = 18.5 mm; P ₀ = 12.7 mm	$\pm 10\%$	2222 373 45...	on request
		$\pm 5\%$	2222 373 46...	on request

Note

1. Taped on reel pitch = 27.5 mm is not available.

Metallized polyester film capacitors**MKT 370/371/372/373** $U_{Rdc} = 250 \text{ V}; U_{Rac} = 160 \text{ V}$

(STANDARD SIZE)

C (μF)	DIMENSIONS $b \times h \times l$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 5.0 \pm 1.0 \text{ mm}$
			C-tol = $\pm 10\%$
Pitch = $15.0 \pm 0.4 \text{ mm}; d_t = 0.80 \pm 0.08 \text{ mm}$			
0.15	$5.0 \times 11.0 \times 17.5$	1.1	2222 373 41154
0.18			2222 373 41184
0.22			2222 373 41224
0.27	$6.0 \times 12.0 \times 17.5$	1.4	2222 373 41274
0.33			2222 373 41334
0.39			2222 373 41394
0.47			2222 373 41474
0.56	$7.0 \times 13.5 \times 17.5$	1.9	2222 373 41564
0.68			2222 373 41684
0.82	$8.5 \times 15.0 \times 17.5$	2.6	2222 373 41824
1.0			2222 373 41105
Pitch = $22.5 \pm 0.4 \text{ mm}; d_t = 0.80 \pm 0.08 \text{ mm}$			
1.2	$8.5 \times 18.0 \times 26.0$	4.4	2222 373 41125
1.5			2222 373 41155
1.8	$10.0 \times 19.5 \times 26.0$	5.5	2222 373 41185
2.2			2222 373 41225
Pitch = $27.5 \pm 0.4 \text{ mm}; d_t = 0.80 \pm 0.08 \text{ mm}$			
2.7	$13.0 \times 23.0 \times 31.0$	10.4	2222 373 41275
3.3			2222 373 41335
3.9	$15.0 \times 25.0 \times 31.0$	12.5	2222 373 41395
4.7			2222 373 41475

Metallized polyester film capacitors

MKT 370/371/372/373

MKT 373 GENERAL DATA

PITCH 15/22.5/27.5 mm (STANDARD SIZE)

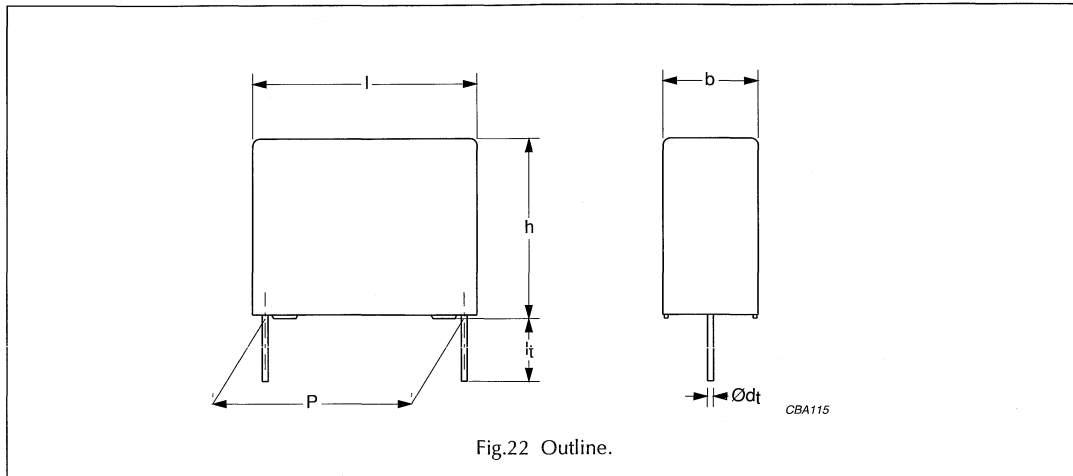


Fig.22 Outline.

Specific reference data for the 400 V DC capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle:			
$C \leq 0.1 \mu\text{F}$	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 250 \times 10^{-4}$
$0.1 \mu\text{F} < C \leq 0.47 \mu\text{F}$	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 300 \times 10^{-4}$
$0.47 \mu\text{F} < C \leq 1.0 \mu\text{F}$	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	–
$1.0 \mu\text{F} < C \leq 1.5 \mu\text{F}$	$\leq 75 \times 10^{-4}$	$\leq 150 \times 10^{-4}$	–
Rated voltage pulse slope $(dU/dt)_R$ at 400 V (DC):			
$P = 15 \text{ mm}$			34 V/ μs
$P = 22.5 \text{ mm}$			14 V/ μs
$P = 27.5 \text{ mm}$			12 V/ μs
R between leads, for $C \leq 0.33 \mu\text{F}$ at 100 V; 1 minute			>30000 M Ω
RC between leads, for $C > 0.33 \mu\text{F}$ at 100 V; 1 minute			>10000 s
R between interconnected leads and case (foil method)			>30000 M Ω
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s			640 V; 1 minute
Withstanding (DC) voltage between leads and case			800 V; 1 minute

Available 400 V DC versions

PACKAGING ⁽¹⁾	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 5.0 \pm 1.0 \text{ mm}$	$\pm 10\%$	2222 373 51...	on request
		$\pm 5\%$	2222 373 52...	on request
Taped on reel	$H = 18.5 \text{ mm}; P_0 = 12.7 \text{ mm}$	$\pm 10\%$	2222 373 55...	on request
		$\pm 5\%$	2222 373 56...	on request

Note

1. Taped on reel pitch = 27.5 mm is not available.

Metallized polyester film capacitors**MKT 370/371/372/373** $U_{Rdc} = 400 \text{ V}; U_{Rac} = 220 \text{ V}$

(STANDARD SIZE)

C (μF)	DIMENSIONS $b \times h \times l$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 5.0 \pm 1.0 \text{ mm}$
			C-tol = $\pm 10\%$
Pitch = $15.0 \pm 0.4 \text{ mm}; d_t = 0.80 \pm 0.08 \text{ mm}$			
0.047	5.0 × 11.0 × 17.5	1.1	2222 373 51473
0.056			2222 373 51563
0.068			2222 373 51683
0.082			2222 373 51823
0.1			2222 373 51104
0.12	6.0 × 12.0 × 17.5	1.4	2222 373 51124
0.15			2222 373 51154
0.18	7.0 × 13.5 × 17.5	1.9	2222 373 51184
0.22			2222 373 51224
0.27	8.5 × 15.0 × 17.5	2.6	2222 373 51274
0.33			2222 373 51334
Pitch = $22.5 \pm 0.4 \text{ mm}; d_t = 0.80 \pm 0.08 \text{ mm}$			
0.39	8.5 × 18.0 × 26.0	4.4	2222 373 51394
0.47			2222 373 51474
0.56	10.0 × 19.5 × 26.0	4.4	2222 373 51564
0.68		5.5	2222 373 51684
Pitch = $27.5 \pm 0.4 \text{ mm}; d_t = 0.80 \pm 0.08 \text{ mm}$			
0.82	11.0 × 21.0 × 31.0	7.8	2222 373 51824
1			2222 373 51105
1.2	15.0 × 25.0 × 31.0	12.8	2222 373 51125
1.5			2222 373 51155

Metallized polyester film capacitors

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CONSTRUCTION

Description

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

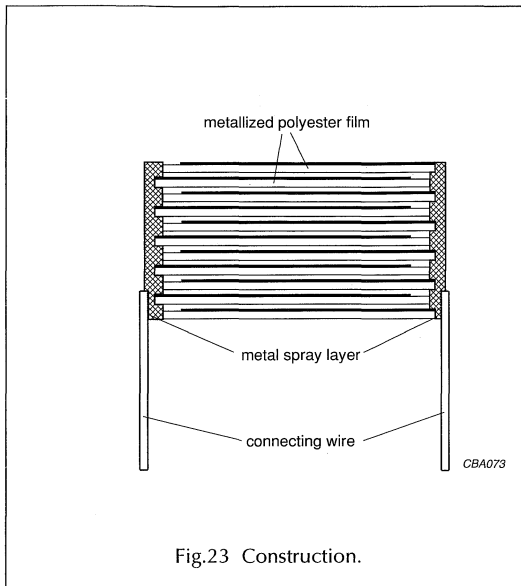


Fig.23 Construction.

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 tape specifications refer to this handbook, chapter "Packaging information".

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 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 Fig.24:

- Eccentricity see Fig.24. 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 60717" as reference: $h_{\max} \leq h + 0.3$ mm.

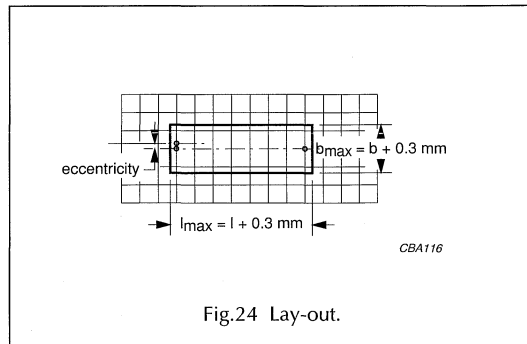


Fig.24 Lay-out.

Storage temperature

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

RATINGS AND CHARACTERISTICS REFERENCE CONDITIONS

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 $50 \pm 2\%$.

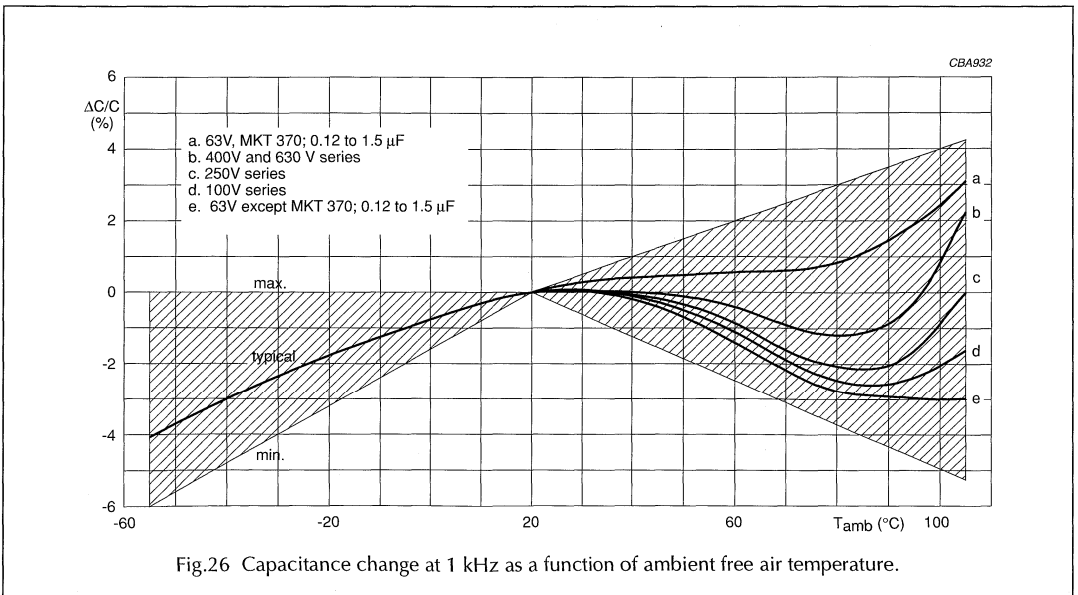
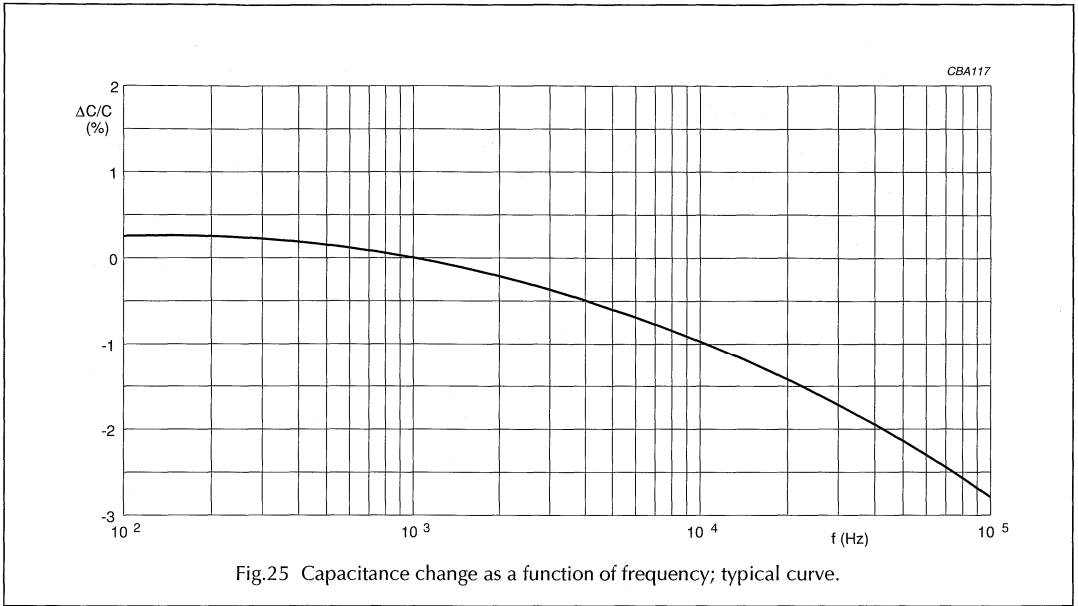
For reference testing, a conditioning period shall be applied over 96 ± 4 hours by heating the products in a circulating air oven at the rated temperature and a relative humidity not exceeding 20%.

Metallized polyester film capacitors

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CHARACTERISTICS

Capacitance



Metallized polyester film capacitors

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Impedance

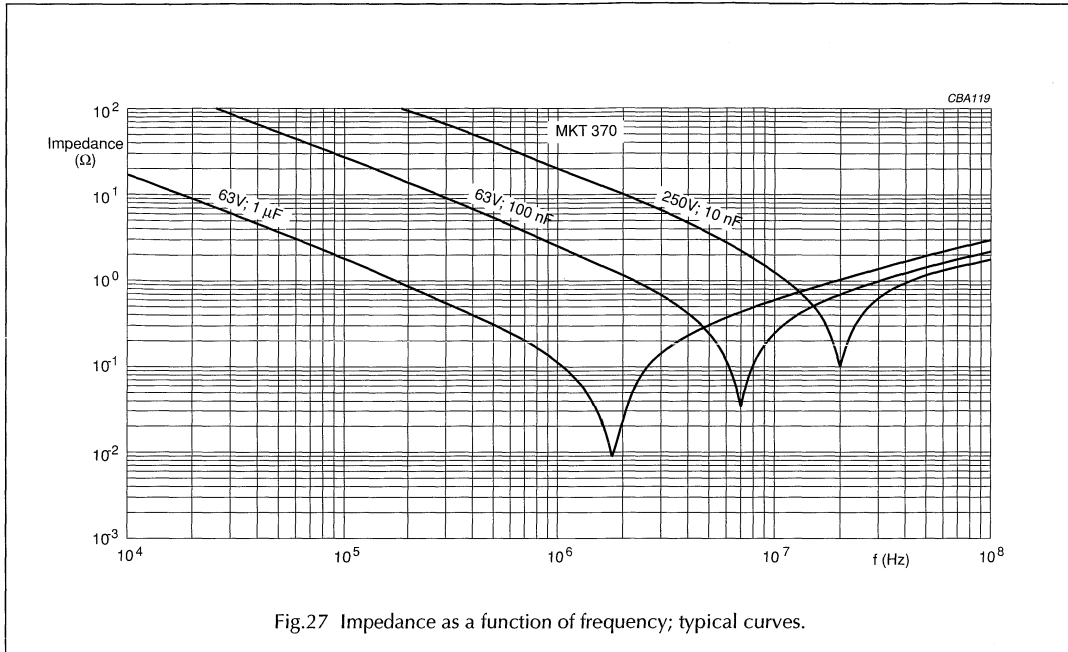


Fig.27 Impedance as a function of frequency; typical curves.

Maximum DC and AC voltage as a function of temperature

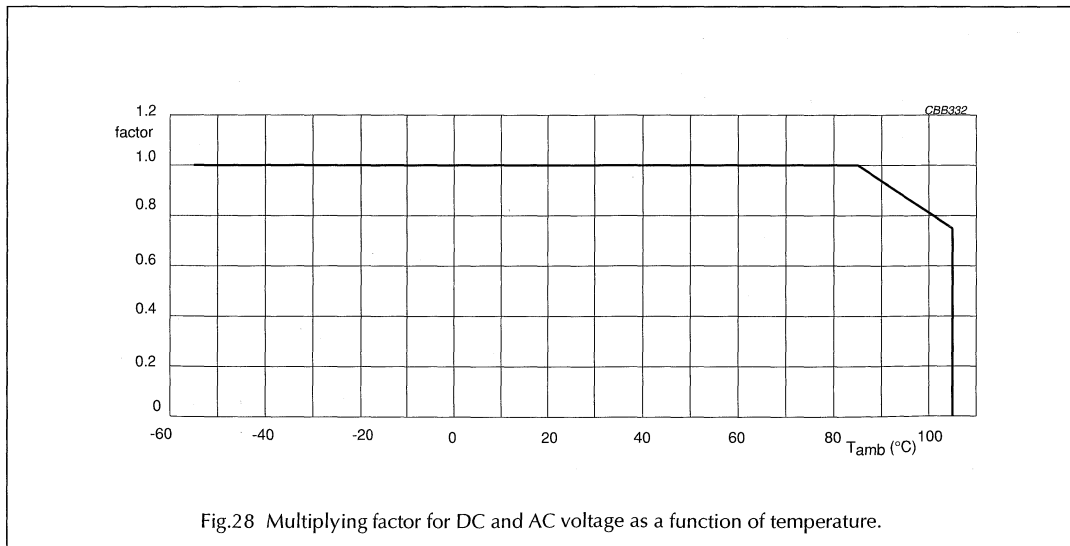
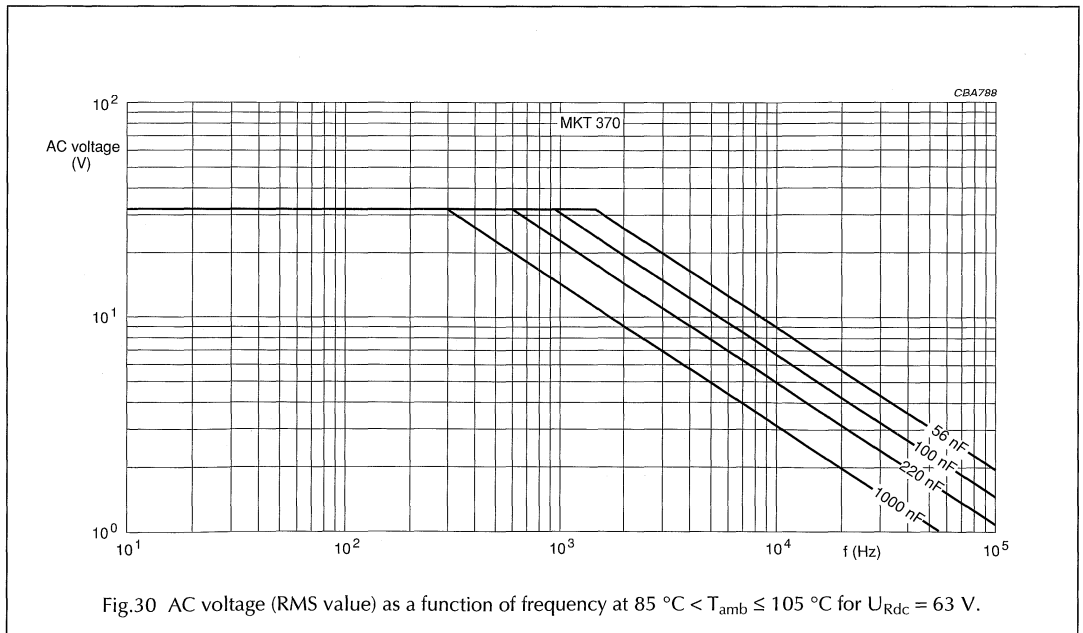
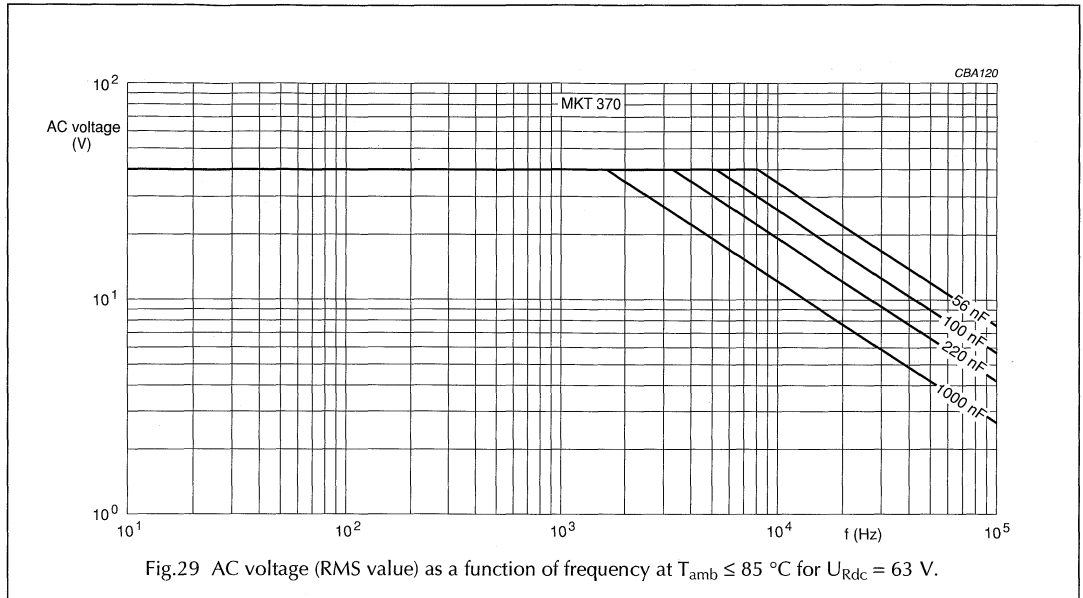


Fig.28 Multiplying factor for DC and AC voltage as a function of temperature.

Metallized polyester film capacitors

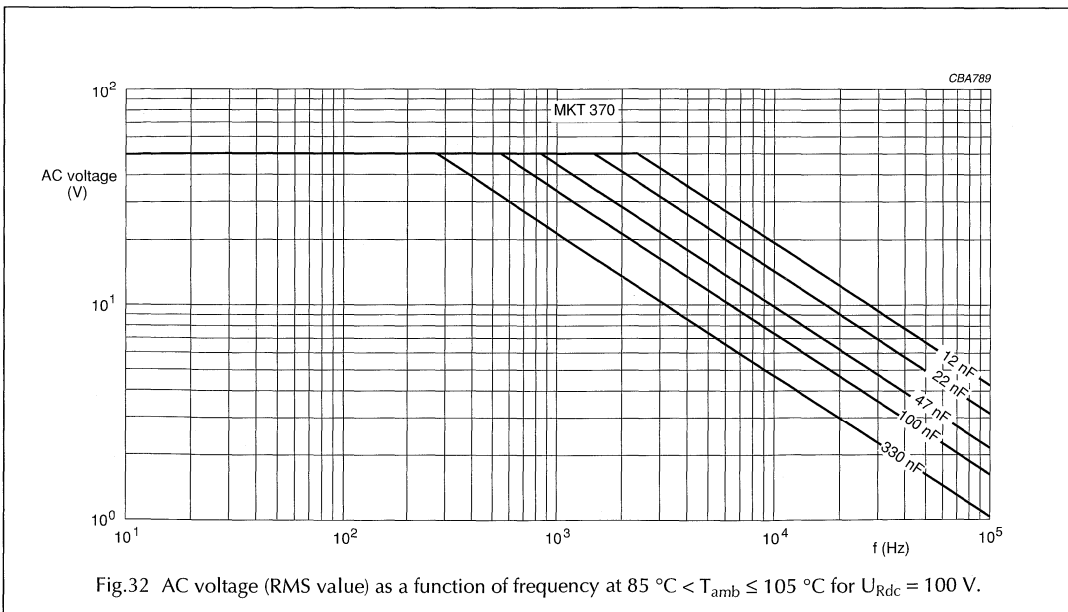
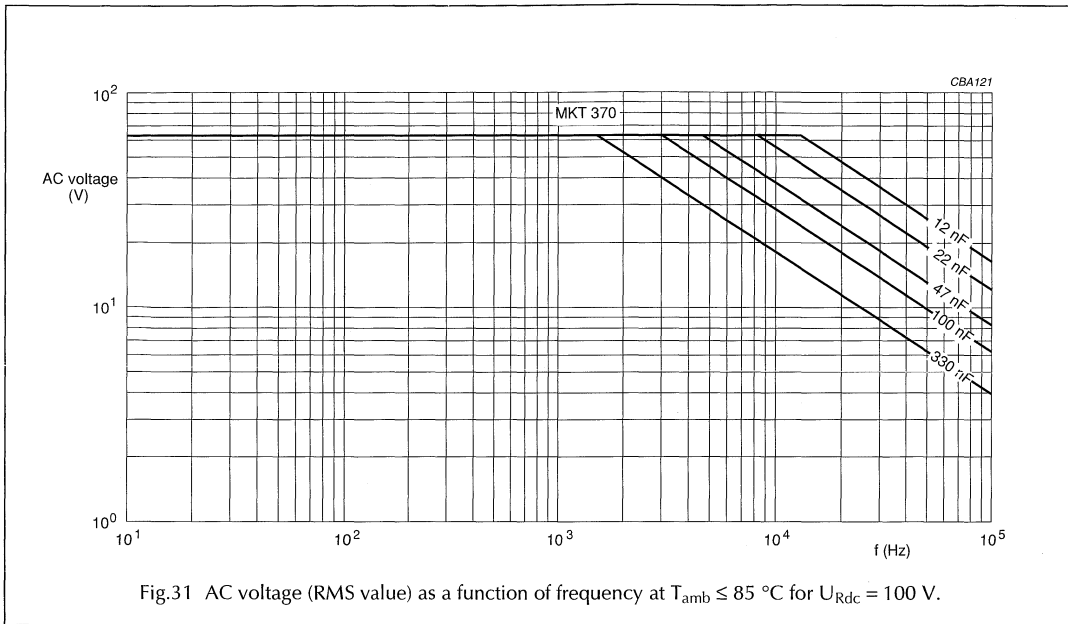
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Maximum RMS voltage (sinewave) as a function of frequency



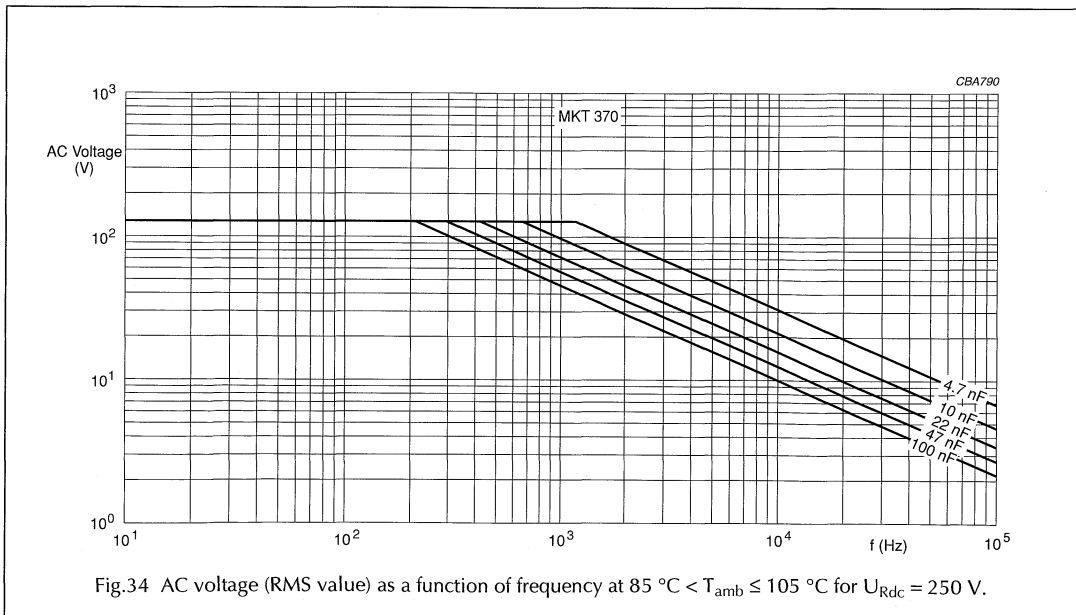
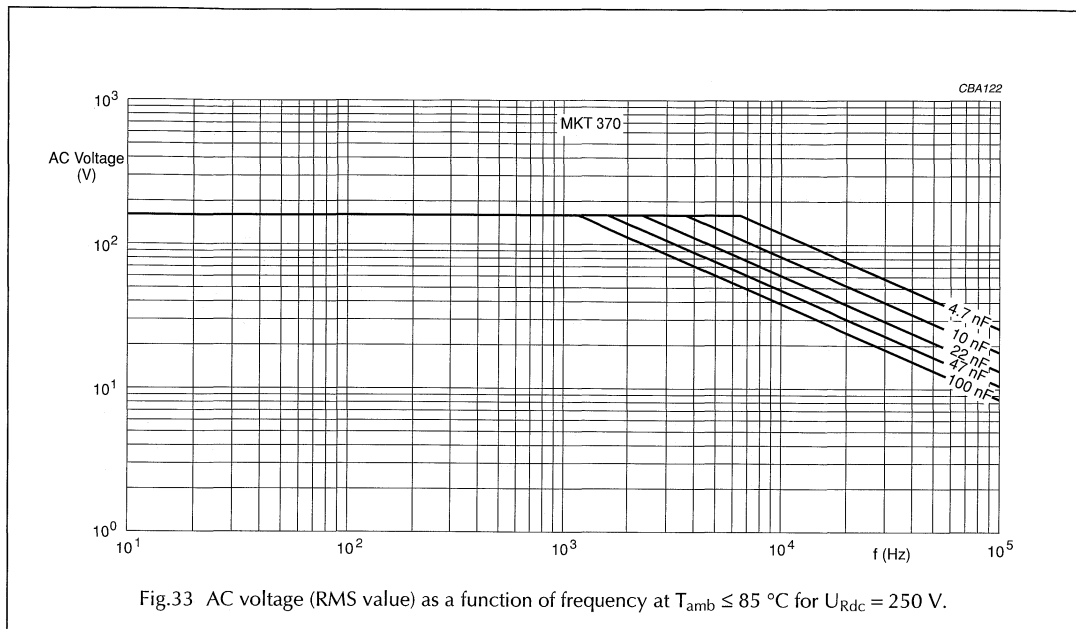
Metallized polyester film capacitors

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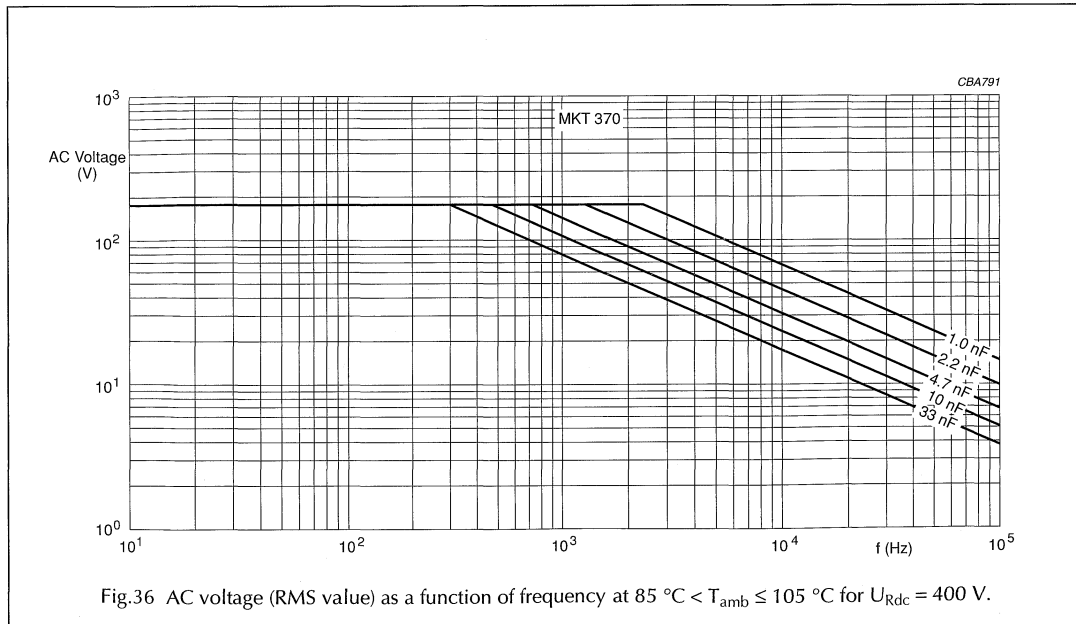
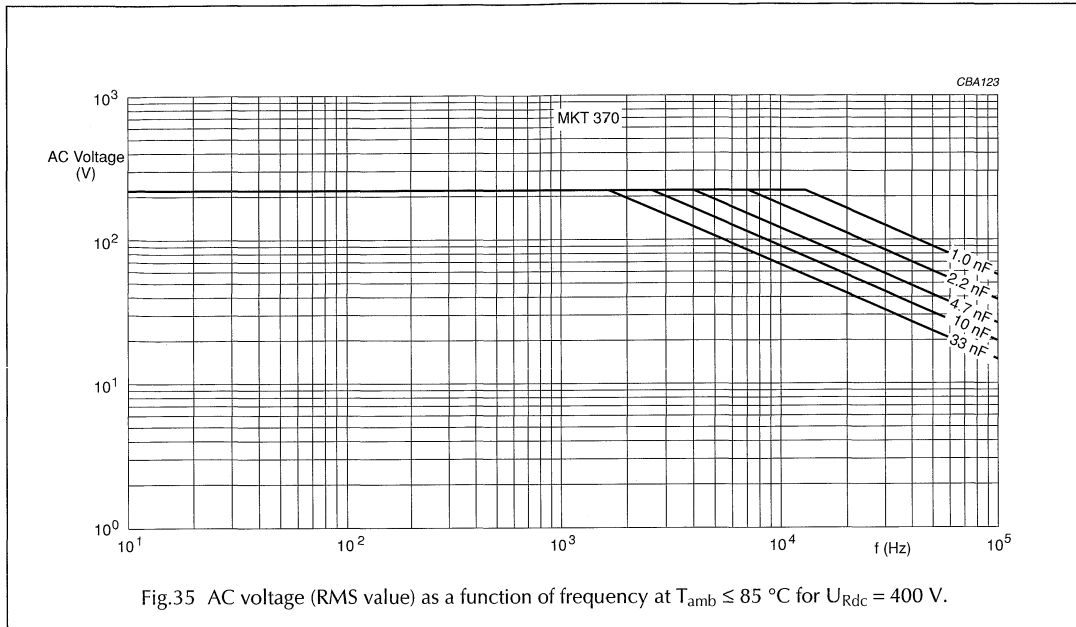
Metallized polyester film capacitors

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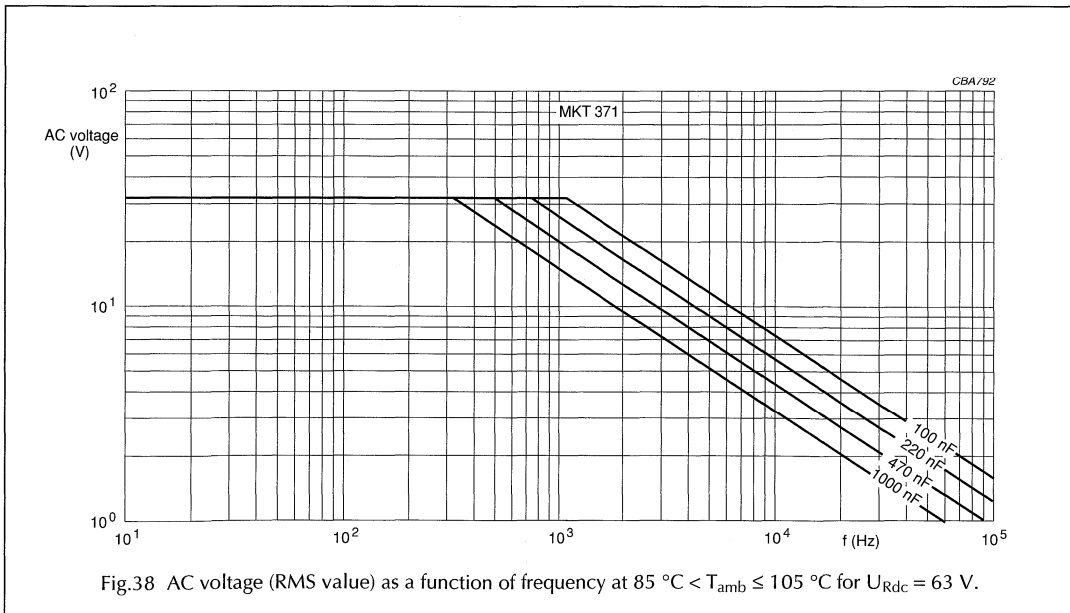
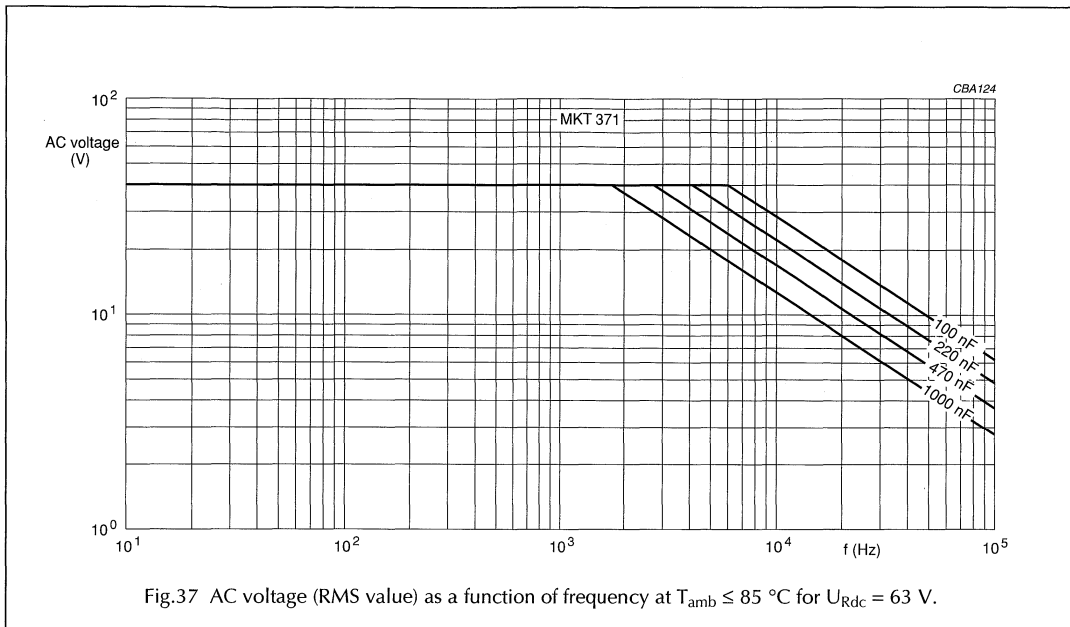
Metallized polyester film capacitors

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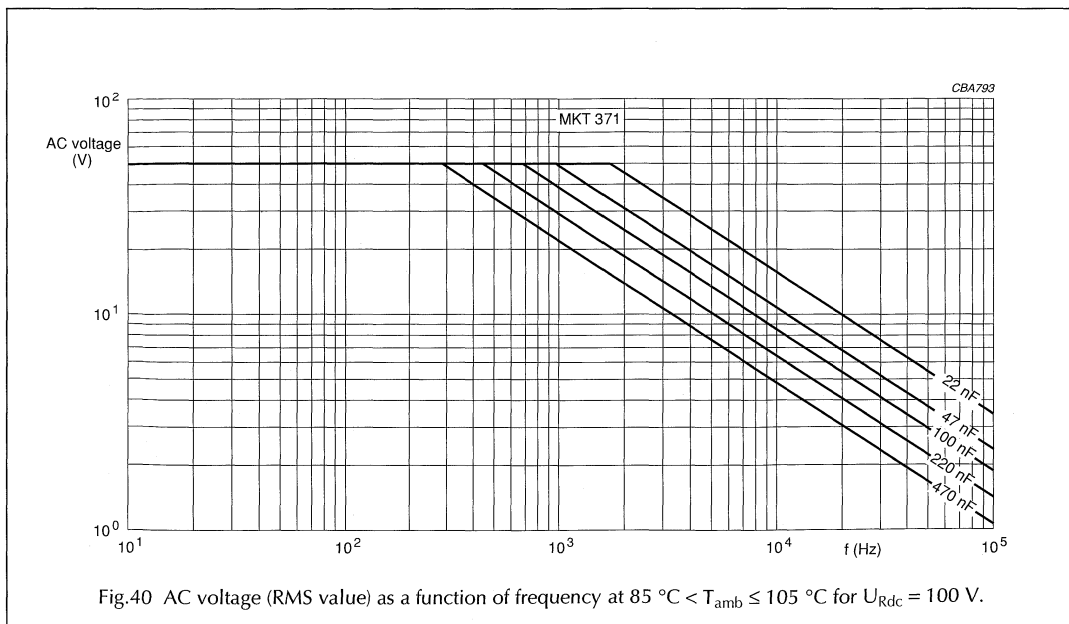
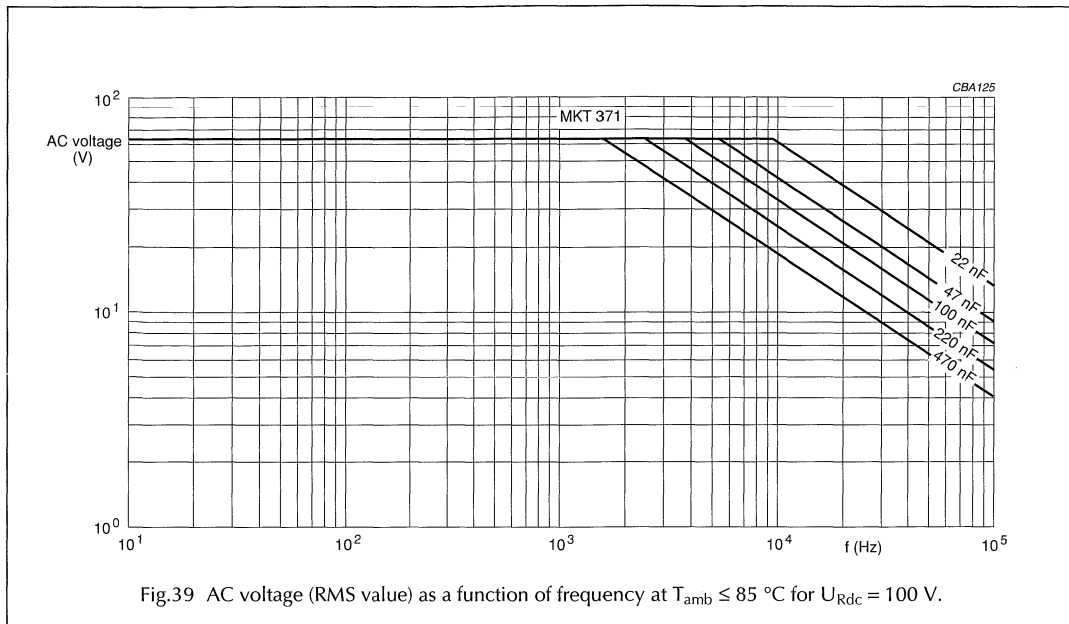
Metallized polyester film capacitors

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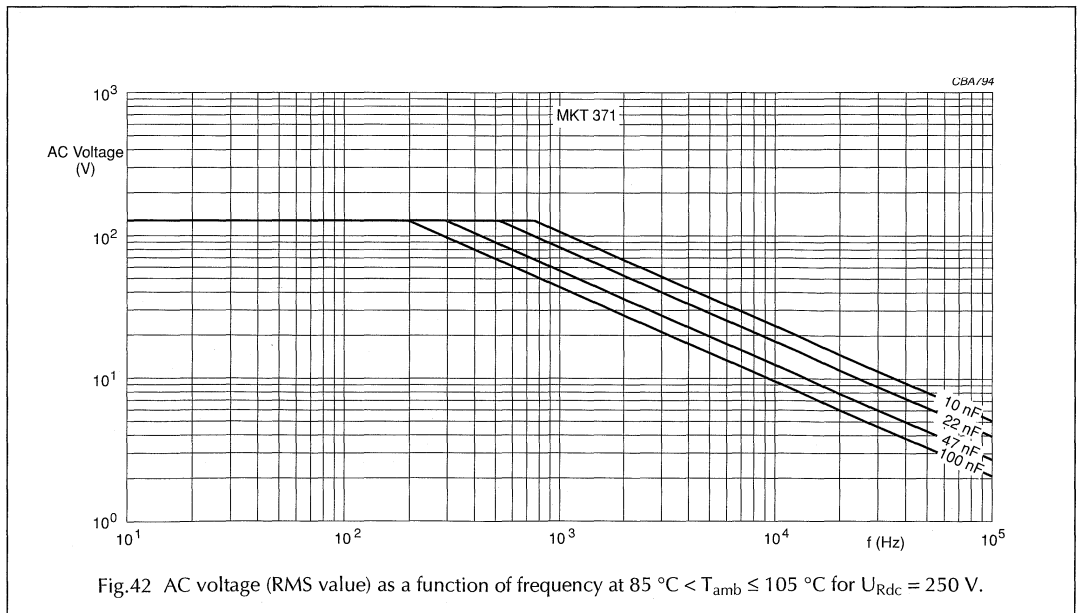
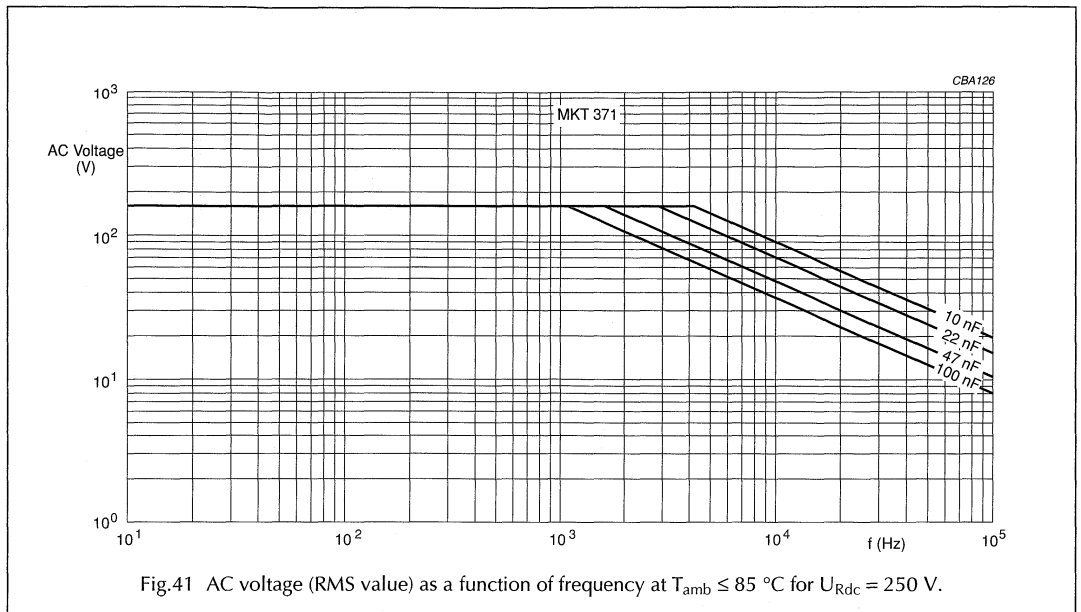
Metallized polyester film capacitors

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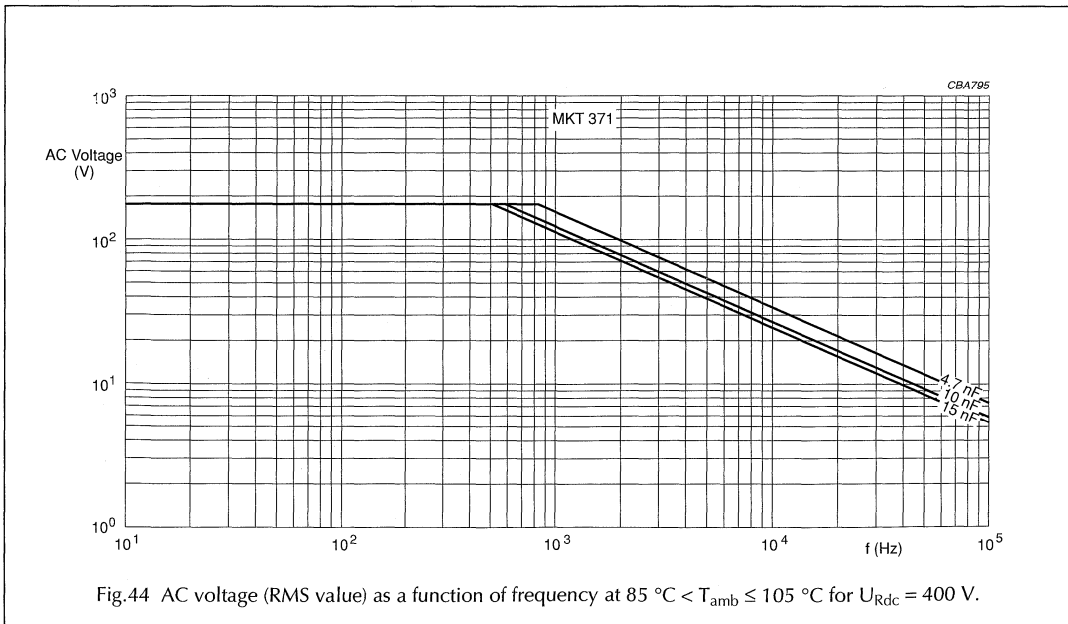
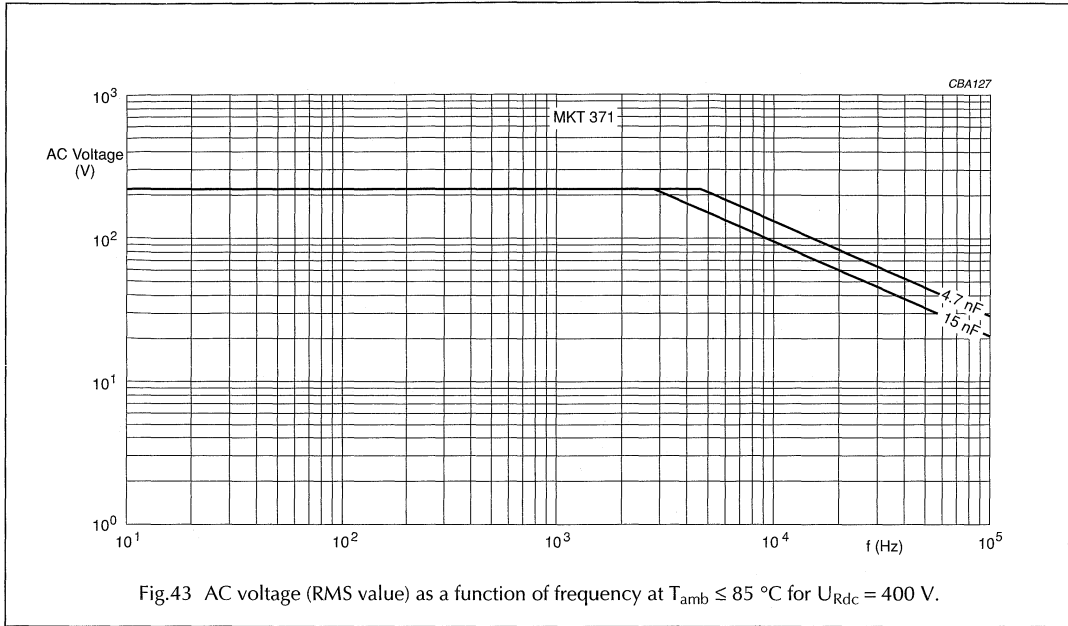
Metallized polyester film capacitors

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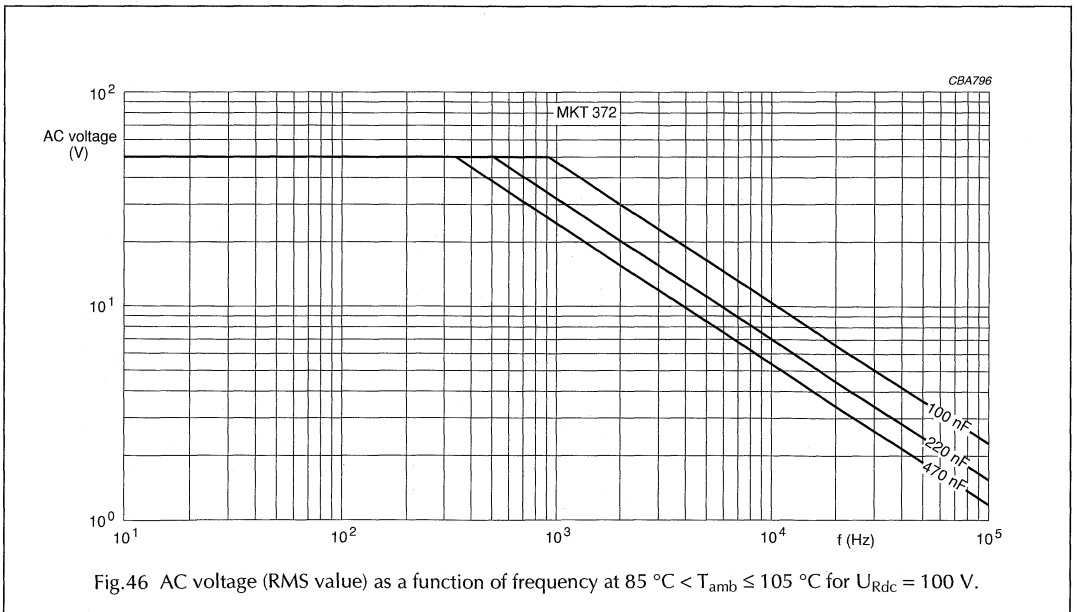
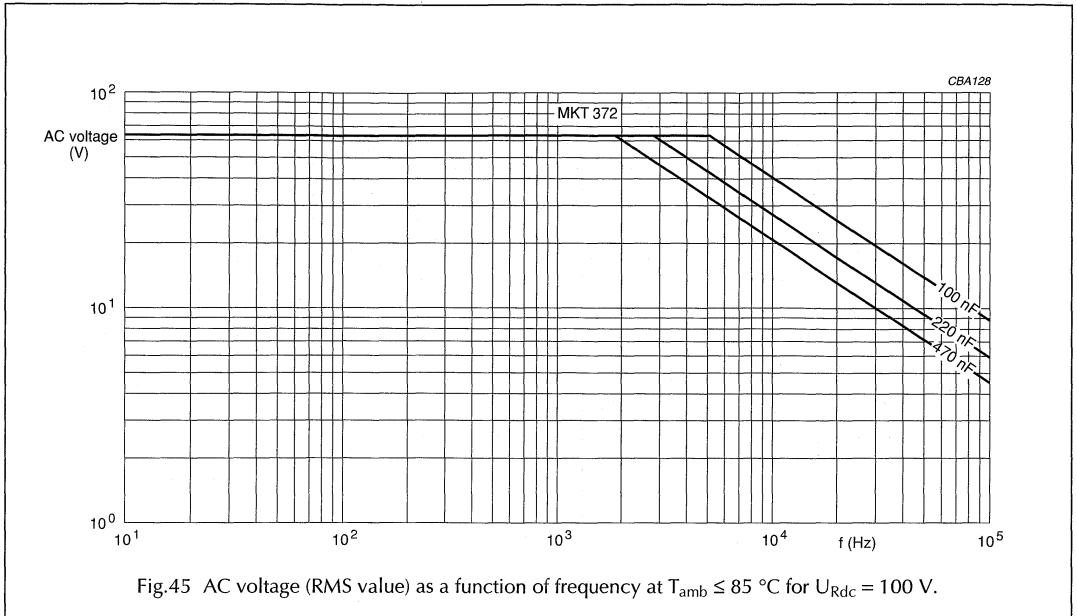
Metallized polyester film capacitors

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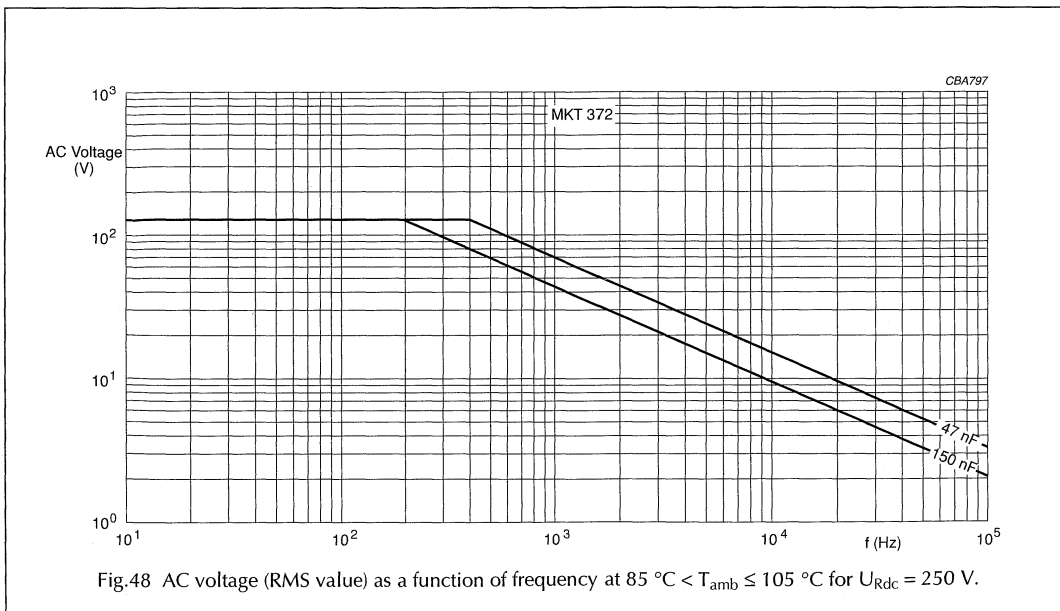
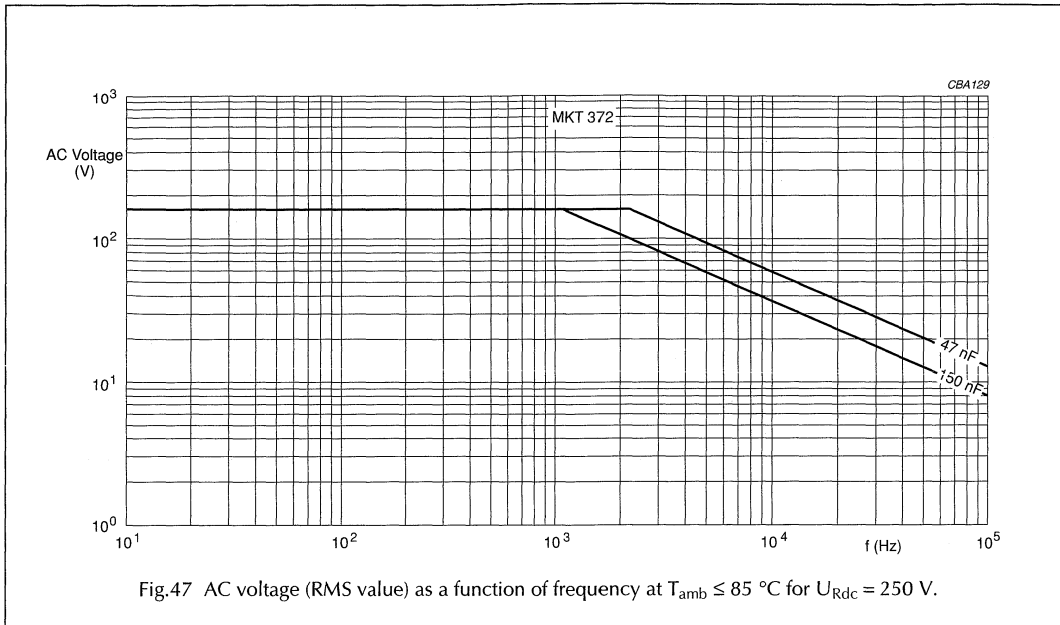
Metallized polyester film capacitors

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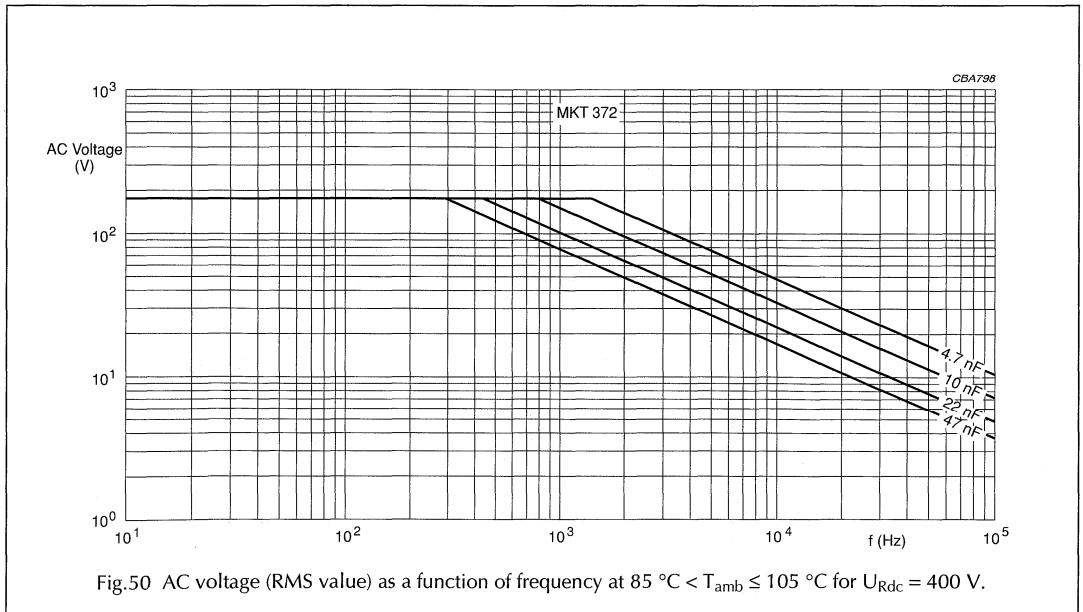
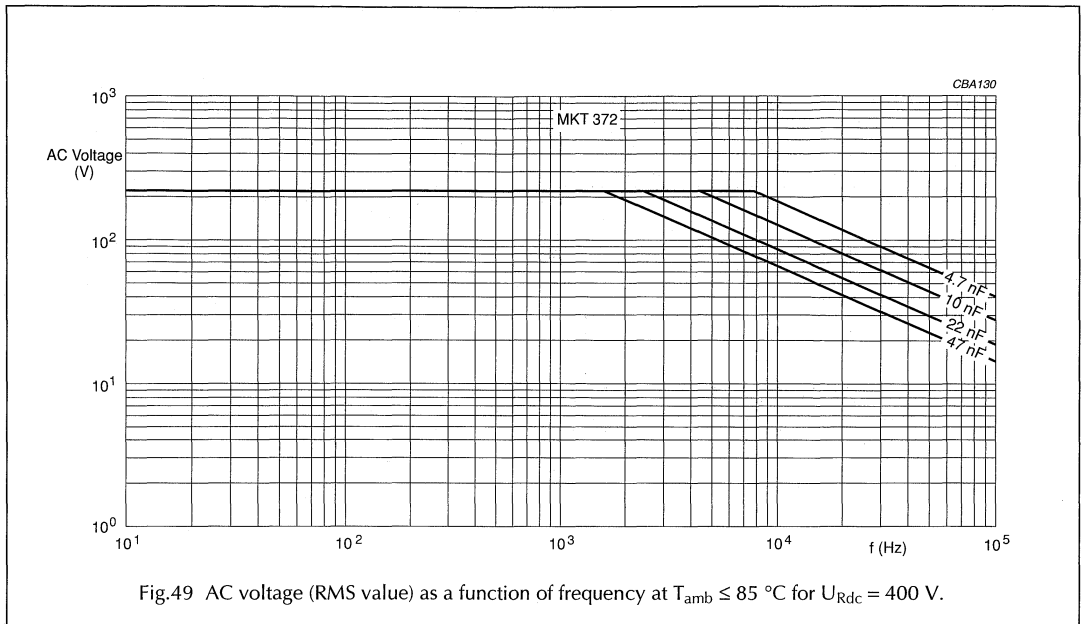
Metallized polyester film capacitors

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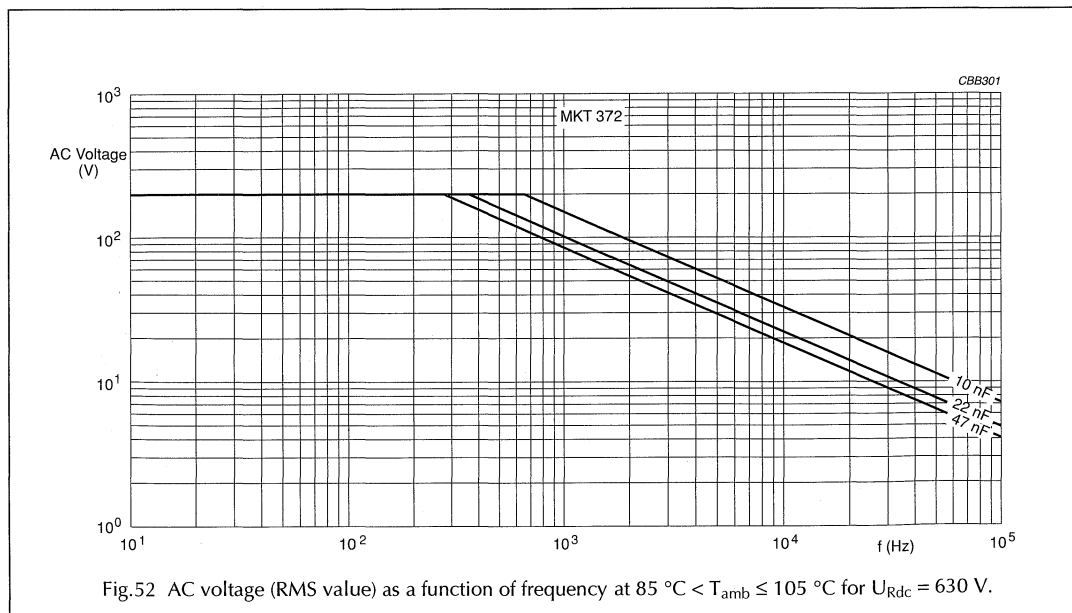
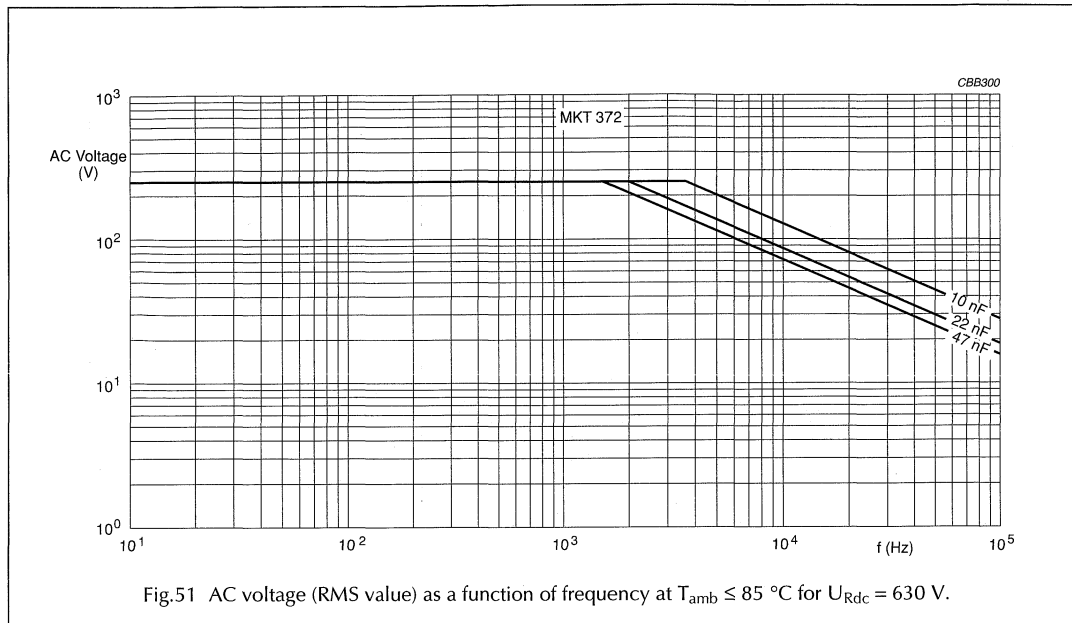
Metallized polyester film capacitors

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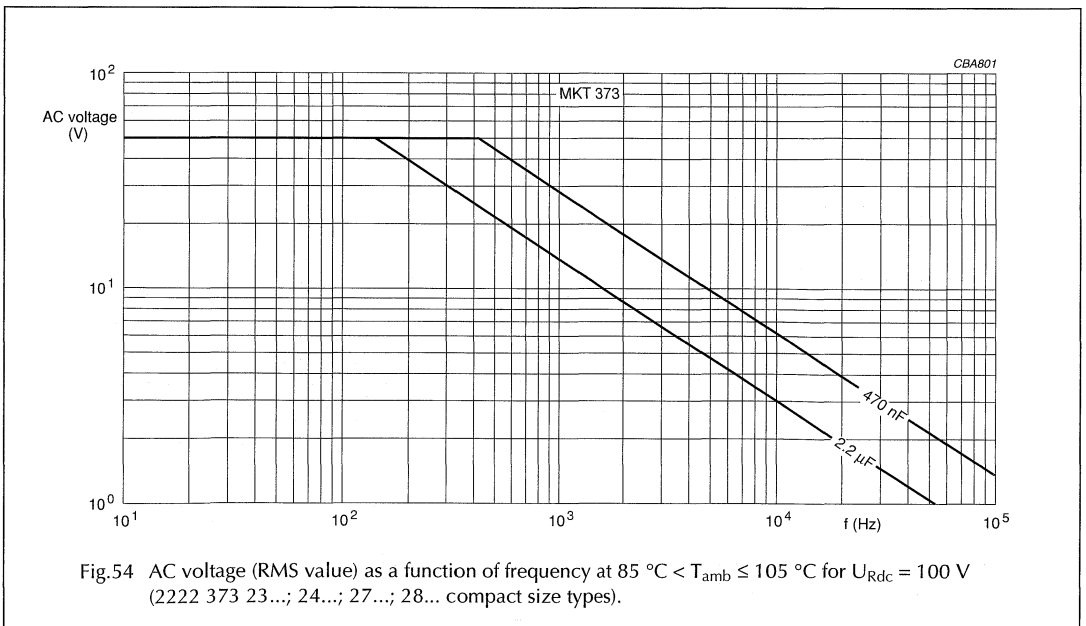
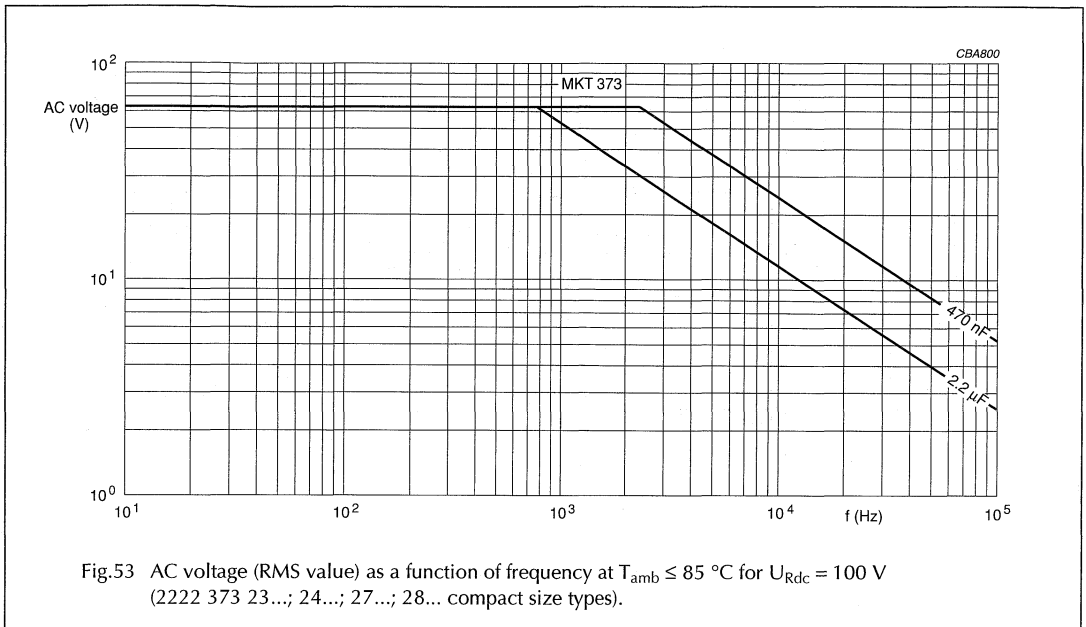
Metallized polyester film capacitors

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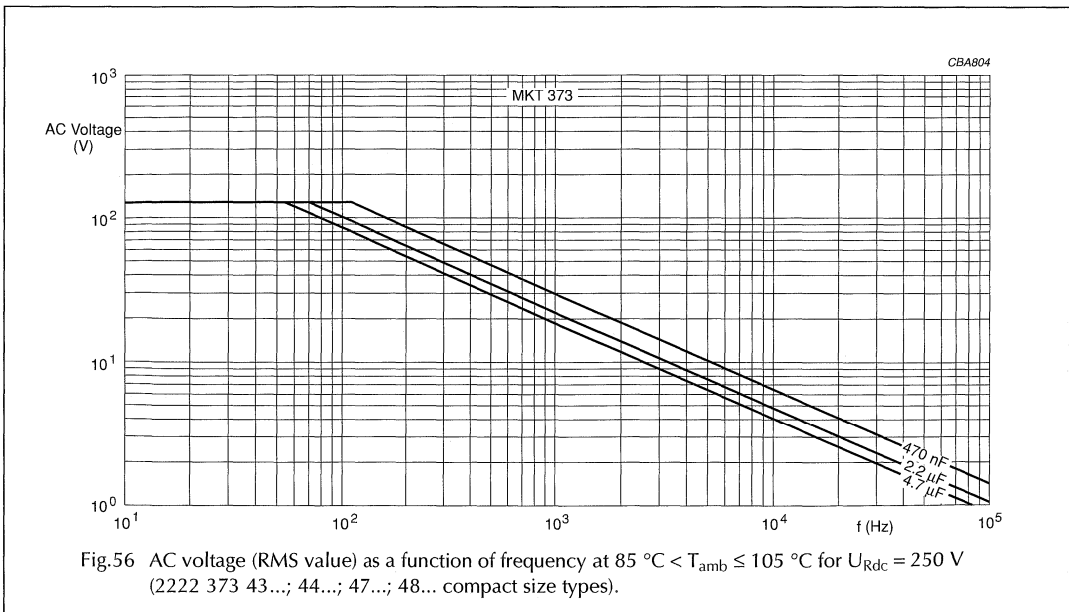
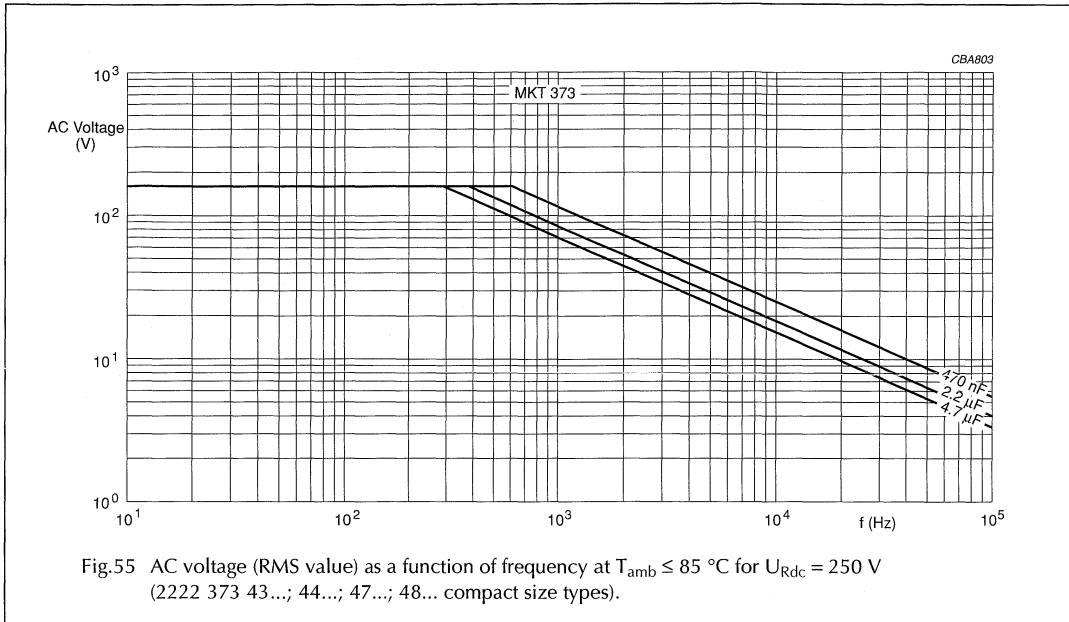
Metallized polyester film capacitors

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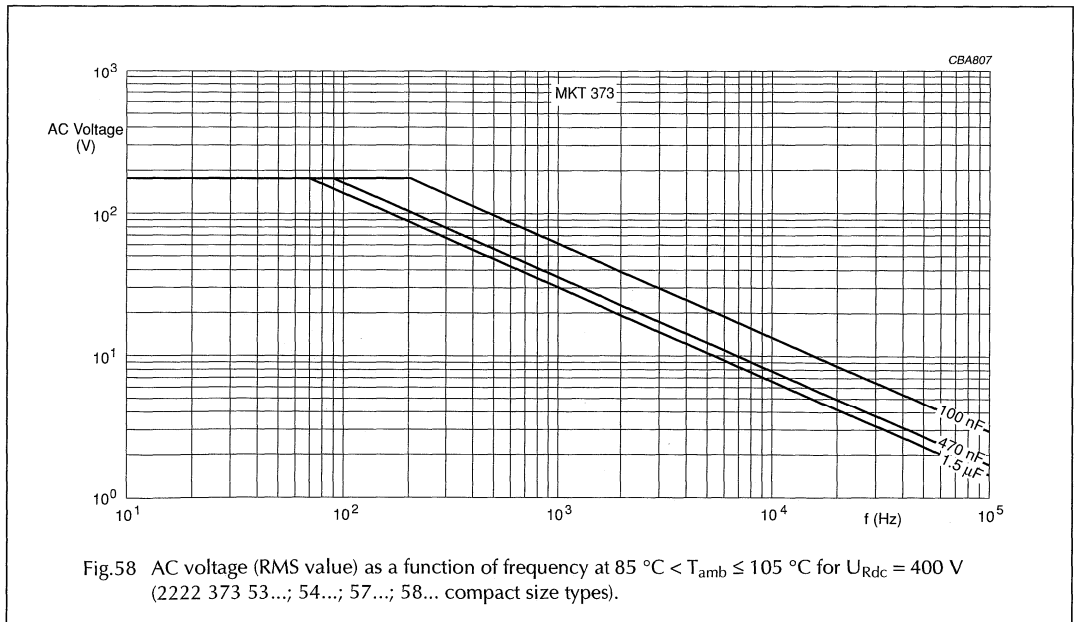
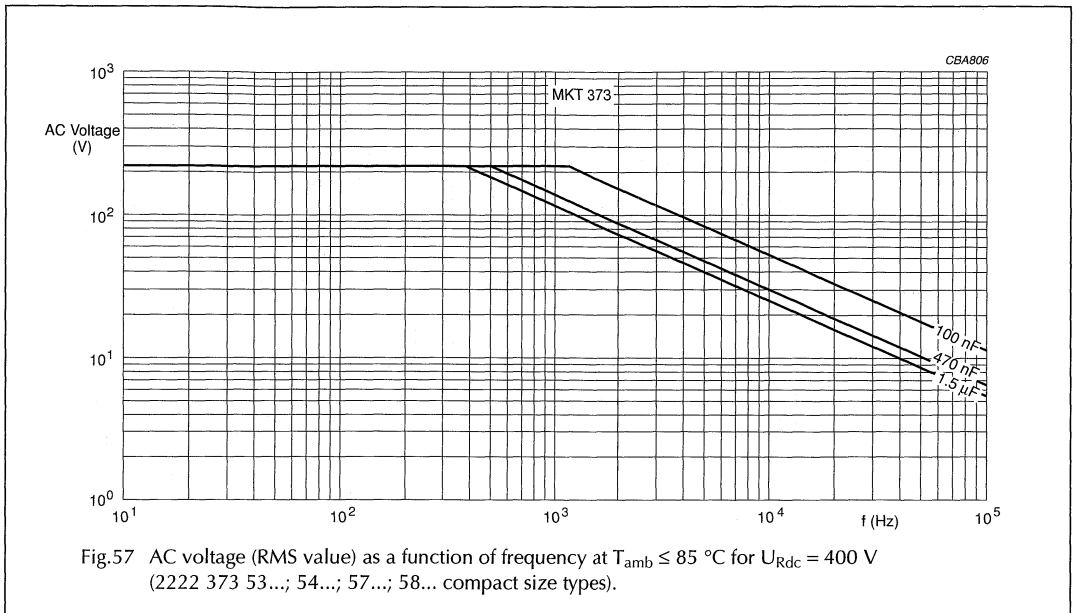
Metallized polyester film capacitors

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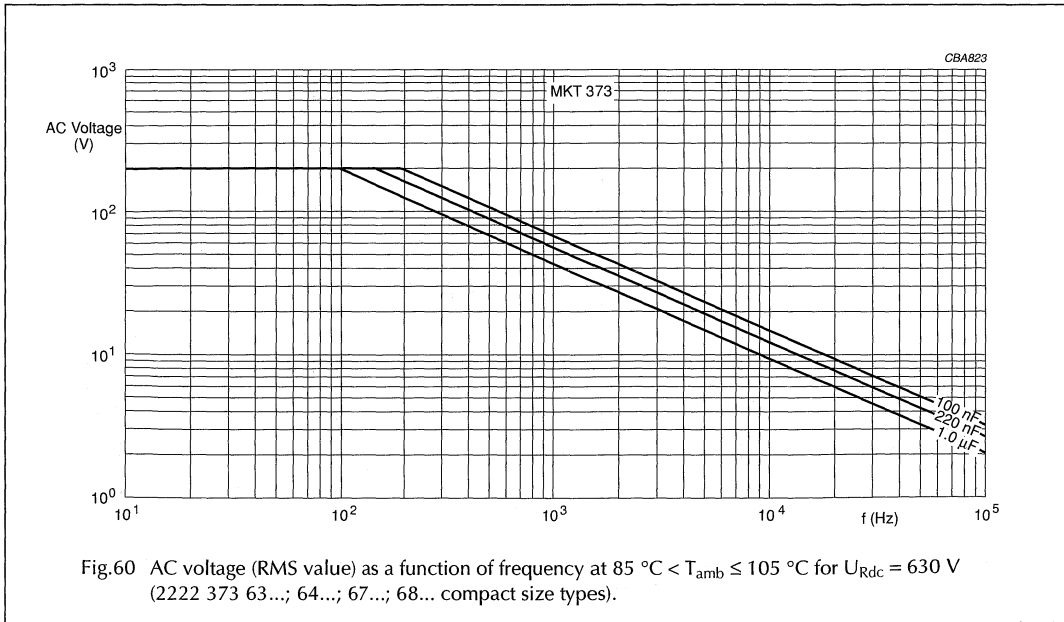
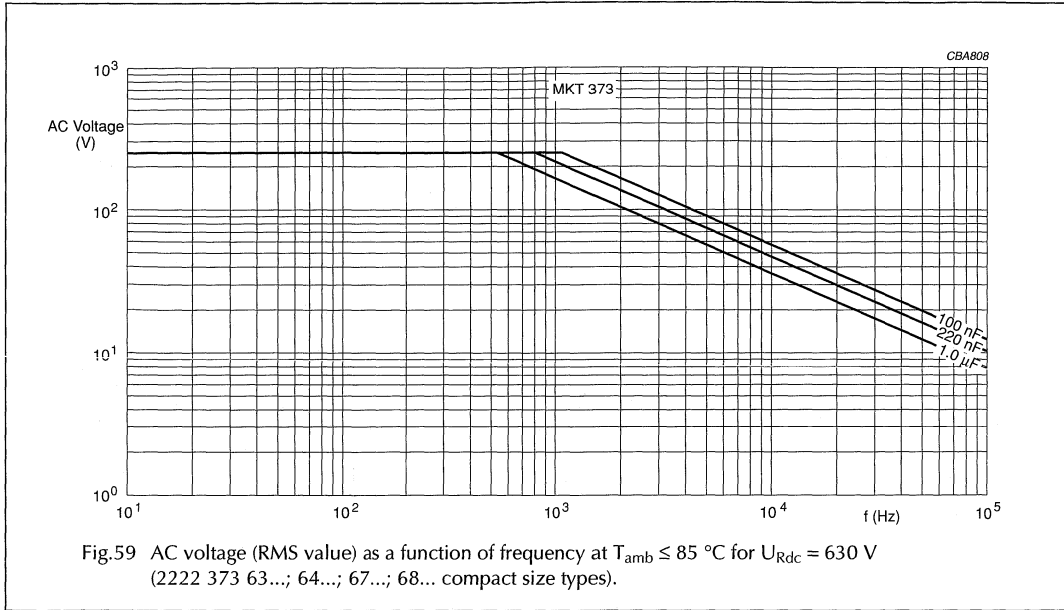
Metallized polyester film capacitors

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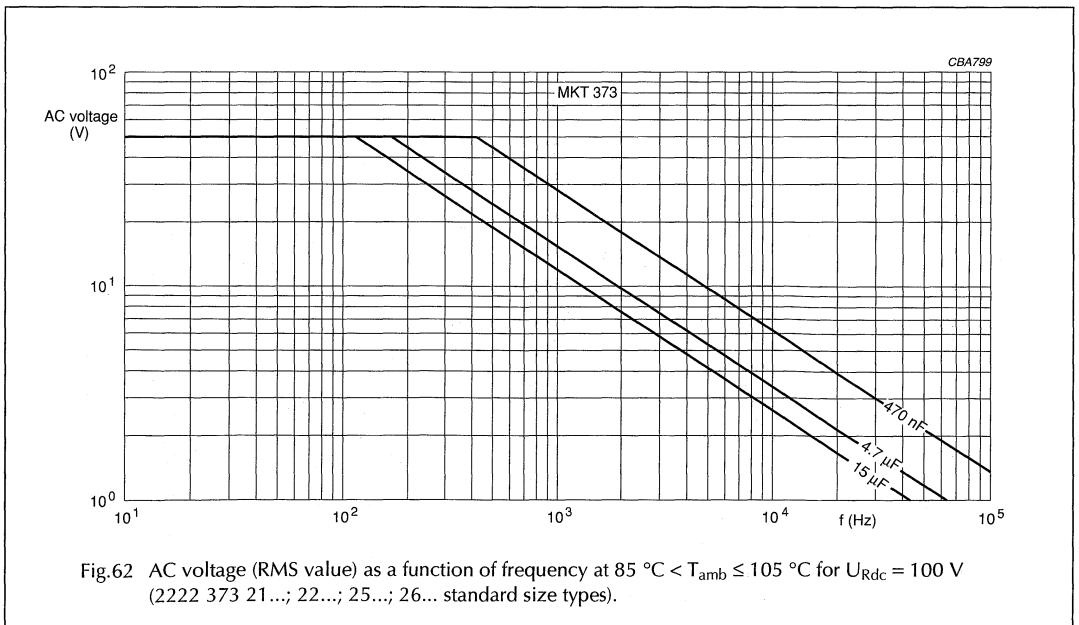
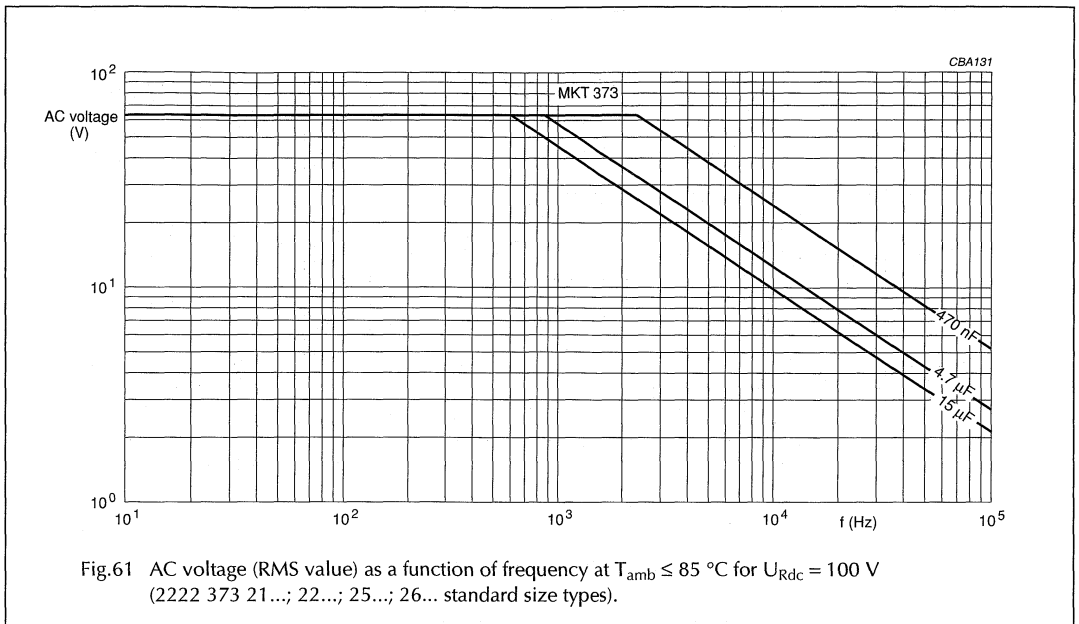
Metallized polyester film capacitors

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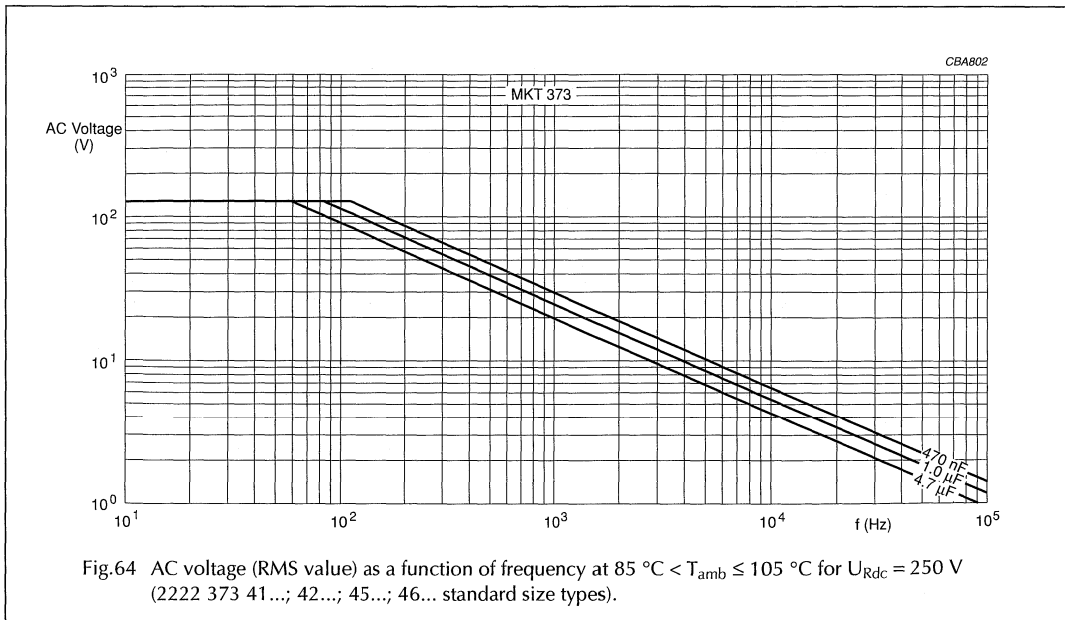
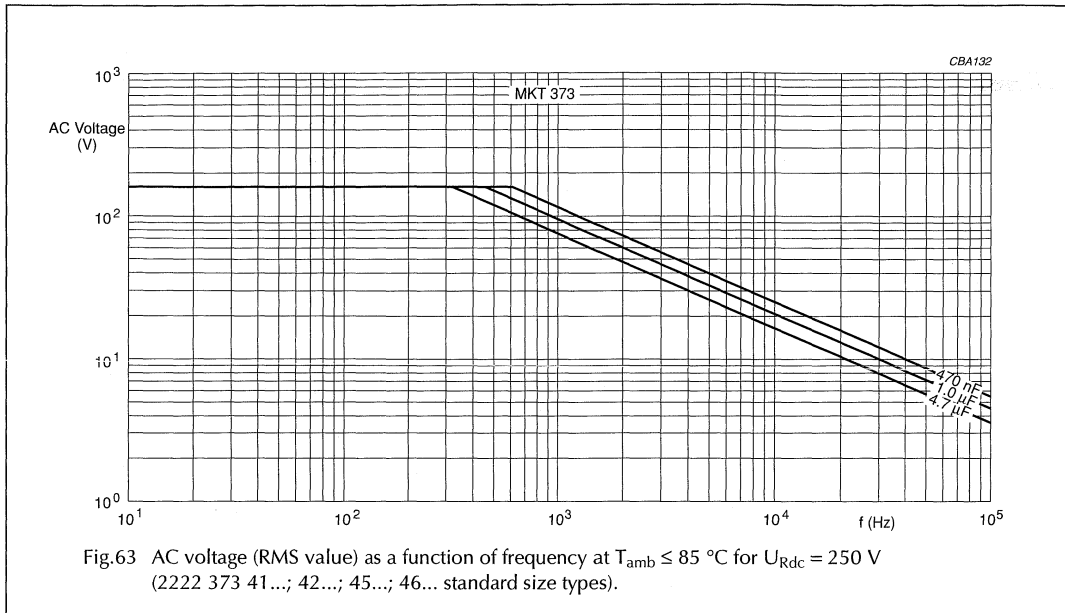
Metallized polyester film capacitors

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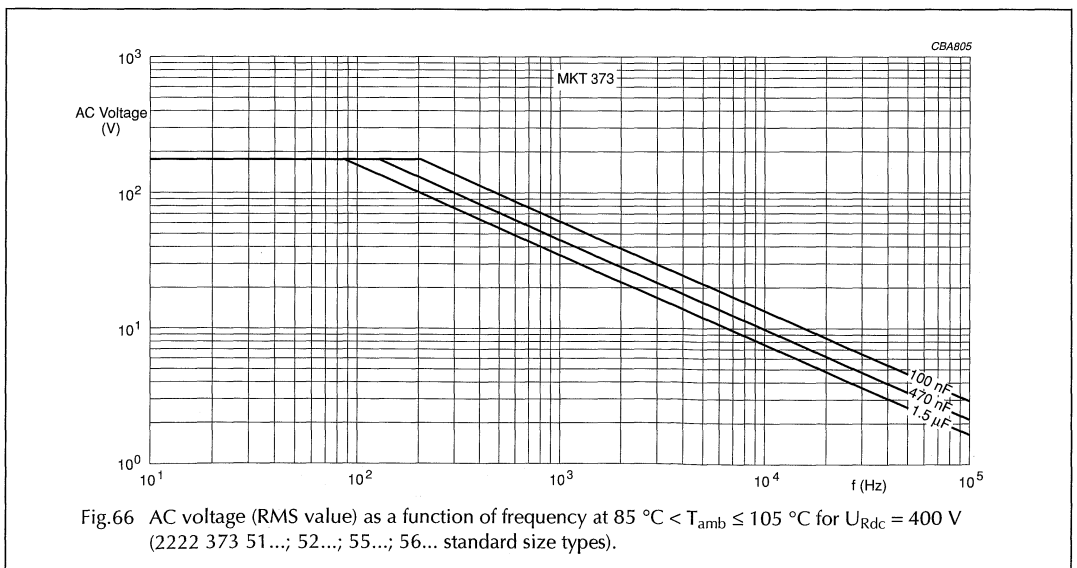
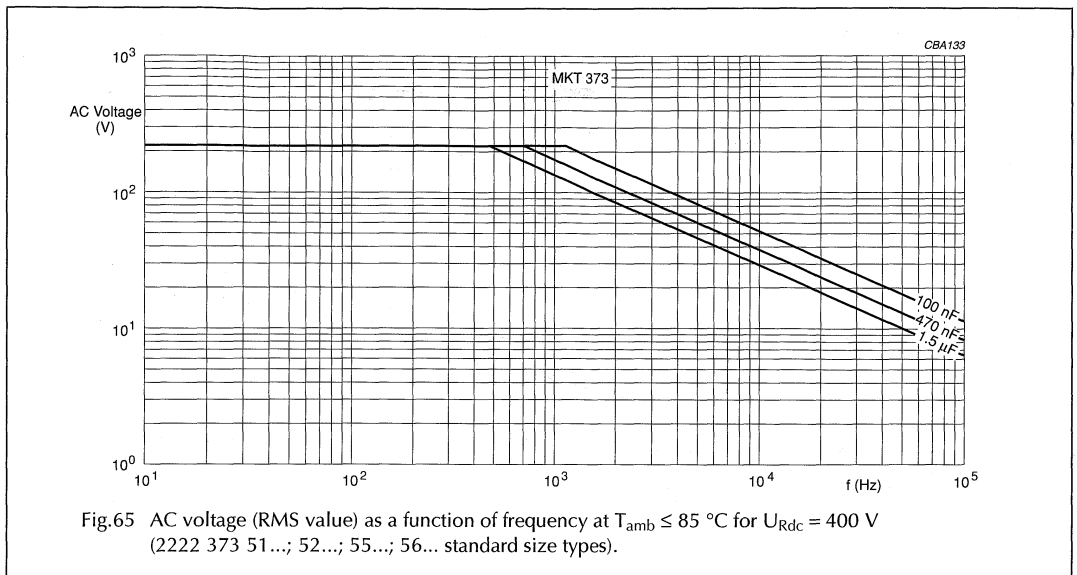
Metallized polyester film capacitors

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Metallized polyester film capacitors

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**Maximum RMS current (sinewave) as a function of frequency**

The maximum RMS current is defined by $I_{ac} = \omega \times C \times U_{ac}$.

U_{ac} is the maximum AC voltage depending on the ambient temperature in Figs 29 to 66.

Metallized polyester film capacitors

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Tangent of loss angle

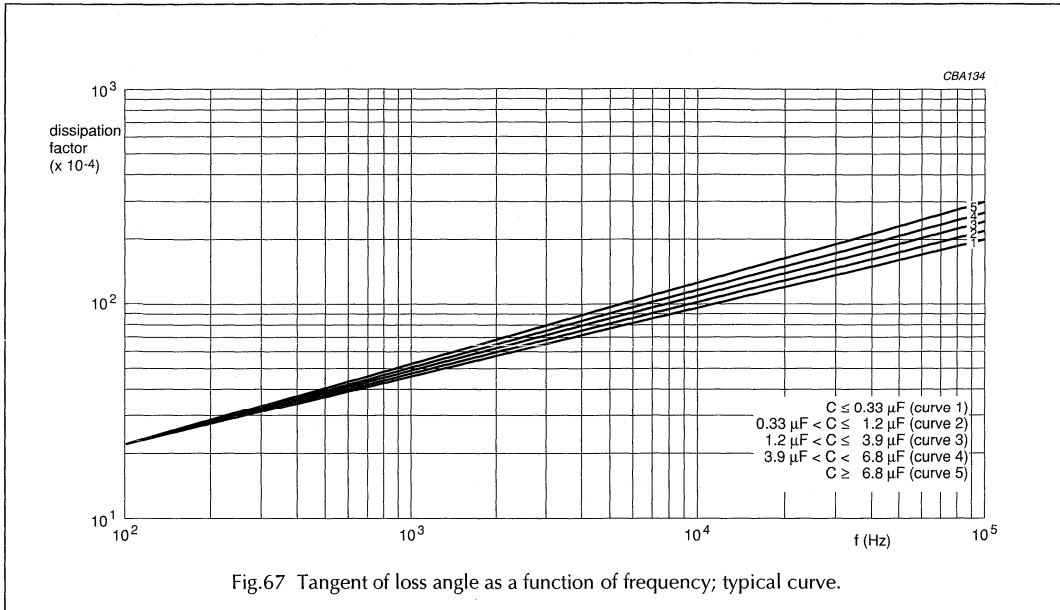


Fig.67 Tangent of loss angle as a function of frequency; typical curve.

Insulation resistance

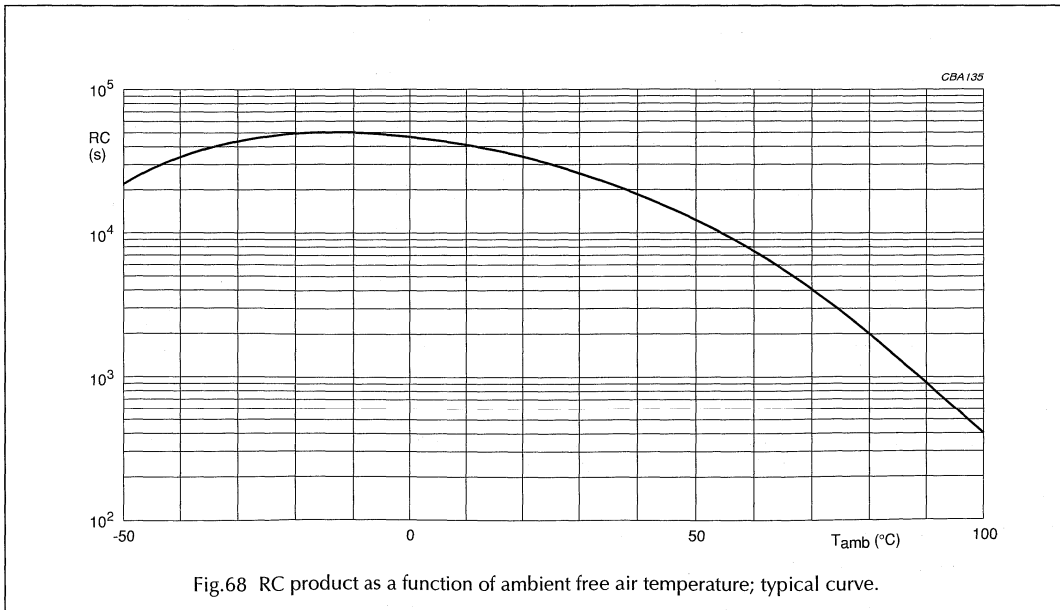


Fig.68 RC product as a function of ambient free air temperature; typical curve.

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Maximum allowed component temperature rise (ΔT) as a function of the ambient temperature (T_{amb})

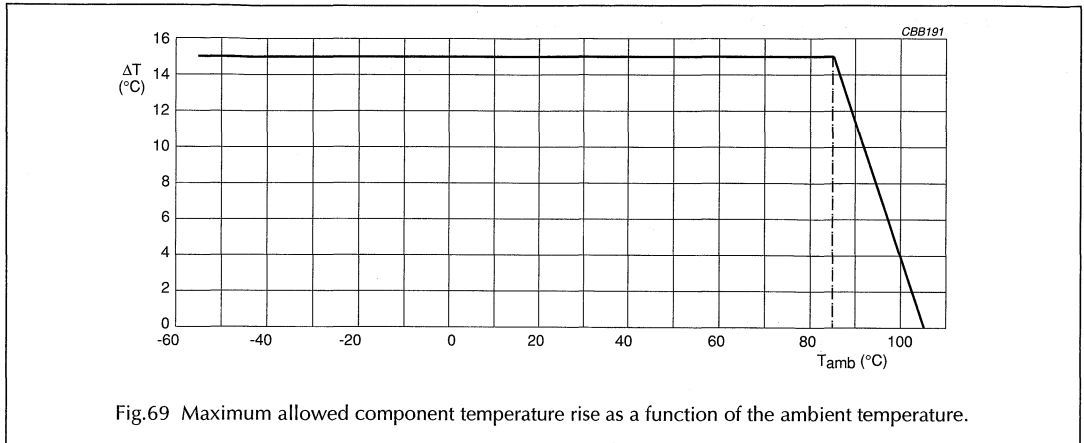


Fig.69 Maximum allowed component temperature rise as a function of the ambient temperature.

Heat conductivity (G) as a function of pitch and capacitor body thickness in mW/°C

Table 1 Heat conductivity

b_{max} (mm)	PITCH (mm)					
	5	7.5	10	15	22.5	27.5
2.5	2.5	3	–	–	–	–
3.0	–	4	–	–	–	–
3.5	3.0	–	–	–	–	–
4.0	–	5	6.0	–	–	–
4.5	4.0	–	–	–	–	–
5.0	–	6	7.5	10	–	–
6.0	5.5	7	9.0	11	19	–
7.0	–	–	–	12	21	–
8.5	–	–	–	16	25	–
10.0	–	–	–	18	28	–
11.0	–	–	–	–	–	36
13.0	–	–	–	–	–	42
15.0	–	–	–	–	–	48
18.0	–	–	–	–	–	57

Power dissipation and maximum component temperature rise

The power dissipation must be limited in order not to exceed the maximum allowed component temperature rise as a function of the free air ambient temperature.

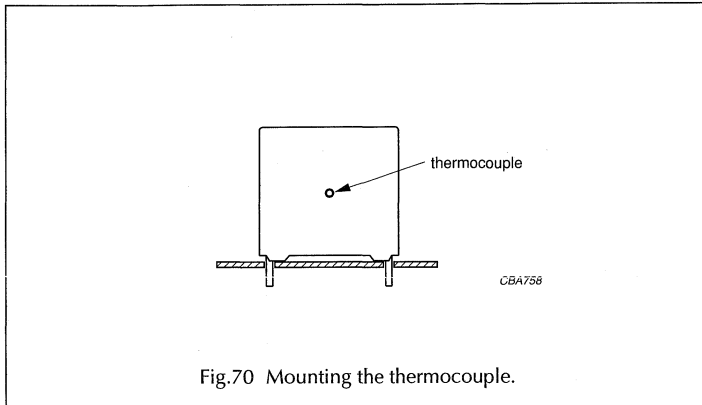
The power dissipation can be calculated according chapter "Introduction", section "Maximum power dissipation".

The component temperature rise (ΔT) can be measured (see section "Measuring the component temperature" for more details) or calculated by $\Delta T = P/G$:

- ΔT = component temperature rise (°C).
- P = power dissipation of the component (mW).
- G = heat conductivity of the component (mW/°C).

Metallized polyester film capacitors**MKT 370/371/372/373****Measuring the component temperature**

A thermocouple must be attached to the capacitor body as in Fig.70.



The temperature is measured in unloaded (T_{amb}) and maximum loaded condition (T_c).

The temperature rise is given by $\Delta T = T_c - T_{amb}$.

To avoid radiation or convection, the capacitor should be tested in a wind-free box.

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Application note and limiting conditions

These capacitors are not suitable for mains applications as across-the-line capacitors without additional protection, as described hereunder. These mains applications are strictly regulated in safety standards and therefore electromagnetic interference suppression capacitors conforming the standards must be used.

To select the capacitor for a certain application, the following 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 the maximum U_{p-p} to avoid the ionisation inception level.
3. The voltage pulse slope (dU/dt) shall not exceed the rated voltage pulse slope in an RC-circuit at rated voltage and without ringing. If the pulse voltage is lower than the rated DC voltage, the rated voltage pulse slope may be multiplied by U_{Rdc} and divided by the applied voltage.

For all other pulses following equation must be fulfilled:

$$2 \times \int_0^T \left(\frac{dU}{dt} \right)^2 \times dt < U_{Rdc} \times \left(\frac{dU}{dt} \right)_{rated}$$

T is the pulse duration.

4. The maximum component surface temperature rise must be lower than the limits in Fig.69.
5. Since in circuits used at voltages over 280 V peak-to-peak the risk for an intrinsically active flammability after a capacitor breakdown (short circuit) increases, it is recommended that the power to the component is limited to 100 times the values mentioned in Table 1 "Heat conductivity".
6. When using these capacitors as across-the-line capacitor in the input filter for mains applications or as series connected with an impedance to the mains the applicant must guarantee that following conditions are fulfilled in any case (spikes and surge voltages from the mains included).

VOLTAGE CONDITIONS FOR 6 ABOVE

ALLOWED VOLTAGES	$T_{amb} \leq 85 \text{ } ^\circ\text{C}$	$85 \text{ } ^\circ\text{C} < T_{amb} \leq 105 \text{ } ^\circ\text{C}$
Maximum continuous RMS voltage	U_{Rac}	$0.8 \times U_{Rac}$
Maximum temporary RMS -overvoltage (<24 hours)	$1.25 \times U_{Rac}$	$1.0 \times U_{Rac}$
Maximum peak voltage (V_{o-p}) (<2 s)	$1.6 \times U_{Rdc}$	$1.3 \times U_{Rdc}$

Metallized polyester film capacitors

MKT 370/371/372/373

Example

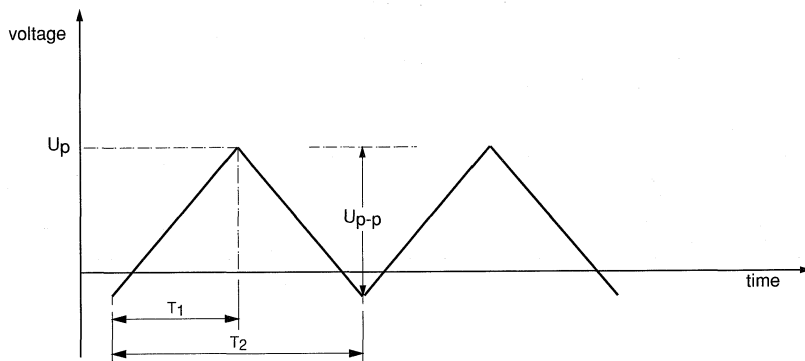
$C = 3300 \text{ nF} - 100 \text{ V}$ used for the voltage signal shown in Fig.71.

$U_{p-p} = 80 \text{ V}$; $U_p = 70 \text{ V}$; $T_1 = 0.5 \text{ ms}$; $T_2 = 1 \text{ ms}$.

The ambient temperature is $35 \text{ }^\circ\text{C}$.

Checking the conditions:

1. The peak voltage $U_p = 70 \text{ V}$ is lower than 100 V (DC) .
2. The peak-to-peak voltage 80 V is lower than $2 \times \sqrt{2} \times 63 \text{ V(AC)} = 178 U_{p-p}$.
3. The voltage pulse slope $dU/dt = 80 \text{ V}/500 \mu\text{s} = 0.16 \text{ V}/\mu\text{s}$.
This is lower than $8 \text{ V}/\mu\text{s}$ (see specific reference data for each version).
4. The dissipated power is 60 mW as calculated with Fourier terms.
The temperature rise for $b_{\text{max}} = 7.0 \text{ mm}$ and pitch = 15 mm will be $\frac{60 \text{ mW}}{12 \text{ mW}/^\circ\text{C}} = 5 \text{ }^\circ\text{C}$.
This is lower than $15 \text{ }^\circ\text{C}$ temperature rise at $35 \text{ }^\circ\text{C}$; see Fig.69.
5. Not applicable.
6. Not applicable.



CBA865

Fig.71 Voltage signal.

Metallized polyester film capacitors

MKT 370/371/372/373

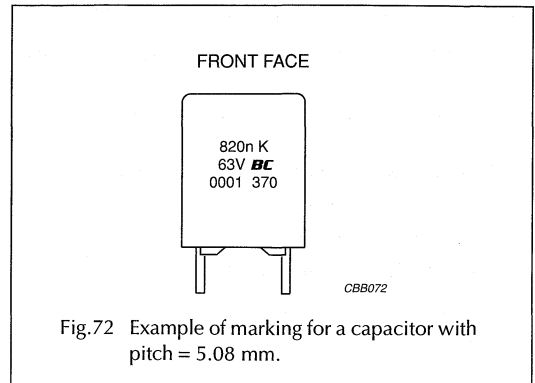
MARKING

Product marking

CAPACITORS WITH PITCH = 5.08 mm: STYLE 2222 370

The capacitors are marked on the side (see Fig.72) with the following information:

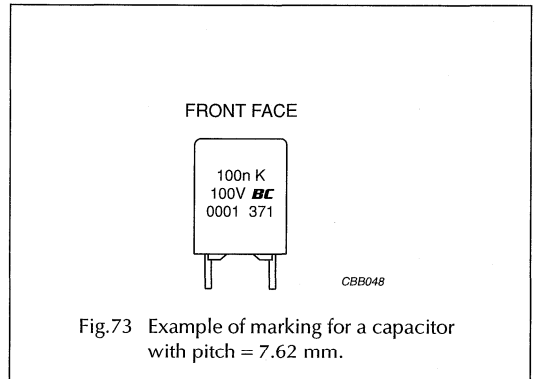
1. Capacitance code in accordance with "IEC 60062"
2. Tolerance on rated capacitance: K = $\pm 10\%$; J = $\pm 5\%$
3. Rated voltage (DC) (e.g. 63 V)
4. Code for manufacturer
5. Year and week of manufacture (e.g. 0001)
6. Manufacturer's type designation (e.g. 370).



CAPACITORS WITH PITCH = 7.62 mm: STYLE 2222 371

The capacitors are marked on the side (see Fig.73) with the following information:

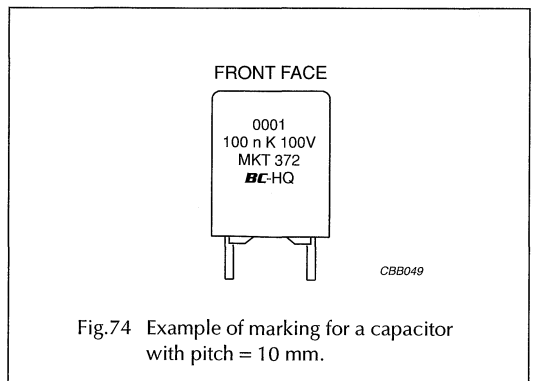
1. Capacitance code in accordance with "IEC 60062"
2. Tolerance on rated capacitance: K = $\pm 10\%$; J = $\pm 5\%$
3. Rated voltage (DC) (e.g. 100 V)
4. Code for manufacturer
5. Year and week of manufacture (e.g. 0001)
6. Manufacturer's type designation (e.g. 371).



CAPACITORS WITH PITCH = 10 mm: STYLE 2222 372

The capacitors are marked on the side (see Fig.74) with the following information:

1. Year and week of manufacture (e.g. 0001)
2. Capacitance code in accordance with "IEC 60062"
3. Tolerance on rated capacitance: K = $\pm 10\%$; J = $\pm 5\%$;
4. Rated voltage (DC) (e.g. 100 V)
5. Code for dielectric material (MKT)
6. Manufacturer's type designation (e.g. 372)
7. Code for manufacturer.
8. Code for factory of origin (HQ)



Metallized polyester film capacitors

MKT 370/371/372/373

CAPACITORS WITH PITCH = 15 mm: STYLES 2222 373

The capacitors are marked on the top (see Fig.75) with the following information:

1. Rated capacitance code in accordance with "IEC 60062"
2. Tolerance on rated capacitance: K = $\pm 10\%$; J = $\pm 5\%$
3. Rated voltage (DC) (e.g. 100 V)
4. Manufacturer's type designation (373)
5. Code for dielectric material (MKT);

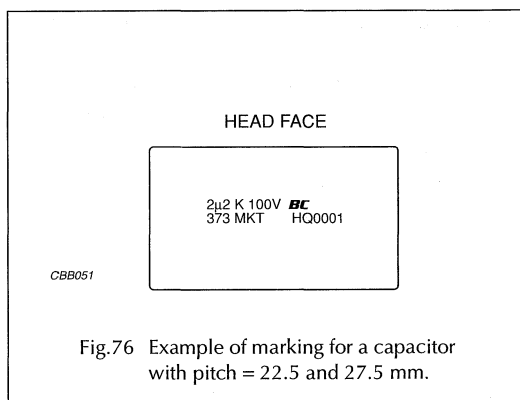
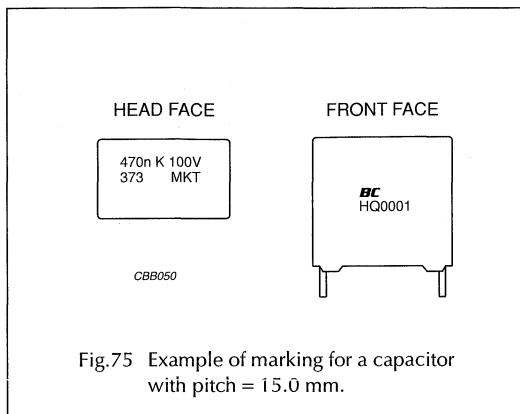
and on the side with the following information:

1. Manufacturer
2. Code for factory of origin (HQ)
3. Year and week of manufacture (e.g. 0001).

CAPACITORS WITH PITCH = 22.5 AND 27.5 mm: STYLES 2222 373

The capacitors are marked on the top (see Fig.76) with the following information:

1. Rated capacitance code in accordance with "IEC 60062"
2. Tolerance on rated capacitance: K = $\pm 10\%$; J = $\pm 5\%$
3. Rated voltage (DC) (e.g. 100 V)
4. Manufacturer
5. Manufacturer's type designation (373)
6. Code for dielectric material (MKT)
7. Code for factory of origin (HQ)
8. Year and week of manufacture (e.g. 0001).



Metallized polyester film capacitors**MKT 370/371/372/373****QUICK REFERENCE TEST REQUIREMENTS**

TEST	PROCEDURE (quick reference)	REQUIREMENTS
Robustness of leads		
Tensile strength: "IEC 60068-2-21"	load 10 N; 10 s	no visible damage legible marking $ \Delta C/C \leq 2\%$ $\Delta \tan \delta \leq 30 \times 10^{-4}$; note 1
Bending: "IEC 60068-2-21"	load 5 N; $4 \times 90^\circ$	
Resistance to soldering heat: "IEC 60068-2-20"	solder bath: 260 °C; 10 s	
Component solvent resistance	isopropyl alcohol; 23 °C; 5 minutes	
Robustness of component		
Vibration: "IEC 60068-2-6"	10 to 55 Hz; amplitude 0.75 mm or acceleration 98 m/s ² ; 6 hours	$ \Delta C/C \leq 3\%$ $\Delta \tan \delta \leq 30 \times 10^{-4}$; note 1
Shock: "IEC 60068-2-27"	half sine wave; 490 m/s ² ; 11 ms	
Climatic sequence		
Dry heat: "IEC 60068-2-2"	16 hours; 105 °C	$ \Delta C/C \leq 3\%$ $\Delta \tan \delta \leq 50 \times 10^{-4}$; note 1 $R_{\text{ins}} \geq 50\%$ of specified value
Damp heat cyclic, test Db, first cycle: "IEC 60068-2-30"		
Cold: "IEC 60068-2-1"	2 hours; -55 °C	
Damp heat, test Db, remaining cycles: "IEC 60068-2-30"		
Other applicable tests		
Damp heat, steady state: "IEC 60068-2-3"	56 days; 40 °C; 90 to 95% RH	$ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 50 \times 10^{-4}$; note 1 $R_{\text{ins}} \geq 50\%$ of specified value
Endurance (DC): "IEC 60384-2"	2000 hours; $1.25 \times U_{\text{Rdc}}$; 85 °C $1 \times U_{\text{Rdc}}$; 105 °C	$ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 30 \times 10^{-4}$; note 1 $R_{\text{ins}} \geq 50\%$ of specified value
Heat storage: "IEC 60384-2"	2000 hours; 105 °C	$ \Delta C/C \leq 3\%$ $\Delta \tan \delta \leq 30 \times 10^{-4}$; note 1
Endurance (AC): "IEC 60384-2"	1000 hours: $1.1 \times U_{\text{Rac}}$; 85 °C	$ \Delta C/C \leq 8\%$ (style 370) $ \Delta C/C \leq 5\%$ (style 371) $ \Delta C/C \leq 3\%$ (style 372 and 373) $\Delta \tan \delta \leq 30 \times 10^{-4}$; note 1

Metallized polyester film capacitors**MKT 370/371/372/373**

TEST	PROCEDURE (quick reference)	REQUIREMENTS
Resistance to detergents	3 minutes in dishwater at 70 °C	$ \Delta C/C \leq 1\%$ $\Delta \tan \delta \leq 30 \times 10^{-4}$; note 1 $R_{ins} \geq 50\%$ of specified value
Resistance to soldering heat with preheating: "IEC 60384-2"	body temperature: 100 °C; bath temperature: 260 °C; dwell time: 5 s	$ \Delta C/C \leq 2\%$ $\Delta \tan \delta \leq 30 \times 10^{-4}$; note 1
Passive flammability "IEC 60384-1"	Class C	no burning

Note

1. Measuring frequency 10 kHz.

Metallized polyester film capacitors**MKT 470**

MKT RADIAL POTTED TYPE

PITCH 5 mm

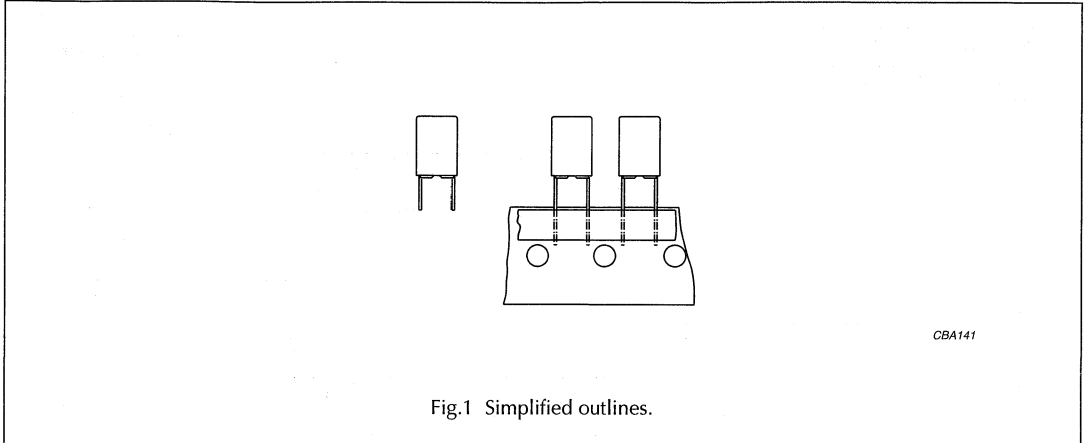


Fig.1 Simplified outlines.

FEATURES

- Low-inductive wound cell of metallized (PETP) film
- Potted with epoxy resin in a flame-retardant case
- Radial leads of solder-coated wire
- Withstands thermal shocks, oils, solvents and rinsing liquids
- Small stand-off pips to allow removal of solder flux
- Suitable for high density packaging.

APPLICATIONS

- Blocking and coupling of signals
- Bypass and energy reservoir
- Filter networks
- Pulse circuits
- Heavy duty and automotive
- Where high reliability is required.

DETAIL SPECIFICATION

For more detailed data and test requirements see "Type detail specification HQN-384-02/104".

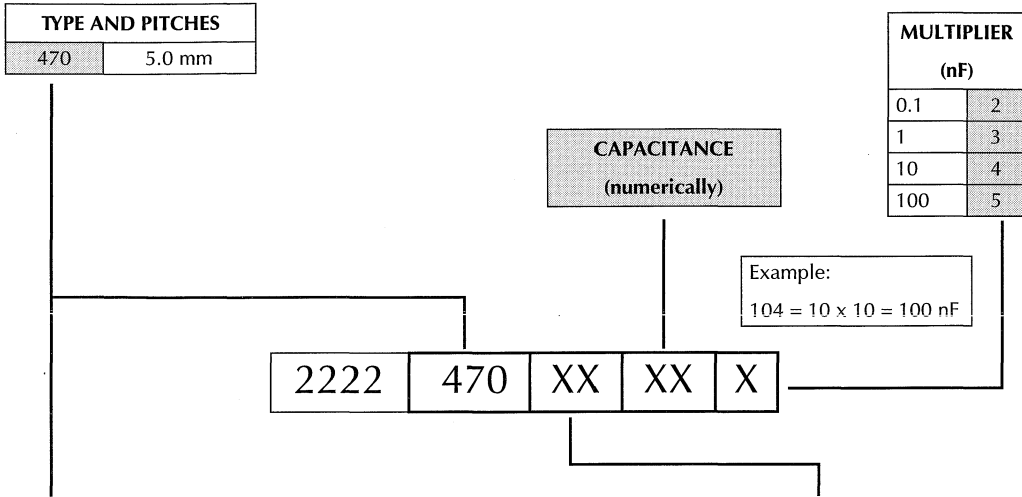
QUICK REFERENCE DATA

DESCRIPTION	VALUE
Capacitance range (E12 series)	0.001 to 1.2 μ F
Capacitance tolerance	\pm 10%; \pm 5%
Rated (DC) voltage	63 V; 100 V; 250 V; 400 V
Rated (AC) voltage	40 V; 63 V; 160 V; 200 V
Climatic category	55/125/56
Rated temperature	85 °C
Maximum application temperature	125 °C
Reference specification	IEC 60384-2
Performance grade	grade 1 (long life)
Materials	qualified in accordance with UL94 V-0

Metallized polyester film capacitors

MKT 470

COMPOSITION OF CATALOGUE NUMBER

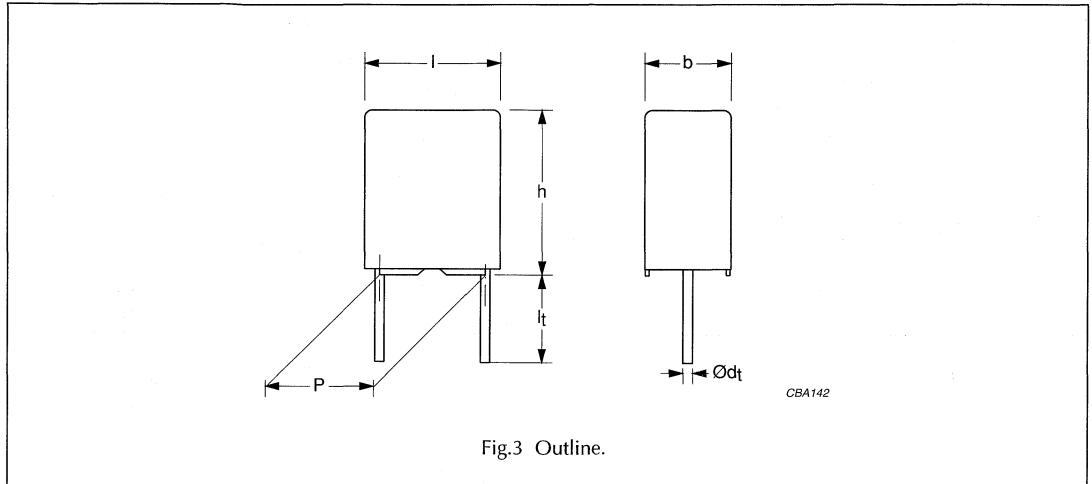


TYPE	PACKAGING	LEAD CONFIGURATION	PREFERRED TYPES				
			C-TOL	63 V	100 V	250 V	400 V
470	ammopack		±10%	75	85	35	65
			±5%	76	86	36	66
			ON REQUEST				
470	loose in box	lead length 4.0 mm	±10%	11	21	41	51
			±5%	12	22	42	52
		lead length 26.0 mm	±10%	15	25	45	55
			±5%	16	26	46	56
	taped on reel		±10%	18	28	48	58
			±5%	19	29	49	59

Metallized polyester film capacitors

MKT 470

MKT 470 GENERAL DATA

PITCH 5 mm


Specific reference data for the 63 V DC capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle:			
$C \leq 0.1 \mu\text{F}$	$\leq 60 \times 10^{-4}$	$\leq 120 \times 10^{-4}$	$\leq 200 \times 10^{-4}$
$0.1 \mu\text{F} < C \leq 0.47 \mu\text{F}$	$\leq 60 \times 10^{-4}$	$\leq 120 \times 10^{-4}$	$\leq 225 \times 10^{-4}$
$0.47 \mu\text{F} < C \leq 1.2 \mu\text{F}$	$\leq 60 \times 10^{-4}$	$\leq 120 \times 10^{-4}$	–
Rated voltage pulse slope $(dU/dt)_R$ at 63 V (DC)	100 V/ μs		
R between leads, for $C \leq 0.33 \text{ mF}$ at 10 V; 1 minute	$>15000 \text{ M}\Omega$		
RC between leads, for $C > 0.33 \text{ mF}$ at 10 V; 1 minute	$>5000 \text{ s}$		
R between interconnected leads and case (foil method)	$>30000 \text{ M}\Omega$		
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	100 V; 1 minute		
Withstanding (DC) voltage between leads and case	200 V; 1 minute		

Available 63 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Ammopack	$H = 18.5 \text{ mm}; P_0 = 12.7 \text{ mm}$	$\pm 10\%$	2222 470 75...	preferred
		$\pm 5\%$	2222 470 76...	preferred
Loose in box	$l_t = 4.0 +1.0/-0.5 \text{ mm}$	$\pm 10\%$	2222 470 11...	on request
		$\pm 5\%$	2222 470 12...	on request
	$l_t = 26.0 \pm 2.0 \text{ mm}$	$\pm 10\%$	2222 470 15...	on request
		$\pm 5\%$	2222 470 16...	on request
Taped on reel	$H = 18.5 \text{ mm}; P_0 = 12.7 \text{ mm}$	$\pm 10\%$	2222 470 18...	on request
		$\pm 5\%$	2222 470 19...	on request

Metallized polyester film capacitors**MKT 470** $U_{Rdc} = 63 \text{ V}; U_{Rac} = 40 \text{ V}$

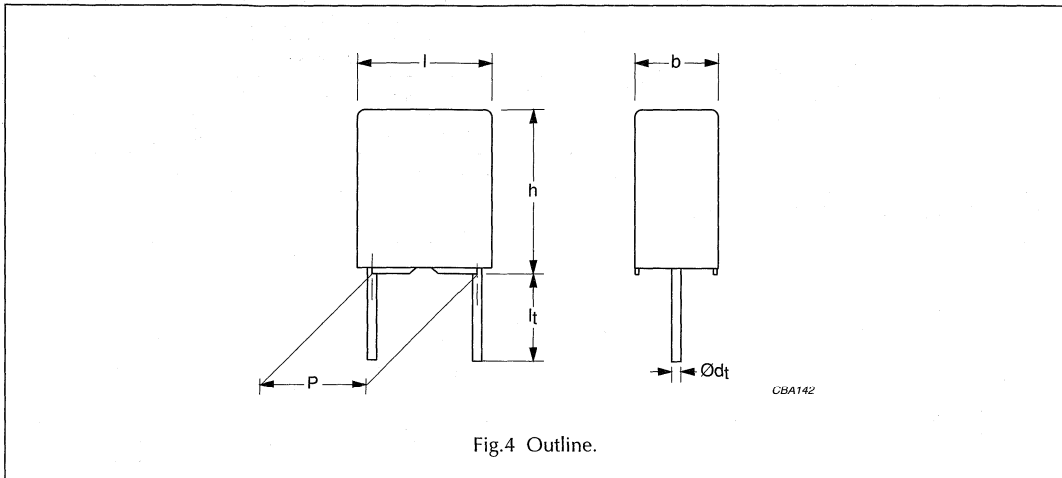
C (μF)	DIMENSIONS $b \times h \times l$ (mm)	MASS (g)	CATALOGUE NUMBER	
			AMMOPACK	
			H = 18.5 mm; P ₀ = 12.7 mm	
			C-tol = $\pm 10\%$	C-tol = $\pm 5\%$
			catalogue number	last 5 digits
Pitch = 5.0 \pm 0.3 mm; d_t = 0.50 \pm 0.05 mm				
0.068	2.5 \times 6.5 \times 7.2	0.25	2222 470 75683	.. 76683
0.082			2222 470 75823	.. 76823
0.1			2222 470 75104	.. 76104
0.12	3.5 \times 8.0 \times 7.2	0.35	2222 470 75124	.. 76124
0.15			2222 470 75154	.. 76154
0.18			2222 470 75184	.. 76184
0.22			2222 470 75224	.. 76224
0.27			2222 470 75274	.. 76274
0.33			2222 470 75334	.. 76334
0.39			2222 470 75394	.. 76394
0.47	4.5 \times 9.0 \times 7.2	0.45	2222 470 75474	.. 76474
0.56			2222 470 75564	.. 76564
0.68			2222 470 75684	.. 76684
0.82	6.0 \times 11.0 \times 7.2	0.60	2222 470 75824	.. 76824
1			2222 470 75105	.. 76105
1.2			2222 470 75125	.. 76125

Metallized polyester film capacitors

MKT 470

MKT 470 GENERAL DATA

PITCH 5 mm



Specific reference data for the 100 V DC capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle:			
$C \leq 0.1 \mu\text{F}$	$\leq 60 \times 10^{-4}$	$\leq 120 \times 10^{-4}$	$\leq 200 \times 10^{-4}$
$0.1 \mu\text{F} < C \leq 0.47 \mu\text{F}$	$\leq 60 \times 10^{-4}$	$\leq 120 \times 10^{-4}$	$\leq 225 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 100 V (DC)	160 V/ μs		
R between leads, for $C \leq 0.33 \mu\text{F}$ at 10 V; 1 minute	$>15000 \text{ M}\Omega$		
RC between leads, for $C > 0.33 \mu\text{F}$ at 10 V; 1 minute	$>5000 \text{ s}$		
R between interconnected leads and case (foil method)	$>30000 \text{ M}\Omega$		
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	160 V; 1 minute		
Withstanding (DC) voltage between leads and case	200 V; 1 minute		

Available 100 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Ammopack	$H = 18.5 \text{ mm}; P_0 = 12.7 \text{ mm}$	$\pm 10\%$	2222 470 85...	preferred
		$\pm 5\%$	2222 470 86...	preferred
Loose in box	$l_t = 4.0 +1.0/-0.5 \text{ mm}$	$\pm 10\%$	2222 470 21...	on request
		$\pm 5\%$	2222 470 22...	on request
	$l_t = 26.0 \pm 2.0 \text{ mm}$	$\pm 10\%$	2222 470 25...	on request
		$\pm 5\%$	2222 470 26...	on request
Taped on reel	$H = 18.5 \text{ mm}; P_0 = 12.7 \text{ mm}$	$\pm 10\%$	2222 470 28...	on request
		$\pm 5\%$	2222 470 29...	on request

Metallized polyester film capacitors**MKT 470** $U_{Rdc} = 100 \text{ V}; U_{Rac} = 63 \text{ V}$

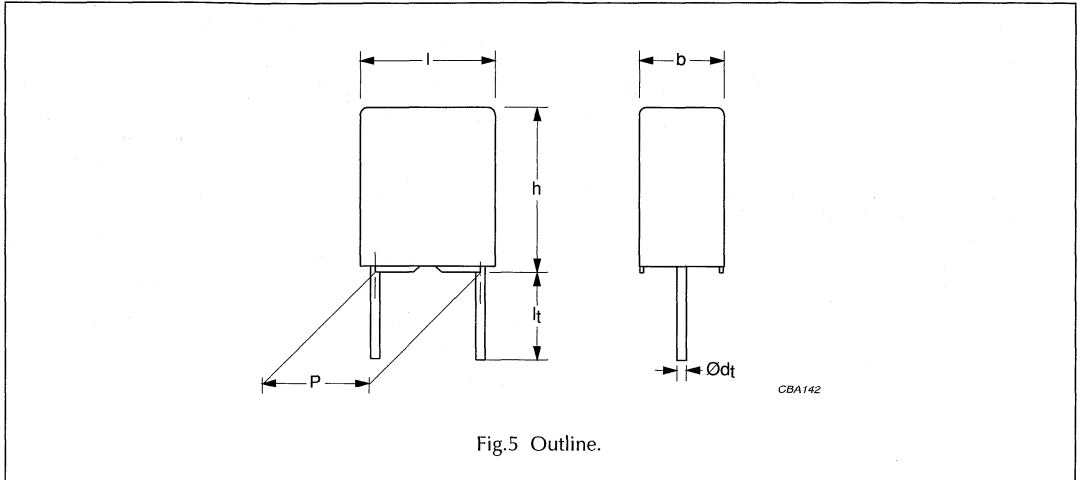
C (μF)	DIMENSIONS $b \times h \times l$ (mm)	MASS (g)	CATALOGUE NUMBER	
			AMMOPACK	
			H = 18.5 mm; P ₀ = 12.7 mm	
			C-tol = $\pm 10\%$	C-tol = $\pm 5\%$
			catalogue number	last 5 digits
Pitch = $5.0 \pm 0.3 \text{ mm}; d_t = 0.50 \pm 0.05 \text{ mm}$				
0.022	2.5 × 6.5 × 7.2	0.25	2222 470 85223	.. 86223
0.027			2222 470 85273	.. 86273
0.033			2222 470 85333	.. 86333
0.039			2222 470 85393	.. 86393
0.047			2222 470 85473	.. 86473
0.056			2222 470 85563	.. 86563
0.068	3.5 × 8.0 × 7.2	0.35	2222 470 85683	.. 86683
0.082			2222 470 85823	.. 86823
0.1			2222 470 85104	.. 86104
0.12			2222 470 85124	.. 86124
0.15	4.5 × 9.0 × 7.2	0.45	2222 470 85154	.. 86154
0.18			2222 470 85184	.. 86184
0.22			2222 470 85224	.. 86224
0.27	6.0 × 11.0 × 7.2	0.65	2222 470 85274	.. 86274
0.33			2222 470 85334	.. 86334
0.39			2222 470 85394	.. 86394
0.47			2222 470 85474	.. 86474

Metallized polyester film capacitors

MKT 470

MKT 470 GENERAL DATA

PITCH 5 mm



Specific reference data for the 250 V DC capacitors

DESCRIPTION	VALUE			
	at 1 kHz	at 10 kHz	at 100 kHz	at 1 MHz
Tangent of loss angle:				
$C \leq 0.01 \mu\text{F}$	$\leq 60 \times 10^{-4}$	$\leq 120 \times 10^{-4}$	$\leq 200 \times 10^{-4}$	$\leq 250 \times 10^{-4}$
$0.01 \mu\text{F} < C \leq 0.1 \mu\text{F}$	$\leq 60 \times 10^{-4}$	$\leq 120 \times 10^{-4}$	$\leq 200 \times 10^{-4}$	–
$0.1 \mu\text{F} < C \leq 0.12 \mu\text{F}$	$\leq 60 \times 10^{-4}$	$\leq 120 \times 10^{-4}$	$\leq 225 \times 10^{-4}$	–
Rated voltage pulse slope $(dU/dt)_R$ at 250 V (DC)	400 V/ μs			
R between leads, for $C \leq 0.33 \mu\text{F}$ at 10 V; 1 minute	$> 15000 \text{ M}\Omega$			
R between interconnected leads and case (foil method)	$> 30000 \text{ M}\Omega$			
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	400 V; 1 minute			
Withstanding (DC) voltage between leads and case	500 V; 1 minute			

Available 250 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Ammopack	$H = 18.5 \text{ mm}; P_0 = 12.7 \text{ mm}$	$\pm 10\%$	2222 470 35...	preferred
		$\pm 5\%$	2222 470 36...	preferred
Loose in box	$l_t = 4.0 +1.0/-0.5 \text{ mm}$	$\pm 10\%$	2222 470 41...	on request
		$\pm 5\%$	2222 470 42...	on request
	$l_t = 26.0 \pm 2.0 \text{ mm}$	$\pm 10\%$	2222 470 45...	on request
		$\pm 5\%$	2222 470 46...	on request
Taped on reel	$H = 18.5 \text{ mm}; P_0 = 12.7 \text{ mm}$	$\pm 10\%$	2222 470 48...	on request
		$\pm 5\%$	2222 470 49...	on request

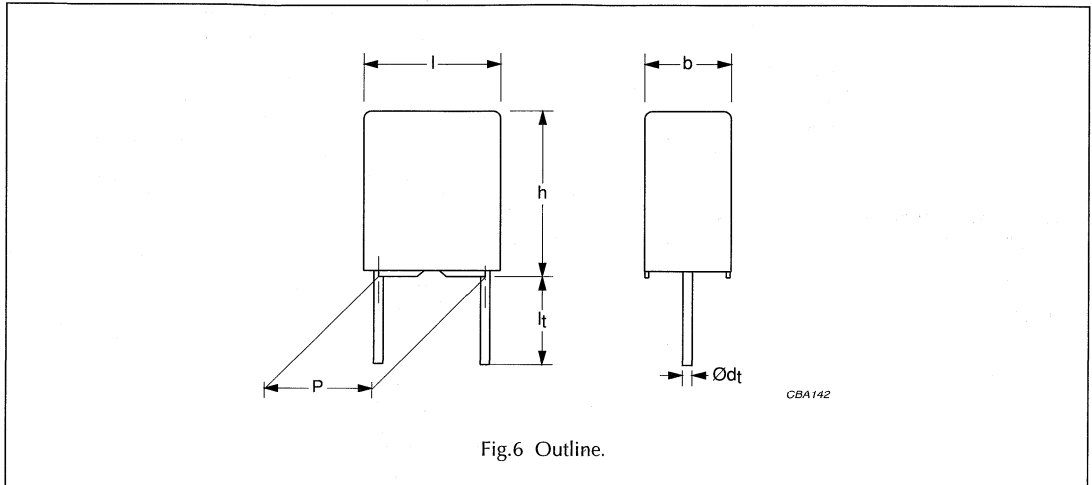
Metallized polyester film capacitors**MKT 470** $U_{Rdc} = 250 \text{ V}$; $U_{Rac} = 160 \text{ V}$

C (μF)	DIMENSIONS $b \times h \times l$ (mm)	MASS (g)	CATALOGUE NUMBER	
			AMMOPACK	
			H = 18.5 mm; P ₀ = 12.7 mm	
			C-tol = $\pm 10\%$	C-tol = $\pm 5\%$
			catalogue number	last 5 digits
Pitch = 5.0 \pm0.3 mm; d_t = 0.50 \pm0.05 mm				
0.01	2.5 \times 6.5 \times 7.2	0.25	2222 470 35103	.. 36103
0.012			2222 470 35123	.. 36123
0.015			2222 470 35153	.. 36153
0.018			2222 470 35183	.. 36183
0.022	3.5 \times 8.0 \times 7.2	0.35	2222 470 35223	.. 36223
0.027			2222 470 35273	.. 36273
0.033			2222 470 35333	.. 36333
0.039			2222 470 35393	.. 36393
0.047	4.5 \times 9.0 \times 7.2	0.45	2222 470 35473	.. 36473
0.056			2222 470 35563	.. 36563
0.068			2222 470 35683	.. 36683
0.082	6.0 \times 11.0 \times 7.2	0.60	2222 470 35823	.. 36823
0.1			2222 470 35104	.. 36104
0.12			2222 470 35124	.. 36124

Metallized polyester film capacitors

MKT 470

MKT 470 GENERAL DATA

PITCH 5 mm


Specific reference data for the 400 V DC capacitors

DESCRIPTION	VALUE			
	at 1 kHz	at 10 kHz	at 100 kHz	at 1 MHz
Tangent of loss angle: $C \leq 0.01 \mu\text{F}$ $0.01 \mu\text{F} < C \leq 0.047 \mu\text{F}$	$\leq 60 \times 10^{-4}$ $\leq 60 \times 10^{-4}$	$\leq 120 \times 10^{-4}$ $\leq 120 \times 10^{-4}$	$\leq 200 \times 10^{-4}$ $\leq 200 \times 10^{-4}$	$\leq 250 \times 10^{-4}$ -
Rated voltage pulse slope $(dU/dt)_R$ at 400 V (DC)	800 V/ μs			
R between leads, for $C \leq 0.33 \mu\text{F}$ at 10 V; 1 minute	>15 000 M Ω			
R between interconnected leads and case (foil method)	>30 000 M Ω			
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	640 V; 1 minute			
Withstanding (DC) voltage between leads and case	800 V; 1 minute			

Available 400 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Ammopack	$H = 18.5 \text{ mm}; P_0 = 12.7 \text{ mm}$	$\pm 10\%$	2222 470 65...	preferred
		$\pm 5\%$	2222 470 66...	preferred
Loose in box	$l_t = 4.0 + 1.0 / -0.5 \text{ mm}$	$\pm 10\%$	2222 470 51...	on request
		$\pm 5\%$	2222 470 52...	on request
	$l_t = 26.0 \pm 2.0 \text{ mm}$	$\pm 10\%$	2222 470 55...	on request
		$\pm 5\%$	2222 470 56...	on request
Taped on reel	$H = 18.5 \text{ mm}; P_0 = 12.7 \text{ mm}$	$\pm 10\%$	2222 470 58...	on request
		$\pm 5\%$	2222 470 59...	on request

Metallized polyester film capacitors**MKT 470** $U_{Rdc} = 400 \text{ V}$; $U_{Rac} = 200 \text{ V}$

C (μF)	DIMENSIONS $b \times h \times l$ (mm)	MASS (g)	CATALOGUE NUMBER	
			AMMOPACK	
			H = 18.5 mm; P ₀ = 12.7 mm	
			C-tol = $\pm 10\%$	C-tol = $\pm 5\%$
			catalogue number	last 5 digits
Pitch = 5.0 \pm 0.3 mm; d_t = 0.50 \pm 0.05 mm				
0.001	2.5 \times 6.5 \times 7.2	0.25	2222 470 65102	.. 66102
0.0012			2222 470 65122	.. 66122
0.0015			2222 470 65152	.. 66152
0.0018			2222 470 65182	.. 66182
0.0022			2222 470 65222	.. 66222
0.0027			2222 470 65272	.. 66272
0.0033			2222 470 65332	.. 66332
0.0039			2222 470 65392	.. 66392
0.0047			2222 470 65472	.. 66472
0.0056			2222 470 65562	.. 66562
0.0068			2222 470 65682	.. 66682
0.0082			2222 470 65822	.. 66822
0.01	3.5 \times 8.0 \times 7.2	0.35	2222 470 65103	.. 66103
0.012			2222 470 65123	.. 66123
0.015			2222 470 65153	.. 66153
0.018	4.5 \times 9.0 \times 7.2	0.45	2222 470 65183	.. 66183
0.022			2222 470 65223	.. 66223
0.027			2222 470 65273	.. 66273
0.033	6.0 \times 11.0 \times 7.2	0.60	2222 470 65333	.. 66333
0.039			2222 470 65393	.. 66393
0.047			2222 470 65473	.. 66473

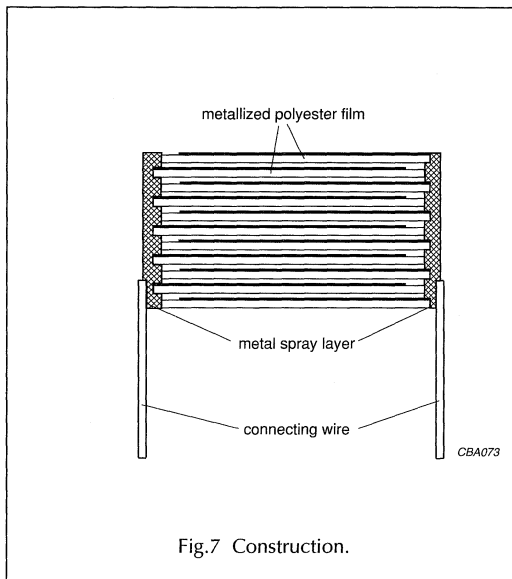
Metallized polyester film capacitors

MKT 470

CONSTRUCTION

Description

- Low-inductive wound cell of metallized polyethylene terephthalate (PETP) film, potted with epoxy resin in a flame-retardant case
- Radial leads
- 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 tape specifications refer to this handbook, chapter "Packaging information".

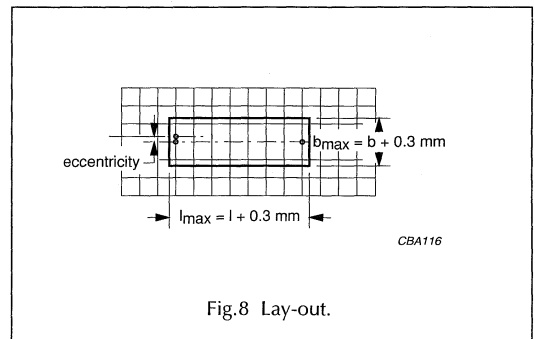
SPECIFIC METHOD OF MOUNTING TO WITHSTAND VIBRATION AND SHOCK TEST

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.

SPACE REQUIREMENTS ON PRINTED-CIRCUIT BOARD

The maximum length and width of film capacitors is shown in Fig.8:

- Eccentricity see Fig.8. 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 60717" as reference: $h_{\max} \leq h + 0.3 \text{ mm}$.



Storage temperature

- Storage temperature: $T_{\text{stg}} = -25 \text{ to } +40 \text{ }^\circ\text{C}$ with RH maximum 80% without condensation.

RATINGS AND CHARACTERISTICS REFERENCE CONDITIONS

Unless otherwise specified, all electrical values apply to an ambient free air temperature of $23 \pm 1 \text{ }^\circ\text{C}$, an atmospheric pressure of 86 to 106 kPa and a relative humidity of $50 \pm 2\%$.

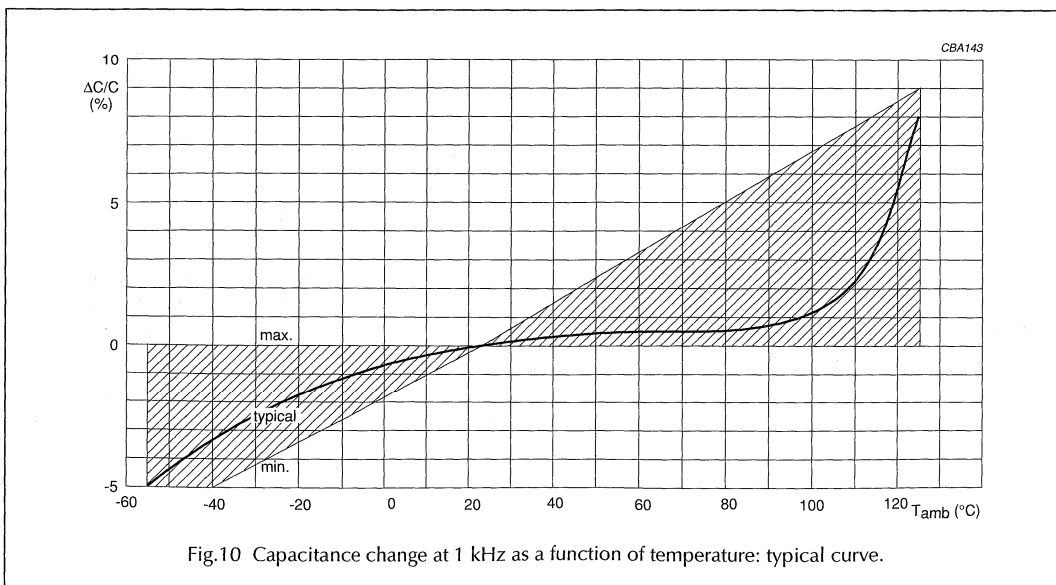
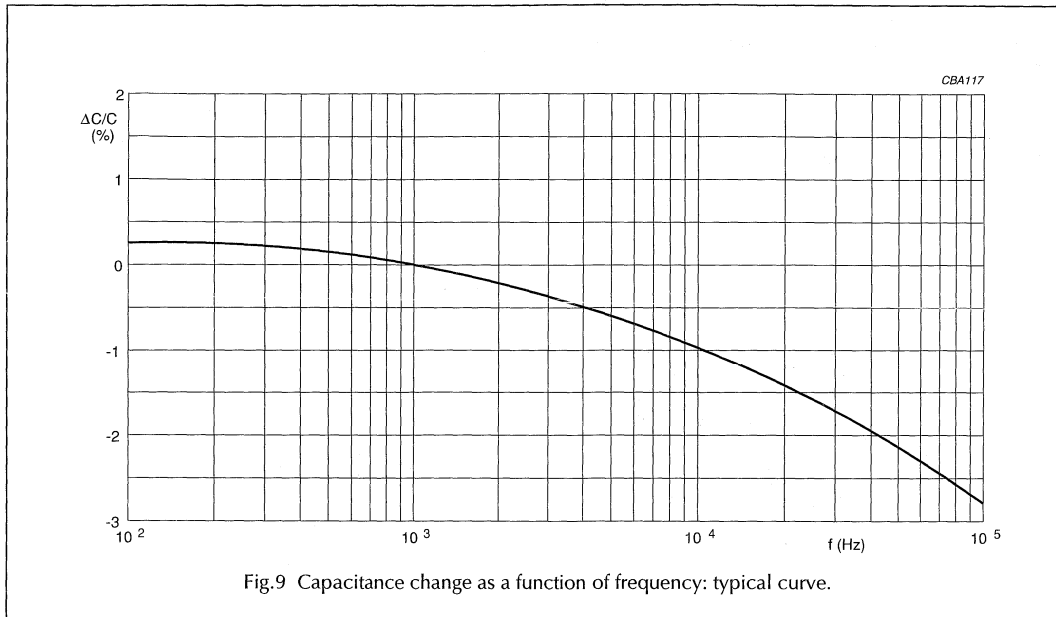
For reference testing, a conditioning period shall be applied over 96 ± 4 hours by heating the products in a circulating air oven at the rated temperature and a relative humidity not exceeding 20%.

Metallized polyester film capacitors

MKT 470

CHARACTERISTICS

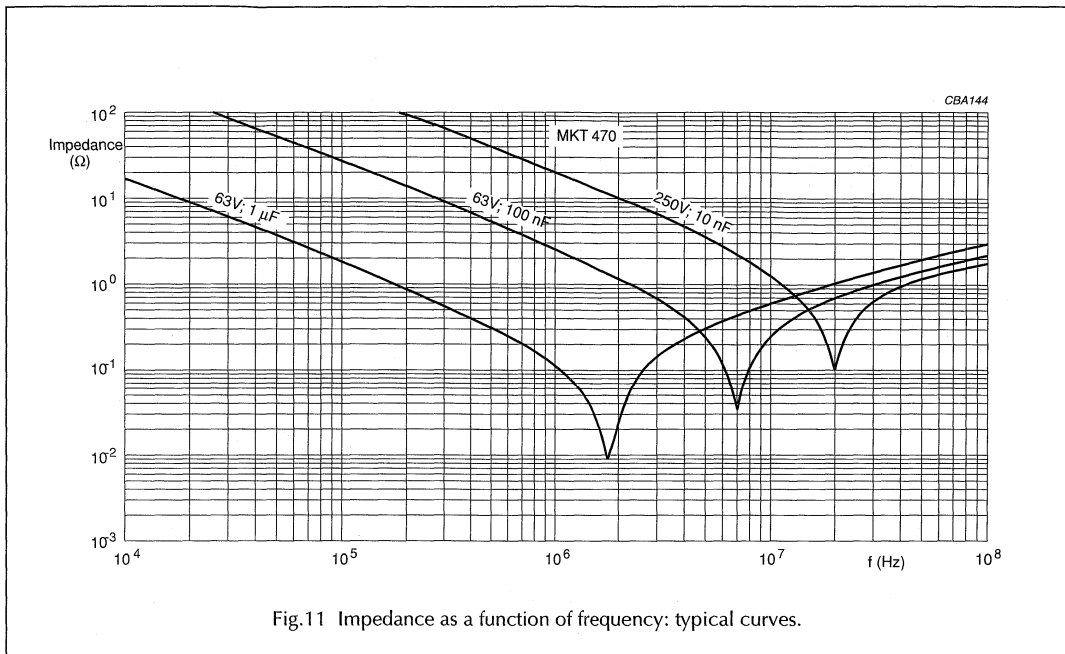
Capacitance



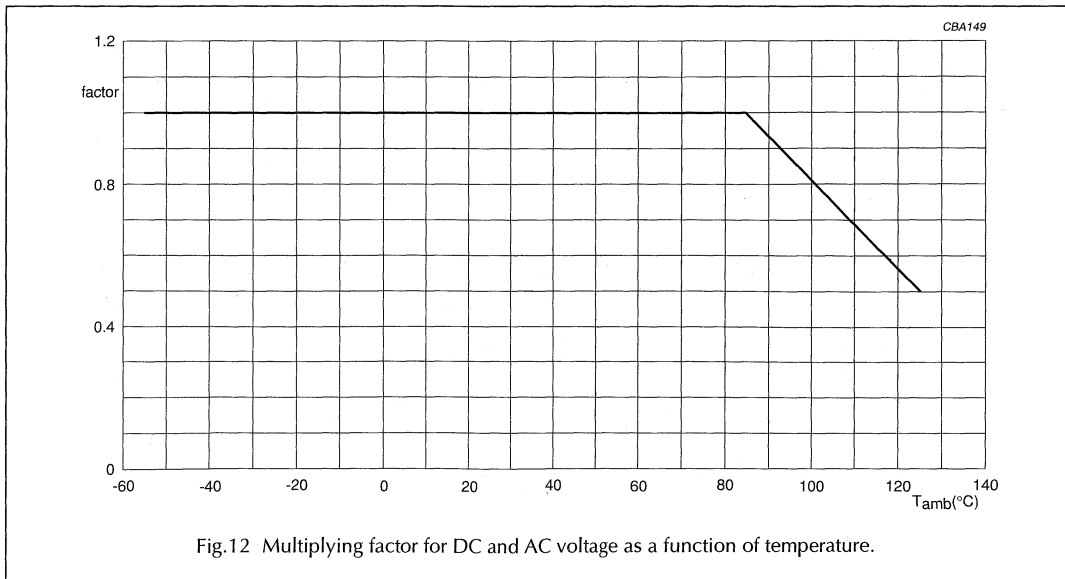
Metallized polyester film capacitors

MKT 470

Impedance



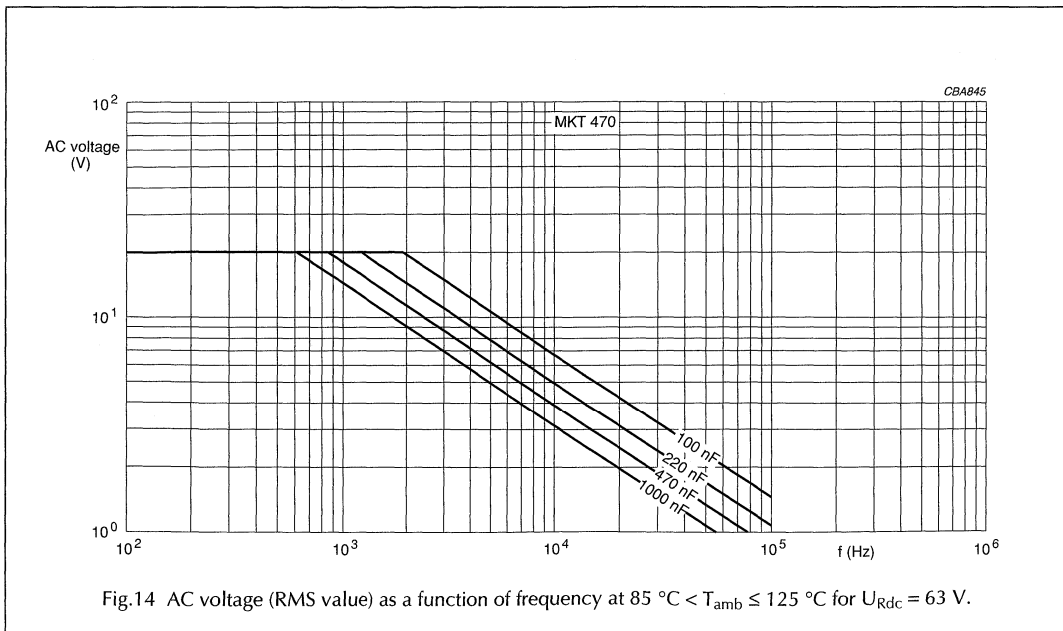
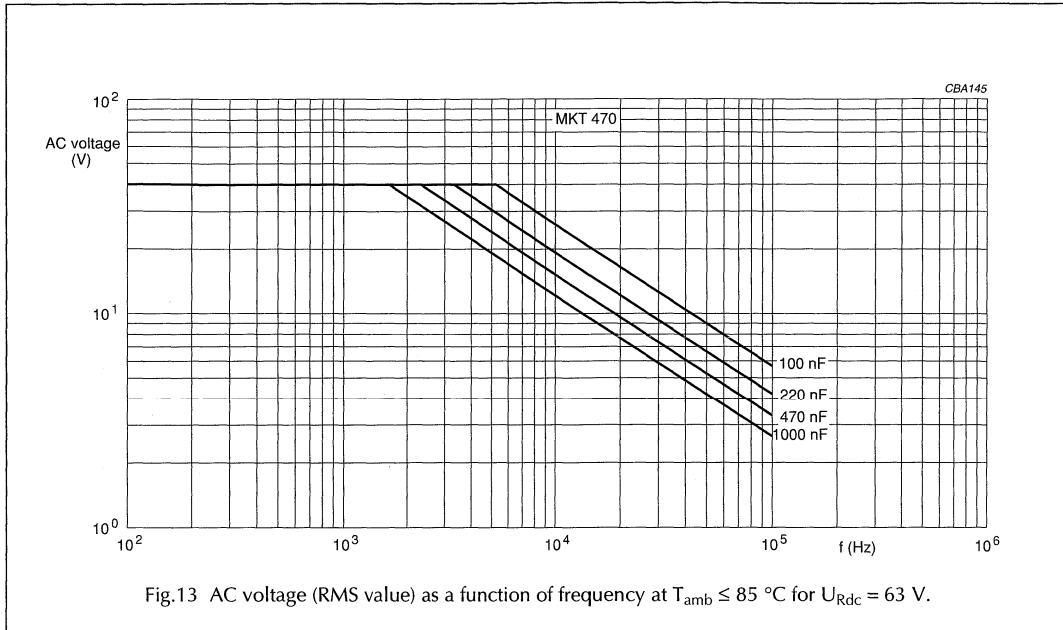
Maximum DC and AC voltage as a function of temperature



Metallized polyester film capacitors

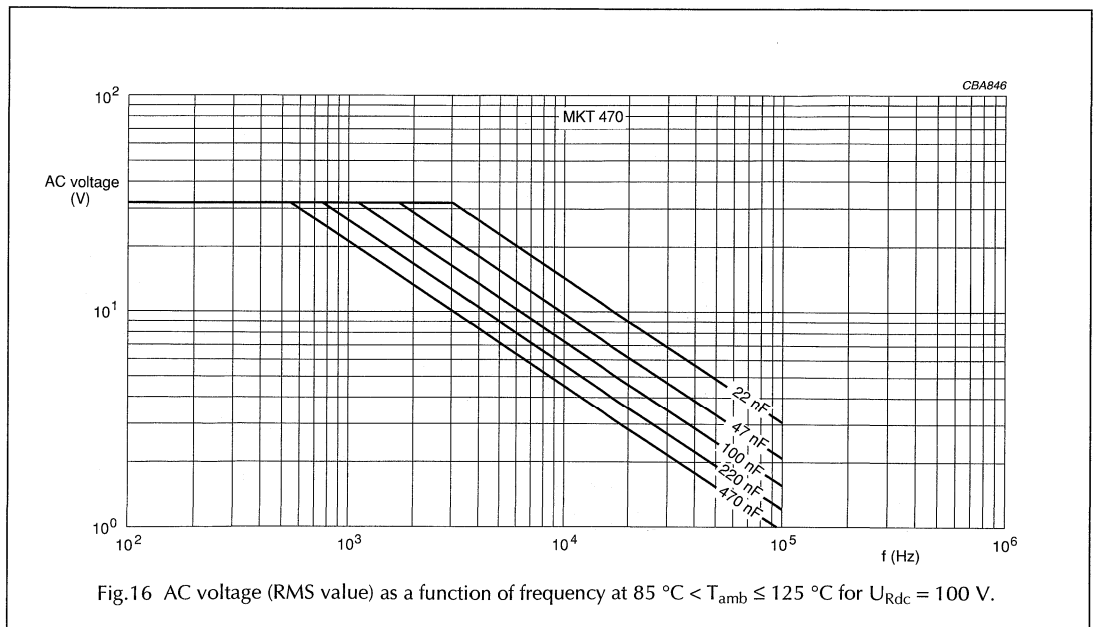
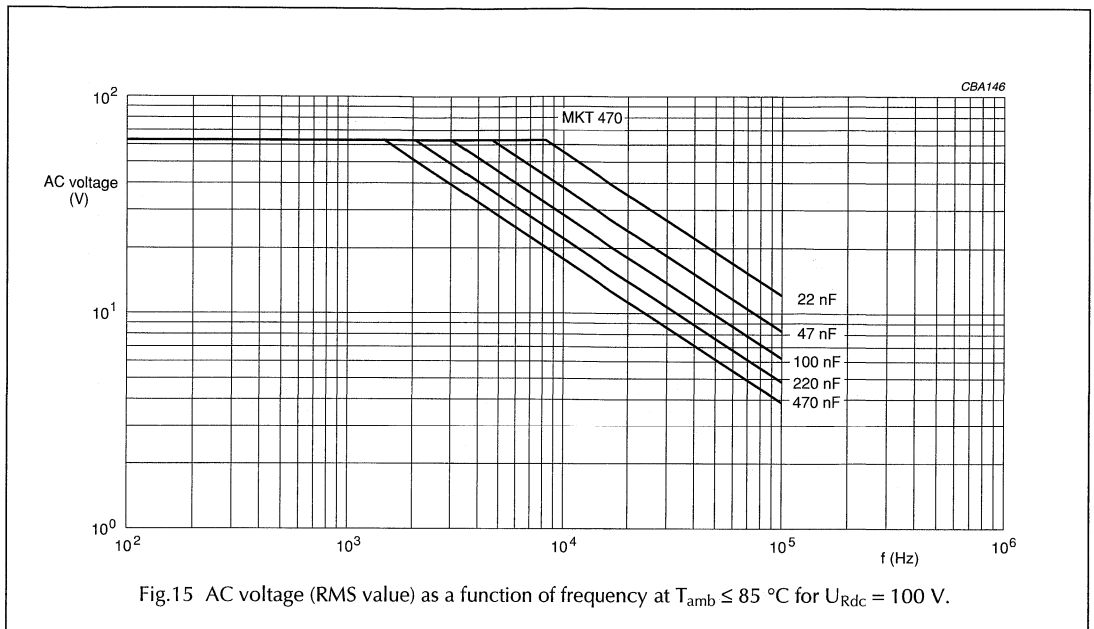
MKT 470

Maximum RMS voltage (sinewave) as a function of frequency



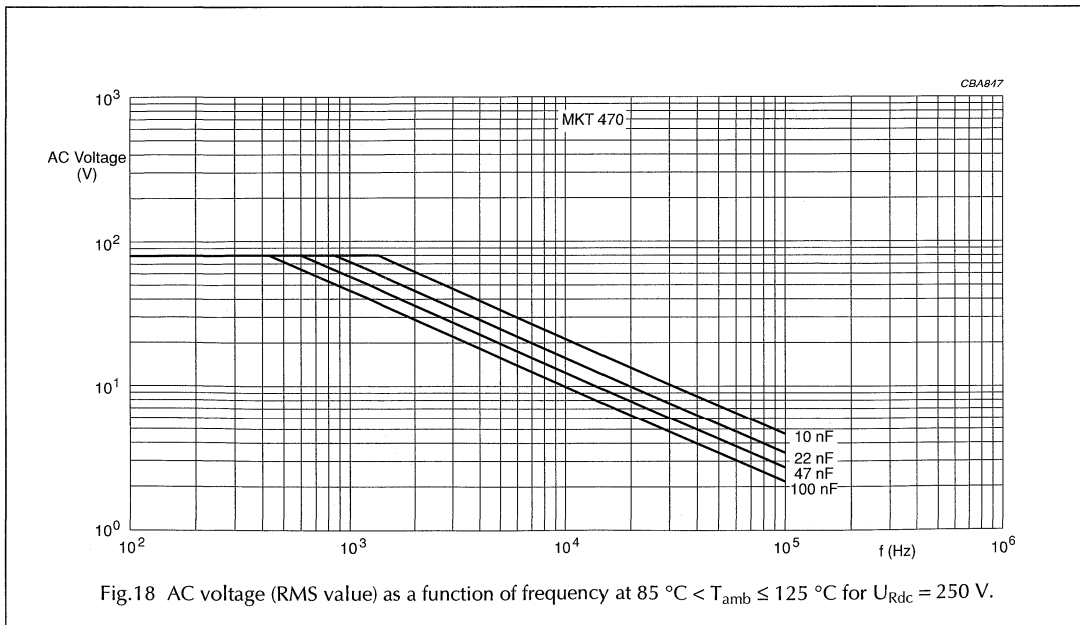
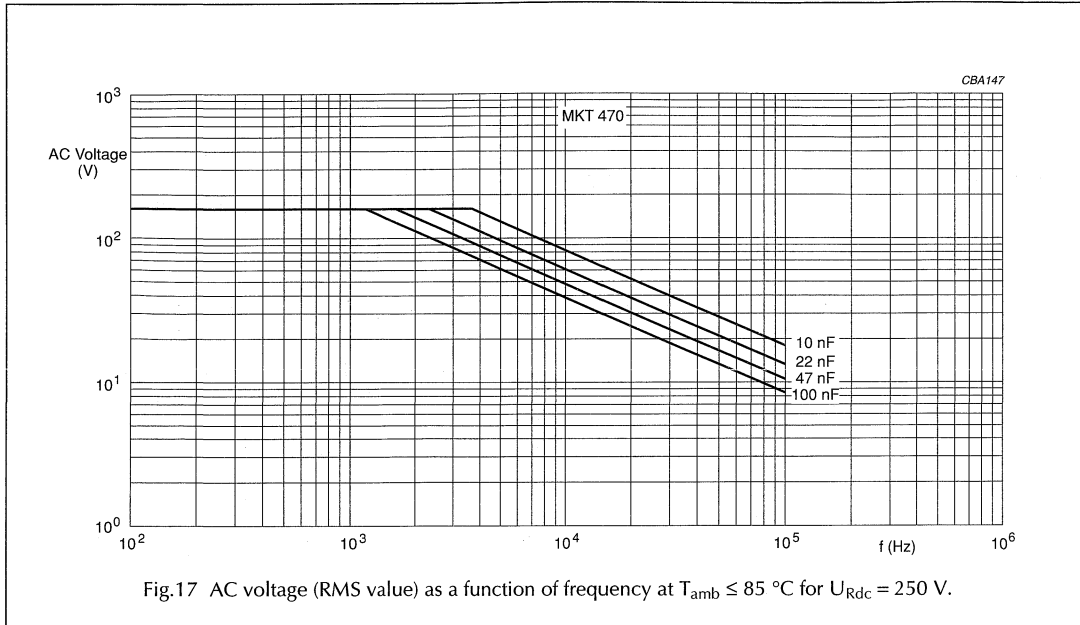
Metallized polyester film capacitors

MKT 470



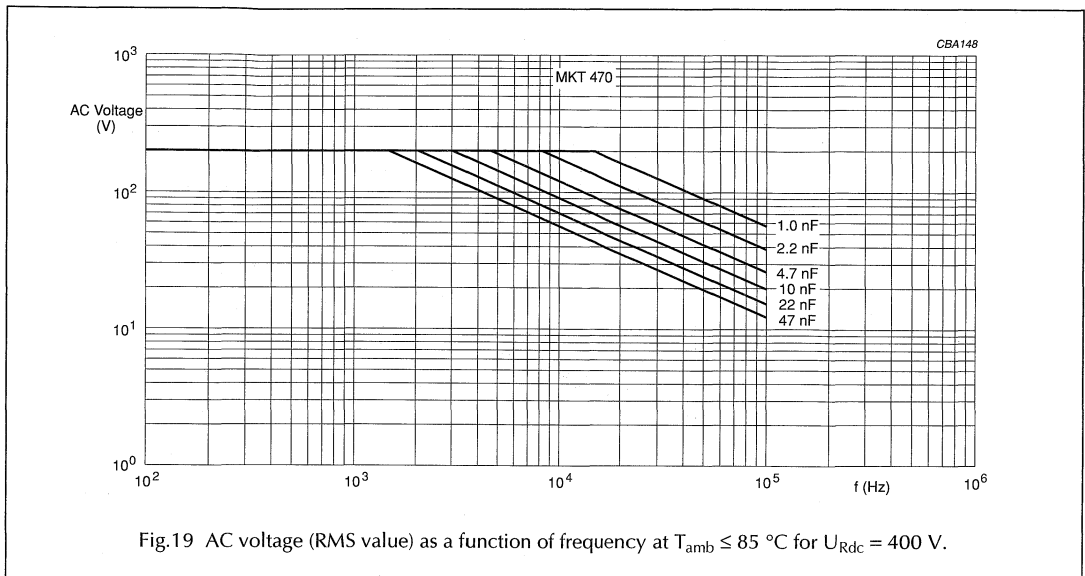
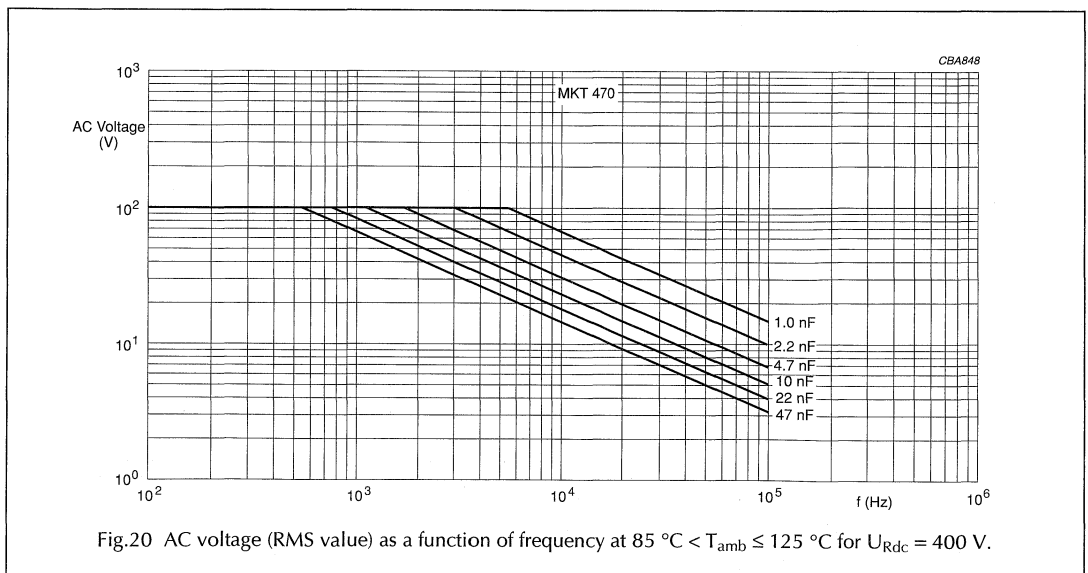
Metallized polyester film capacitors

MKT 470



Metallized polyester film capacitors

MKT 470

Fig.19 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85 \text{ °C}$ for $U_{Rdc} = 400 \text{ V}$.Fig.20 AC voltage (RMS value) as a function of frequency at $85 \text{ °C} < T_{amb} \leq 125 \text{ °C}$ for $U_{Rdc} = 400 \text{ V}$.

Maximum RMS current (sinewave) as a function of frequency

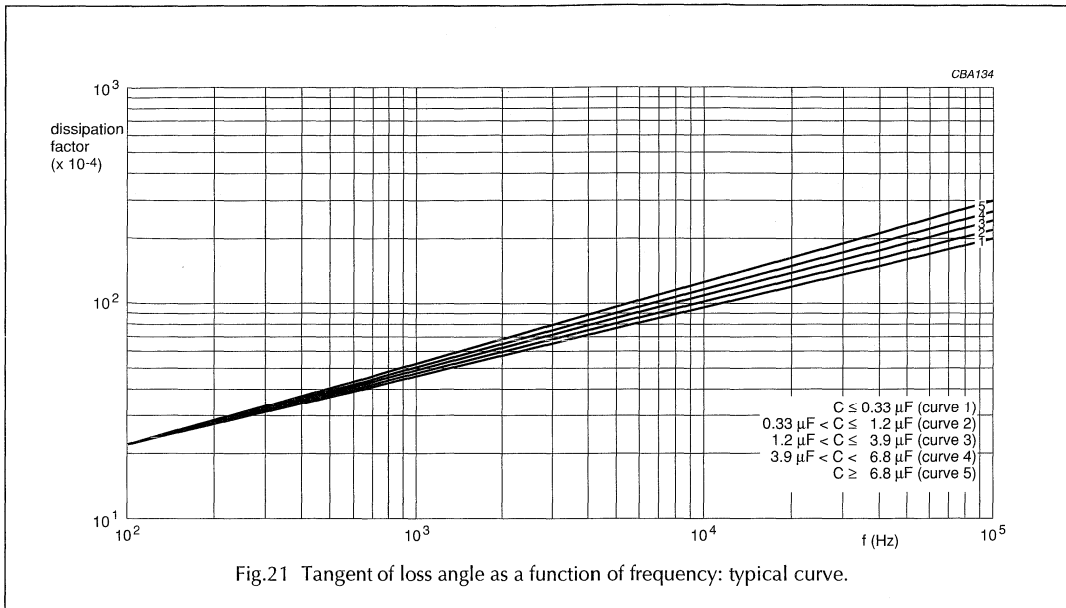
The maximum RMS current is defined by $I_{ac} = \omega \times C \times U_{ac}$.

U_{ac} is the maximum AC voltage depending on the ambient temperature in Figs 13 to 20.

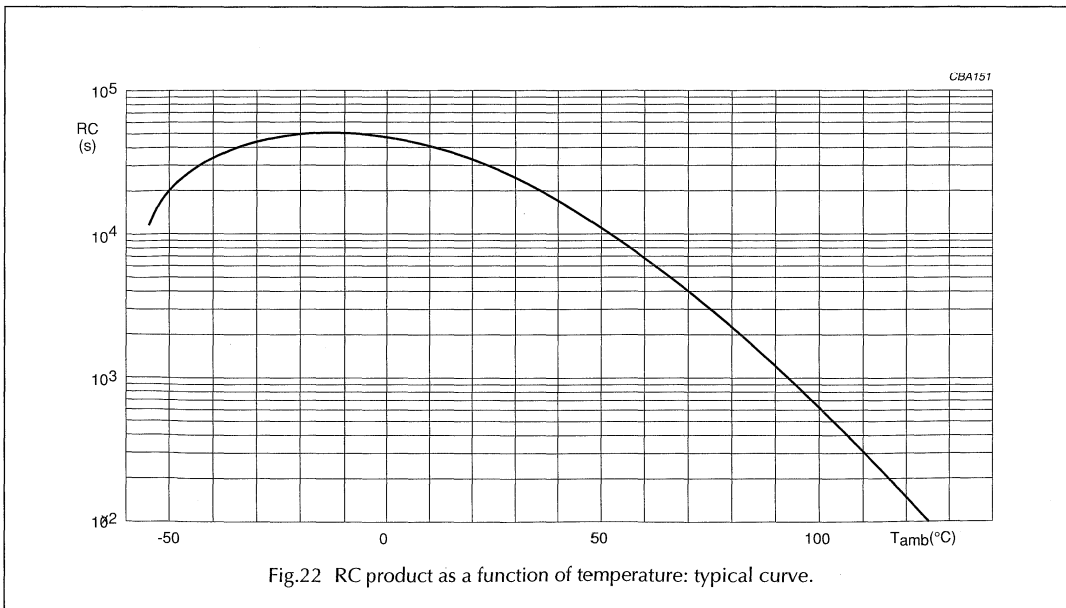
Metallized polyester film capacitors

MKT 470

Tangent of loss angle



Insulation resistance



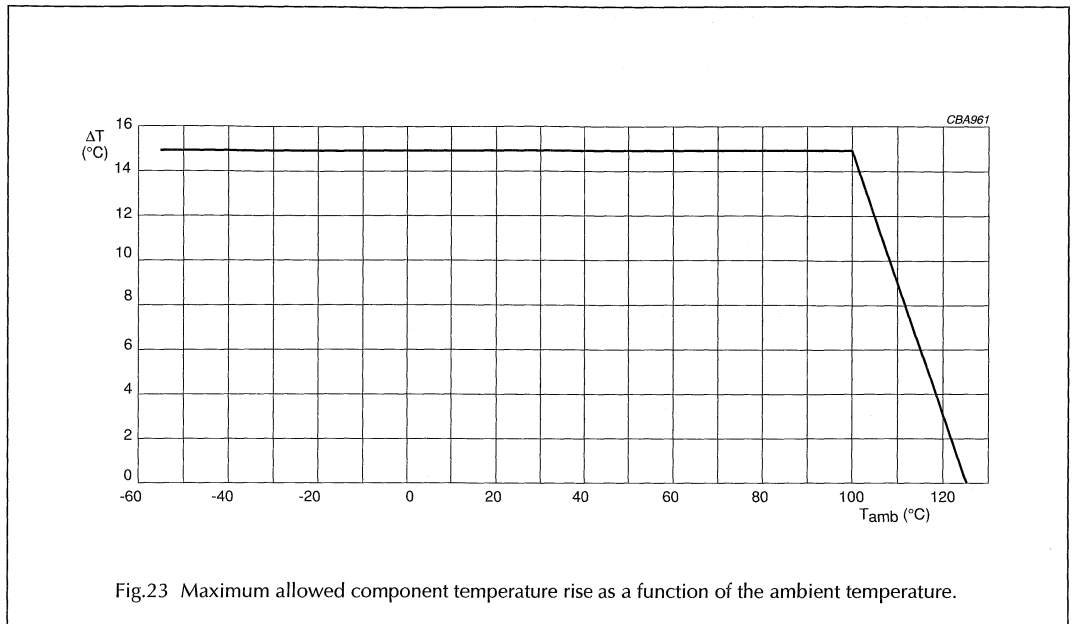
Metallized polyester film capacitors**MKT 470****Maximum allowed component temperature rise (ΔT) as a function of the ambient temperature (T_{amb})**

Fig.23 Maximum allowed component temperature rise as a function of the ambient temperature.

Heat conductivity (G) as a function of pitch and capacitor body thickness in mW/°C**Table 1** Heat conductivity

b_{max} (mm)	PITCH 5 mm
2.5	2.5
3.5	3.0
4.5	4.0
6.0	5.5

Power dissipation and maximum component temperature rise

The power dissipation must be limited in order not to exceed the maximum allowed component temperature rise as a function of the free air ambient temperature.

The power dissipation can be calculated according chapter "Introduction", section "Maximum power dissipation".

The component temperature rise (ΔT) can be measured (see section "Measuring the component temperature" for more details) or calculated by $\Delta T = P/G$:

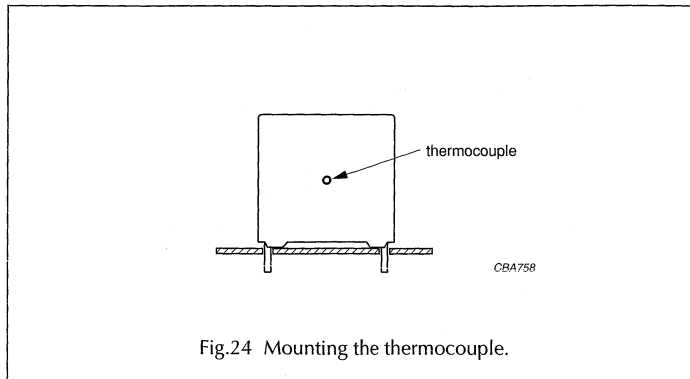
- ΔT = component temperature rise (°C).
- P = power dissipation of the component (mW).
- G = heat conductivity of the component (mW/°C).

Metallized polyester film capacitors

MKT 470

Measuring the component temperature

A thermocouple must be attached to the capacitor body; see Fig.24.



The temperature is measured in unloaded (T_{amb}) and maximum loaded condition (T_c).

The temperature rise is given by: $\Delta T = T_c - T_{amb}$.

To avoid radiation or convection, the capacitor should be tested in a wind-free box.

Metallized polyester film capacitors

MKT 470

Application note and limiting conditions

These capacitors are not suitable for mains applications as across-the-line capacitors without additional protection, as described hereunder. These mains applications are strictly regulated in safety standards and therefore electromagnetic interference suppression capacitors conforming the standards must be used.

To select the capacitor for a certain application, the following 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 the maximum U_{p-p} to avoid the ionisation inception level.
3. The voltage pulse slope (dU/dt) shall not exceed the rated voltage pulse slope in an RC-circuit at rated voltage and without ringing. If the pulse voltage is lower than the rated DC voltage, the rated voltage pulse slope may be multiplied by U_{Rdc} and divided by the applied voltage.

For all other pulses following equation must be fulfilled:

$$2 \times \int_0^T \left(\frac{dU}{dt} \right)^2 \times dt < U_{Rdc} \times \left(\frac{dU}{dt} \right)_{rated}$$

T is the pulse duration.

The rated voltage pulse slope is valid for ambient temperatures up to 85 °C. For higher temperatures a derating factor of 3% per K shall be applied.

4. The maximum component surface temperature rise must be lower than the limits in Fig.23.
5. Since in circuits used at voltages over 280 V peak-to-peak the risk for an intrinsically active flammability after a capacitor breakdown (short circuit) increases, it is recommended that the power to the component is limited to 100 times the values mentioned in Table 1 "Heat conductivity".
6. When using these capacitors as across-the-line capacitor in the input filter for mains applications or as series connected with an impedance to the mains the applicant must guarantee that following conditions are fulfilled in any case (spikes and surge voltages from the mains included).

VOLTAGE CONDITIONS FOR 6 ABOVE

ALLOWED VOLTAGES	$T_{amb} < 85 \text{ °C}$	$85 < T_{amb} \leq 100 \text{ °C}$	$100 < T_{amb} \leq 125 \text{ °C}$
Maximum continuous RMS voltage	$1 \times U_{Rac}$	$0.8 \times U_{Rac}$	$0.5 \times U_{Rac}$
Maximum temporary RMS -overvoltage (<24 hours)	$1.25 \times U_{Rac}$	$1.0 \times U_{Rac}$	$0.625 \times U_{Rac}$
Maximum peak voltage (V_{o-p}) (<2 s)	$1.6 \times U_{Rdc}$	$1.3 \times U_{Rdc}$	$0.8 \times U_{Rdc}$

Metallized polyester film capacitors

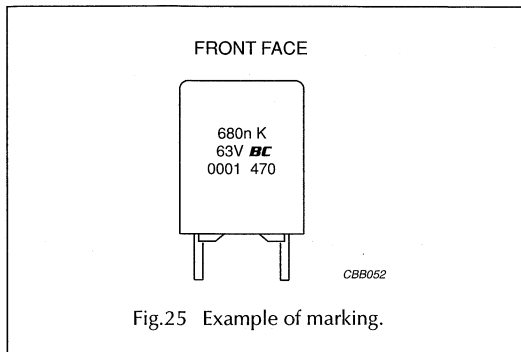
MKT 470

MARKING

Product marking

The capacitors are marked by on the side (see Fig.25) with the following information:

1. Capacitance code in accordance with "IEC 60062"
2. Tolerance on rated capacitance: K = ±10%; J = ±5%
3. Rated (DC) voltage (e.g. 63 V)
4. Manufacturer
5. Year and week of manufacture (e.g. 0001)
6. Manufacturer's type designation (e.g. 470).



QUICK REFERENCE TEST REQUIREMENTS

TEST	PROCEDURE (quick reference)	REQUIREMENTS
Robustness of leads		
Tensile strength: "IEC 60068-2-21"	load 10 N; 10 s	no visible damage legible marking $ \Delta C/C \leq 2\%$
Bending: "IEC 60068-2-21"	load 5 N; 4 × 90 °	
Resistance to soldering heat: "IEC 60068-2-20"	solder bath: 260 °C; 10 s	$\Delta \tan \delta \leq 50 \times 10^{-4}$ (C ≤ 10 nF) $\Delta \tan \delta \leq 30 \times 10^{-4}$ (10 nF < C ≤ 470 nF) $\Delta \tan \delta \leq 20 \times 10^{-4}$ (C > 470 nF)
Component solvent resistance	isopropyl alcohol; 23 °C; 5 minutes	
Robustness of component		
Vibration: "IEC 60068-2-6"	10 to 55 Hz; amplitude 0.75 mm or acceleration 98 m/s ² ; 6 hours	$ \Delta C/C \leq 5\%$ for b = 2.5 mm or $ \Delta C/C \leq 3\%$ for b > 2.5 mm $\Delta \tan \delta \leq 50 \times 10^{-4}$ (C ≤ 10 nF) $\Delta \tan \delta \leq 30 \times 10^{-4}$ (10 nF < C ≤ 470 nF) $\Delta \tan \delta \leq 20 \times 10^{-4}$ (C > 470 nF)
Shock: "IEC 60068-2-27"	half sinewave; 490 m/s ² ; 11 ms	
Climatic sequence		
Dry heat: "IEC 60068-2-2"	16 hours; 125 °C	$ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 80 \times 10^{-4}$ (C ≤ 10 nF) $\Delta \tan \delta \leq 50 \times 10^{-4}$ (10 nF < C ≤ 470 nF) $\Delta \tan \delta \leq 30 \times 10^{-4}$ (C > 470 nF) $R_{ins} \geq 50\%$ of specified value
Damp heat, cyclic, test Db, first cycle: "IEC 60068-2-30"		
Cold: "IEC 60068-2-1"	2 hours; -55 °C	
Damp heat, cyclic, test Db, remaining cycles: "IEC 60068-2-30"		

Metallized polyester film capacitors

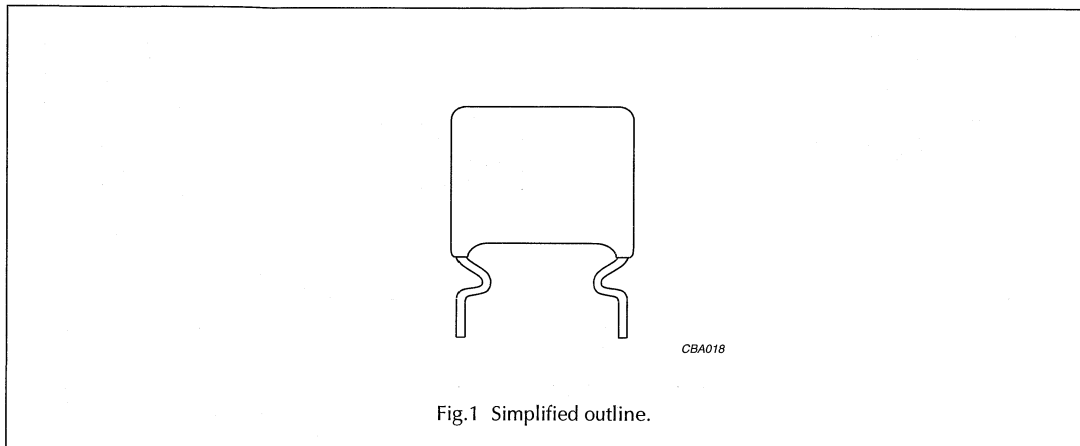
MKT 470

TEST	PROCEDURE (quick reference)	REQUIREMENTS
Other applicable tests		
Damp heat steady state: "IEC 60068-2-3"	56 days; 40 °C; 90 to 95% RH	$ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 50 \times 10^{-4}$ ($C \leq 470$ nF) $\Delta \tan \delta \leq 30 \times 10^{-4}$ ($C > 470$ nF) $R_{ins} \geq 50\%$ of specified value
Endurance (DC): "IEC 60384-2"	2000 hours; $1.25 \times U_{Rdc}$; 85 °C $0.625 \times U_{Rdc}$; 125 °C	$ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 50 \times 10^{-4}$ ($C \leq 10$ nF) $\Delta \tan \delta \leq 30 \times 10^{-4}$ (10 nF $< C \leq 470$ nF) $\Delta \tan \delta \leq 20 \times 10^{-4}$ ($C > 470$ nF) $R_{ins} \geq 50\%$ of specified value
Heat storage: "IEC 60384-2"	2000 hours; 125 °C	$ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 50 \times 10^{-4}$ ($C \leq 10$ nF) $\Delta \tan \delta \leq 30 \times 10^{-4}$ (10 nF $< C \leq 470$ nF) $\Delta \tan \delta \leq 20 \times 10^{-4}$ ($C > 470$ nF)
Resistance to detergents	3 minutes in dishwasher at 70 °C	$ \Delta C/C \leq 1\%$ $\Delta \tan \delta \leq 50 \times 10^{-4}$ ($C \leq 10$ nF) $\Delta \tan \delta \leq 30 \times 10^{-4}$ (10 nF $< C \leq 470$ nF) $\Delta \tan \delta \leq 20 \times 10^{-4}$ ($C > 470$ nF) $R_{ins} \geq 50\%$ of specified value
Resistance to soldering heat with preheating: "IEC 60384-2"	body temperature: 125 °C; bath temperature: 260 °C; dwell time: 5 s	$ \Delta C/C \leq 3\%$ for $b = 2.5$ mm or $ \Delta C/C \leq 5\%$ for $b > 2.5$ mm $\Delta \tan \delta \leq 50 \times 10^{-4}$ ($C \leq 10$ nF) $\Delta \tan \delta \leq 30 \times 10^{-4}$ (10 nF $< C \leq 470$ nF) $\Delta \tan \delta \leq 20 \times 10^{-4}$ ($C > 470$ nF)
Passive flammability: "IEC 60384-1"	class C	no burning

Polyester film capacitors**KT 347**

KT RADIAL EPOXY LACQUERED TYPE

PITCH 10/15/22.5 mm

**FEATURES**

- Low-inductive wound cell of metal foil and a polyethylene terephthalate film
- Cell protected by epoxy lacquer
- Radial leads of solder-coated wire
- Resistant to solvents and rinsing liquids.

APPLICATIONS

- Consumer and industrial
- Especially where high currents and/or steep pulses occur
- DC or AC voltage.

DETAIL SPECIFICATION

For more detailed data and test requirements see "Type detail specification HQN-384-11/101".

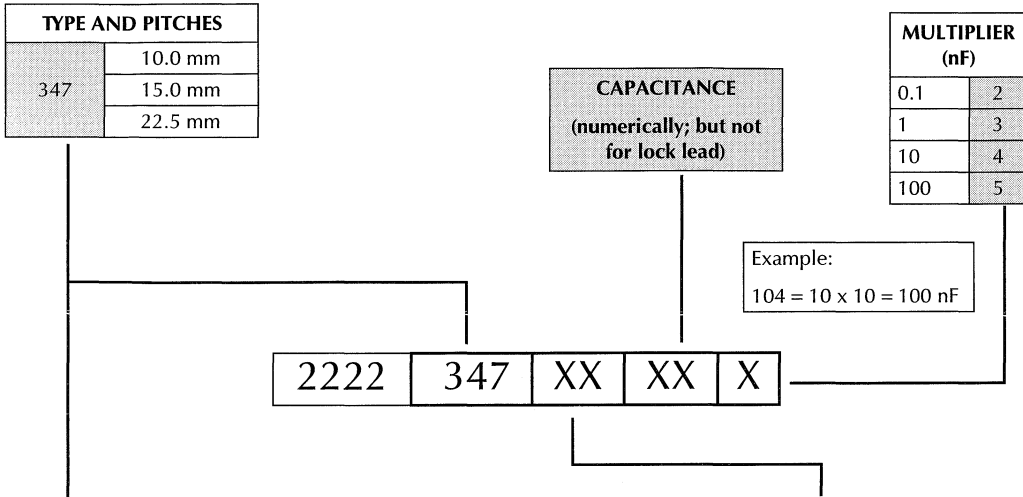
QUICK REFERENCE DATA

DESCRIPTION	VALUE
Capacitance range (E12 series)	0.001 to 0.47 μF
Capacitance tolerance	$\pm 20\%$; $\pm 10\%$
Rated (DC) voltage	100 V; 250 V; 400 V; 630 V
Rated (AC) voltage at 50 to 60 Hz	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 60384-11
Performance grade	grade 1 (long life)

Polyester film capacitors

KT 347

COMPOSITION OF CATALOGUE NUMBER



TYPE	PACKAGING	LEAD CONFIGURATION	PREFERRED TYPES				
			C-TOL	100 V	250 V	400 V	630 V
347	loose in box	lead length 4.0 mm	±10%	21	41	51	61
			ON REQUEST				
347	loose in box	lead length 4.0 mm	±20%	20	40	50	60
		lock lead 4.0 mm	±10%	90	90	90	90

Polyester film capacitors

KT 347

KT 347 GENERAL DATA

PITCH 10/15/22.5 mm

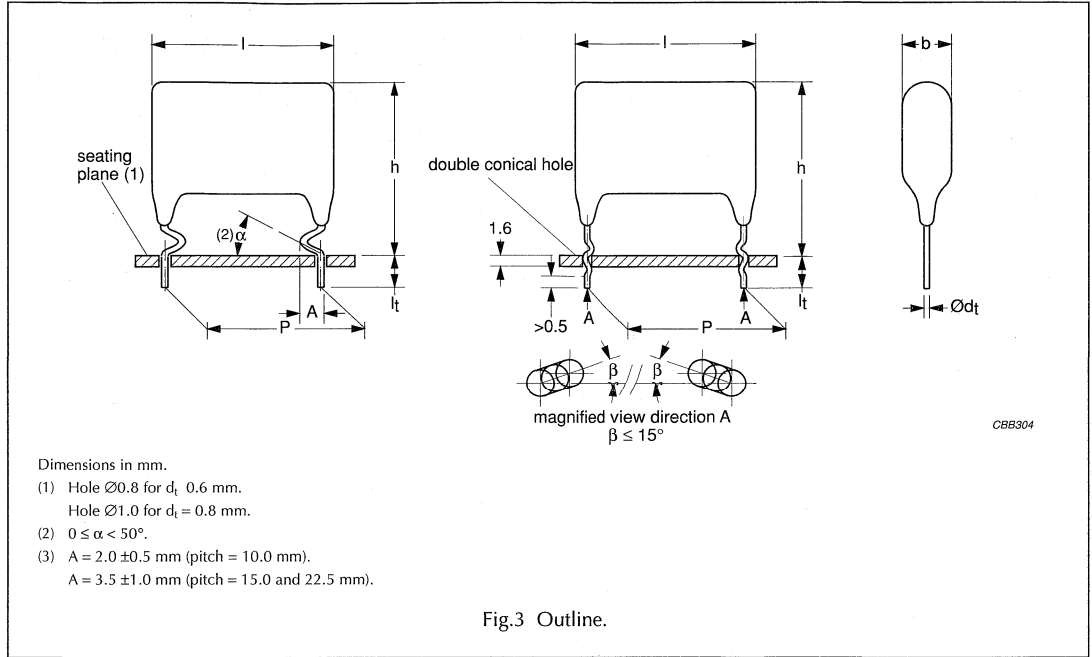


Fig.3 Outline.

Specific reference data for the 100 V DC capacitors

DESCRIPTION	VALUE	
	at 1 kHz	at 10 kHz
Tangent of loss angle: $C \leq 0.47 \mu\text{F}$	$\leq 60 \times 10^{-4}$	$\leq 110 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 100 V (DC)	$>10000 \text{ V}/\mu\text{s}$	
R between leads, for $C \leq 0.33 \mu\text{F}$ at 100 V; 1 minute	$>50000 \text{ M}\Omega$	
RC between leads, for $C > 0.33 \mu\text{F}$ at 100 V; 1 minute	$>16500 \text{ s}$	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	200 V; 1 minute	
Withstanding (DC) voltage between leads and case	200 V; 1 minute	

Available 100 V DC versions

PACKAGING	DIMENSIONS	LEAD CONFIGURATION	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 4.0 +1.0/-0.5 \text{ mm}$	standard	$\pm 10\%$	2222 347 21...	preferred
			$\pm 20\%$	2222 347 20...	on request
		lock lead	$\pm 10\%$	2222 347 90...	preferred

Polyester film capacitors

KT 347

 $U_{Rdc} = 100 \text{ V}$; $U_{Rac} = 50 \text{ V}$; $U_{p-p} = 140 \text{ V}$

C (μF)	DIMENSIONS ⁽¹⁾ $b_{\text{max}} \times h_{\text{max}} \times l_{\text{max}}$ (mm)	MASS (g)	CATALOGUE NUMBER	
			LOOSE IN BOX; $l_t = 4.0 +1.0/-0.5 \text{ mm}$	
			C-tol = $\pm 10\%$	
			catalogue number	last 5 digits
Pitch = 10.0 ± 0.4 mm; $d_t = 0.60 \pm 0.06$ mm			lock lead	
0.015	5.5 \times 13.0 (16.0) \times 13.5	0.7	2222 347 21153	.. 90238
0.018			2222 347 21183	.. 90239
0.022			2222 347 21223	.. 90241
0.027			2222 347 21273	.. 90242
0.033	6.0 \times 13.5 (16.5) \times 13.5	0.7	2222 347 21333	.. 90236
0.039	6.5 \times 14.0 (17.0) \times 13.5	0.8	2222 347 21393	.. 90243
0.047	7.0 \times 14.5 (17.5) \times 13.5	0.9	2222 347 21473	.. 90244
Pitch = 15.0 ± 0.4 mm; $d_t = 0.80 \pm 0.08$ mm			lock lead	
0.056	5.5 \times 14.0 (17.0) \times 19.0	1.2	2222 347 21563	.. 90245
0.068	6.0 \times 14.5 (17.5) \times 19.0	1.3	2222 347 21683	.. 90235
0.082	7.0 \times 15.5 (18.5) \times 19.0	1.5	2222 347 21823	.. 90212
0.1	7.5 \times 16.0 (19.0) \times 19.0	1.7	2222 347 21104	.. 90224
0.12	8.0 \times 16.5 (19.5) \times 19.0	1.9	2222 347 21124	.. 90246
0.15	8.5 \times 17.0 (20.0) \times 19.0	2.3	2222 347 21154	.. 90247
Pitch = 22.5 ± 0.4 mm; $d_t = 0.80 \pm 0.08$ mm			lock lead	
0.18	7.5 \times 18.0 (21.0) \times 27.0	2.8	2222 347 21184	.. 90248
0.22	7.5 \times 18.5 (21.5) \times 27.0	3.2	2222 347 21224	.. 90249
0.27	8.0 \times 19.5 (22.5) \times 27.0	3.8	2222 347 21274	.. 90251
0.33	9.0 \times 20.0 (23.0) \times 27.0	4.4	2222 347 21334	.. 90252
0.39	10.0 \times 21.0 (24.0) \times 27.0	5.1	2222 347 21394	.. 90253
0.47	11.0 \times 22.0 (25.0) \times 27.0	6.0	2222 347 21474	.. 90254

Note

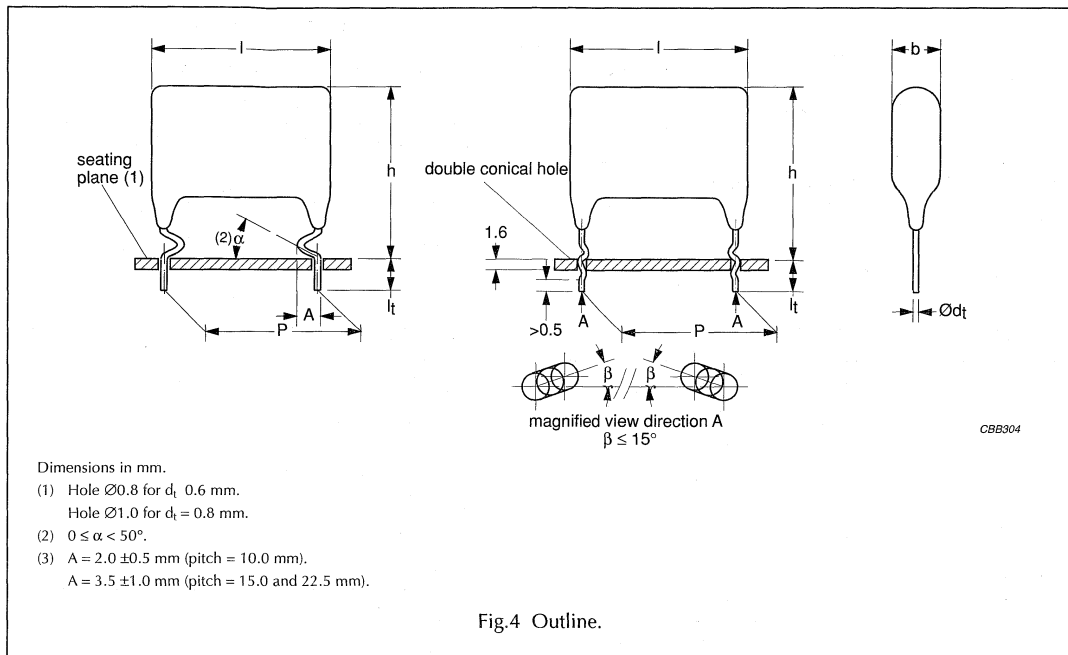
1. Dimensions in brackets for lock lead.

Polyester film capacitors

KT 347

KT 347 GENERAL DATA

PITCH 10/15/22.5 mm



Specific reference data for the 250 V DC capacitors

DESCRIPTION	VALUE	
	at 1 kHz	at 10 kHz
Tangent of loss angle: $C \leq 0.27 \mu\text{F}$	$\leq 60 \times 10^{-4}$	$\leq 110 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 250 V (DC)	$>10000 \text{ V}/\mu\text{s}$	
R between leads, for $C \leq 0.33 \mu\text{F}$ at 100 V; 1 minute	$>50000 \text{ M}\Omega$	
RC between leads, for $C > 0.33 \mu\text{F}$ at 100 V; 1 minute	$>16500 \text{ s}$	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	500 V; 1 minute	
Withstanding (DC) voltage between leads and case	500 V; 1 minute	

Available 250 V DC versions

PACKAGING	DIMENSIONS	LEAD CONFIGURATION	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 4.0 +1.0/-0.5$ mm	standard	$\pm 10\%$	2222 347 41...	preferred
			$\pm 20\%$	2222 347 40...	on request
		lock lead	$\pm 10\%$	2222 347 90...	preferred

Polyester film capacitors

KT 347

 $U_{Rdc} = 250 \text{ V}$; $U_{Rac} = 80 \text{ V}$; $U_{p-p} = 225 \text{ V}$

C (μF)	DIMENSIONS ⁽¹⁾ $b_{\text{max}} \times h_{\text{max}} \times l_{\text{max}}$ (mm)	MASS (g)	CATALOGUE NUMBER	
			LOOSE IN BOX; $l_t = 4.0 +1.0/-0.5 \text{ mm}$	
			C-tol = $\pm 10\%$	
			catalogue number	last 5 digits
Pitch = 10.0 ± 0.4 mm; $d_t = 0.60 \pm 0.06$ mm			lock lead	
0.0082	5.5 \times 13.0 (16.0) \times 13.5	0.7	2222 347 41822	.. 90255
0.01			2222 347 41103	.. 90256
0.012			2222 347 41123	.. 90257
0.015			2222 347 41153	.. 90258
0.018	6.0 \times 13.5 (16.5) \times 13.5	0.7	2222 347 41183	.. 90259
0.022	6.5 \times 14.0 (17.0) \times 13.5	0.8	2222 347 41223	.. 90225
0.027	7.0 \times 14.5 (17.5) \times 13.5	0.9	2222 347 41273	.. 90261
Pitch = 15.0 ± 0.4 mm; $d_t = 0.80 \pm 0.08$ mm			lock lead	
0.033	5.5 \times 14.0 (17.0) \times 19.0	1.1	2222 347 41333	.. 90213
0.039	6.0 \times 14.5 (17.5) \times 19.0	1.3	2222 347 41393	.. 90262
0.047	7.0 \times 15.5 (18.5) \times 19.0	1.4	2222 347 41473	.. 90214
0.056	7.5 \times 16.0 (19.0) \times 19.0	1.6	2222 347 41563	.. 90226
0.068	8.0 \times 16.5 (19.5) \times 19.0	1.8	2222 347 41683	.. 90234
0.082	8.5 \times 17.0 (20.0) \times 19.0	2.1	2222 347 41823	.. 90263
Pitch = 22.5 ± 0.4 mm; $d_t = 0.80 \pm 0.08$ mm			lock lead	
0.1	7.5 \times 18.0 (21.0) \times 27.0	2.7	2222 347 41104	.. 90215
0.12	7.5 \times 18.5 (21.5) \times 27.0	3.0	2222 347 41124	.. 90264
0.15	8.0 \times 19.5 (22.5) \times 27.0	3.5	2222 347 41154	.. 90216
0.18	9.0 \times 20.0 (23.0) \times 27.0	4.0	2222 347 41184	.. 90265
0.22	10.0 \times 21.0 (24.0) \times 27.0	4.5	2222 347 41224	.. 90217
0.27	11.0 \times 22.0 (25.0) \times 27.0	5.3	2222 347 41274	.. 90266

Note

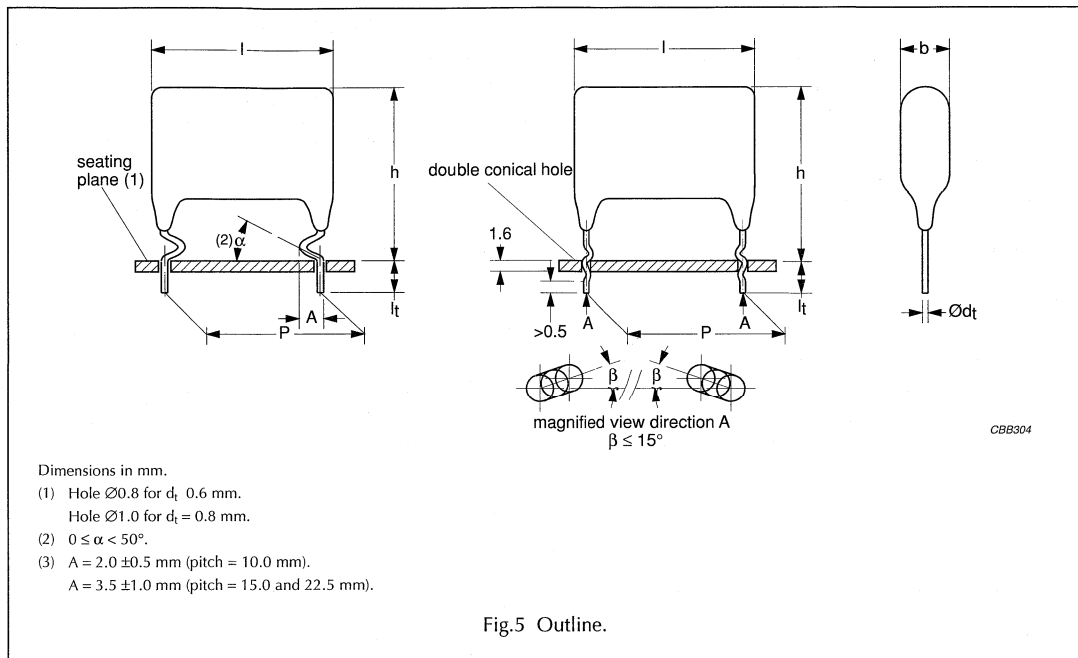
1. Dimensions in brackets for lock lead.

Polyester film capacitors

KT 347

KT 347 GENERAL DATA

PITCH 10/15/22.5 mm



Specific reference data for the 400 V DC capacitors

DESCRIPTION	VALUE	
	at 1 kHz	at 10 kHz
Tangent of loss angle: $C \leq 0.15 \mu\text{F}$	$\leq 60 \times 10^{-4}$	$\leq 110 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 400 V (DC)	$> 10000 \text{ V}/\mu\text{s}$	
R between leads, for $C \leq 0.33 \mu\text{F}$ at 100 V; 1 minute	$> 50000 \text{ M}\Omega$	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	800 V; 1 minute	
Withstanding (DC) voltage between leads and case	800 V; 1 minute	

Available 400 V DC versions

PACKAGING	DIMENSIONS	LEAD CONFIGURATION	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 4.0 + 1.0 / -0.5$ mm	standard	$\pm 10\%$	2222 347 51...	preferred
			$\pm 20\%$	2222 347 50...	on request
		lock lead	$\pm 10\%$	2222 347 90...	preferred

Polyester film capacitors

KT 347

 $U_{Rdc} = 400 \text{ V}$; $U_{Rac} = 125 \text{ V}$; $U_{p-p} = 350 \text{ V}$

C (μF)	DIMENSIONS ⁽¹⁾ $b_{\text{max}} \times h_{\text{max}} \times l_{\text{max}}$ (mm)	MASS (g)	CATALOGUE NUMBER	
			LOOSE IN BOX; $l_t = 4.0 +1.0/-0.5 \text{ mm}$	
			C-tol = $\pm 10\%$	
			catalogue number	last 5 digits
Pitch = 10.0 ± 0.4 mm; $d_t = 0.60 \pm 0.06$ mm			lock lead	
0.0047	5.5 \times 13.0 (16.0) \times 13.5	0.7	2222 347 51472	.. 90237
0.0056			2222 347 51562	.. 90267
0.0068			2222 347 51682	.. 90268
0.0082			2222 347 51822	.. 90269
0.01	6.0 \times 13.5 (16.5) \times 13.5	0.7	2222 347 51103	.. 90218
0.012	6.5 \times 14.0 (17.0) \times 13.5	0.8	2222 347 51123	.. 90221
0.015	7.0 \times 14.5 (17.5) \times 13.5	0.9	2222 347 51153	.. 90219
Pitch = 15.0 ± 0.4 mm; $d_t = 0.80 \pm 0.08$ mm			lock lead	
0.018	5.5 \times 14.0 (17.0) \times 19.0	1.1	2222 347 51183	.. 90222
0.022	6.0 \times 14.5 (17.5) \times 19.0	1.2	2222 347 51223	.. 90223
0.027	7.0 \times 15.5 (18.5) \times 19.0	1.4	2222 347 51273	.. 90232
0.033	7.5 \times 16.0 (19.0) \times 19.0	1.6	2222 347 51333	.. 90227
0.039	8.0 \times 16.5 (19.5) \times 19.0	1.8	2222 347 51393	.. 90228
0.047	8.5 \times 17.0 (20.0) \times 19.0	2.1	2222 347 51473	.. 90229
Pitch = 22.5 ± 0.4 mm; $d_t = 0.80 \pm 0.08$ mm			lock lead	
0.056	7.5 \times 18.0 (21.0) \times 27.0	2.5	2222 347 51563	.. 90231
0.068	7.5 \times 18.5 (21.5) \times 27.0	2.9	2222 347 51683	.. 90271
0.082	8.0 \times 19.5 (22.5) \times 27.0	3.2	2222 347 51823	.. 90272
0.1	9.0 \times 20.0 (23.0) \times 27.0	3.8	2222 347 51104	.. 90273
0.12	10.0 \times 21.0 (24.0) \times 27.0	4.4	2222 347 51124	.. 90274
0.15	11.0 \times 22.0 (25.0) \times 27.0	5.2	2222 347 51154	.. 90275

Note

- Dimensions in brackets for lock lead.

Polyester film capacitors

KT 347

KT 347 GENERAL DATA

PITCH 10/15/22.5 mm

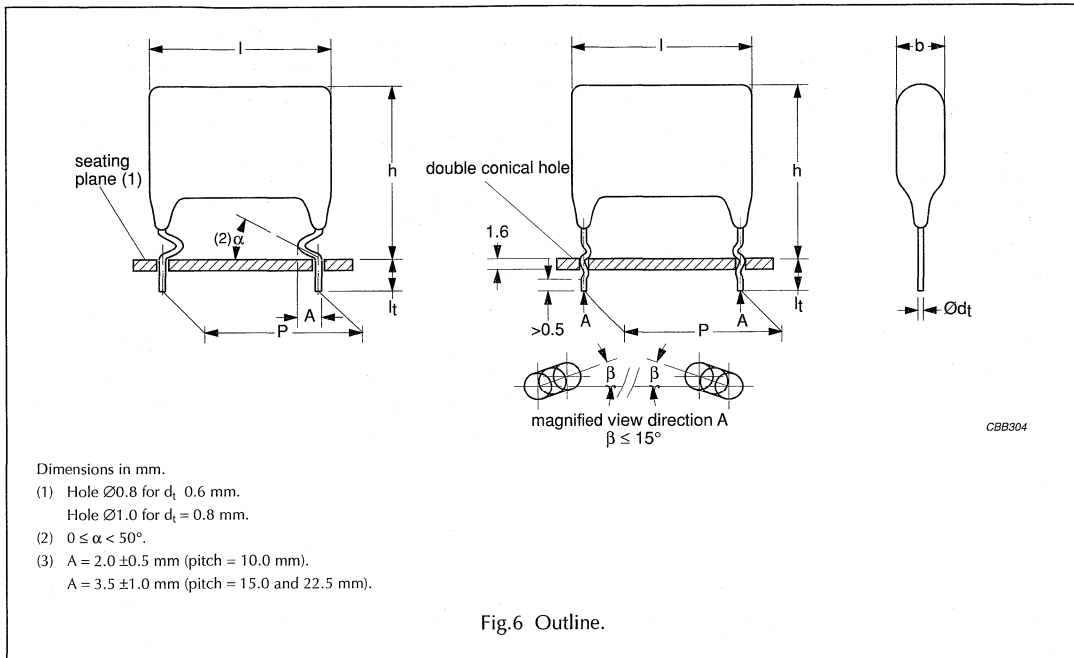


Fig.6 Outline.

Specific reference data for the 630 V DC capacitors

DESCRIPTION	VALUE	
	at 1 kHz	at 10 kHz
Tangent of loss angle: $C \leq 0.068 \mu\text{F}$	$\leq 60 \times 10^{-4}$	$\leq 110 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 630 V (DC)	$>10000 \text{ V}/\mu\text{s}$	
R between leads, for $C \leq 0.33 \mu\text{F}$ at 100 V; 1 minute	$>50000 \text{ M}\Omega$	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	1260 V; 1 minute	
Withstanding (DC) voltage between leads and case	1260 V; 1 minute	

Available 630 V DC versions

PACKAGING	DIMENSIONS	LEAD CONFIGURATION	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 4.0 +1.0/-0.5$ mm	standard	$\pm 10\%$	2222 347 61...	preferred
			$\pm 20\%$	2222 347 60...	on request
		lock lead	$\pm 10\%$	2222 347 90...	preferred

Polyester film capacitors

KT 347

 $U_{Rdc} = 630 \text{ V}$; $U_{Rac} = 200 \text{ V}$; $U_{p-p} = 560 \text{ V}$

C (μF)	DIMENSIONS ⁽¹⁾ $b_{\max} \times h_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER	
			LOOSE IN BOX; $l_t = 4.0 +1.0/-0.5 \text{ mm}$	
			C-tol = $\pm 10\%$	
			catalogue number	last 5 digits
Pitch = 10.0 ± 0.4 mm; $d_t = 0.60 \pm 0.06$ mm			lock lead	
0.001	5.5 \times 13.0 (16.0) \times 13.5	0.7	2222 347 61102	.. 90276
0.0012			2222 347 61122	.. 90277
0.0015			2222 347 61152	.. 90278
0.0018			2222 347 61182	.. 90279
0.0022			2222 347 61222	.. 90281
0.0027			2222 347 61272	.. 90282
0.0033			2222 347 61332	.. 90283
0.0039			2222 347 61392	.. 90284
0.0047	6.0 \times 13.5 (16.5) \times 13.5	0.7	2222 347 61472	.. 90285
0.0056	6.5 \times 14.0 (17.0) \times 13.5	0.8	2222 347 61562	.. 90286
0.0068	7.0 \times 14.5 (17.5) \times 13.5	0.9	2222 347 61682	.. 90287
Pitch = 15.0 ± 0.4 mm; $d_t = 0.80 \pm 0.08$ mm			lock lead	
0.0082	5.5 \times 14.0 (17.0) \times 19.0	1.1	2222 347 61822	.. 90288
0.01	6.0 \times 14.5 (17.5) \times 19.0	1.2	2222 347 61103	.. 90289
0.012	7.0 \times 15.5 (18.5) \times 19.0	1.3	2222 347 61123	.. 90291
0.015	7.5 \times 16.0 (19.0) \times 19.0	1.5	2222 347 61153	.. 90292
0.018	8.0 \times 16.5 (19.5) \times 19.0	1.7	2222 347 61183	.. 90293
0.022	8.5 \times 17.0 (20.0) \times 19.0	2.0	2222 347 61223	.. 90294
Pitch = 22.5 ± 0.4 mm; $d_t = 0.80 \pm 0.08$ mm			lock lead	
0.027	7.5 \times 18.0 (21.0) \times 27.0	2.5	2222 347 61273	.. 90295
0.033	7.5 \times 18.5 (21.5) \times 27.0	2.8	2222 347 61333	.. 90233
0.039	8.0 \times 19.5 (22.5) \times 27.0	3.0	2222 347 61393	.. 90296
0.047	9.0 \times 20.0 (23.0) \times 27.0	3.5	2222 347 61473	.. 90297
0.056	10.0 \times 21.0 (24.0) \times 27.0	3.8	2222 347 61563	.. 90298
0.068	11.0 \times 22.0 (25.0) \times 27.0	4.4	2222 347 61683	.. 90299

Note

1. Dimensions in brackets for lock lead.

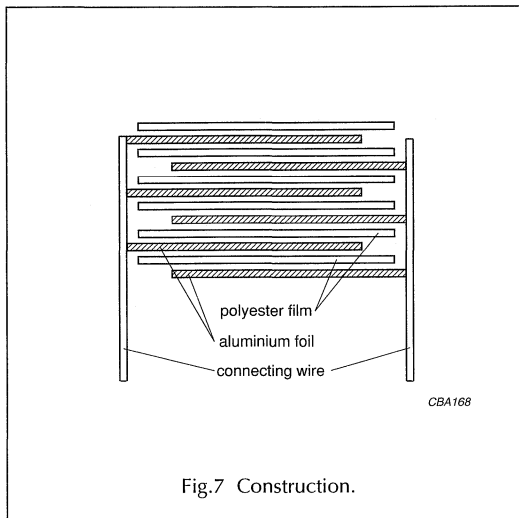
Polyester film capacitors

KT 347

CONSTRUCTION

Description

- Low-inductive wound cell of metal foil and a polyethylene terephthalate 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.

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

Storage temperature

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

RATINGS AND CHARACTERISTICS REFERENCE CONDITIONS

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 $50 \pm 2\%$.

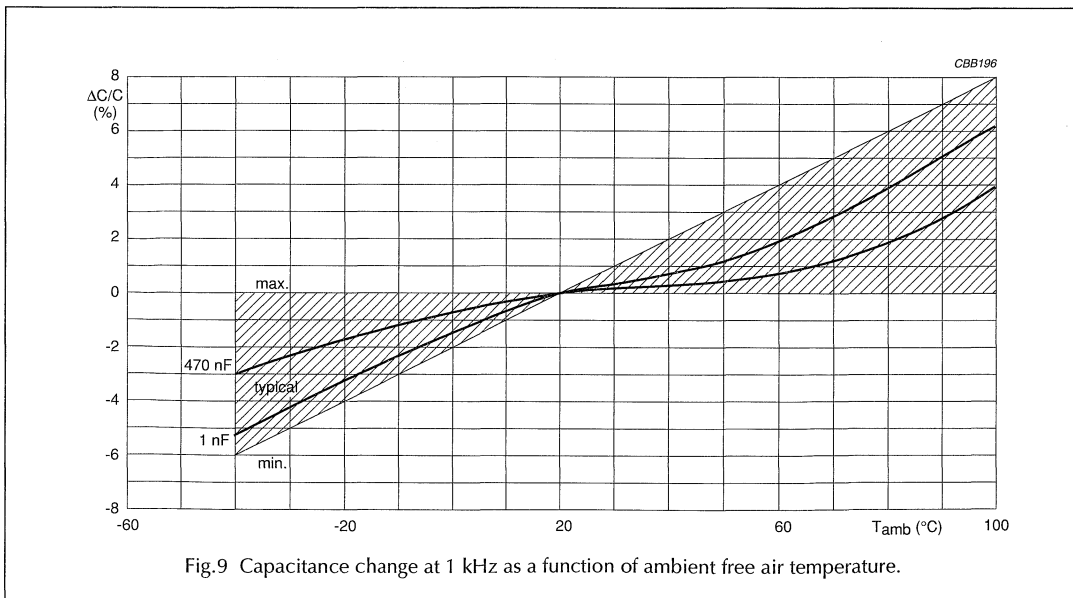
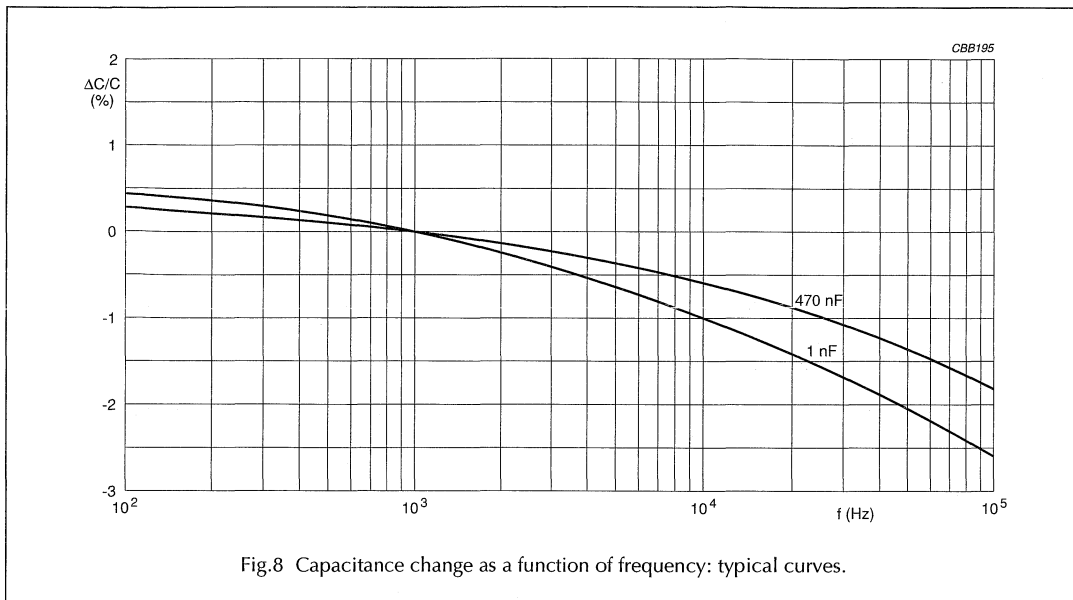
For reference testing, a conditioning period shall be applied over 96 ± 4 hours by heating the products in a circulating air oven at the rated temperature and a relative humidity not exceeding 20%.

Polyester film capacitors

KT 347

CHARACTERISTICS

Capacitance



Polyester film capacitors

KT 347

Tangent of loss angle

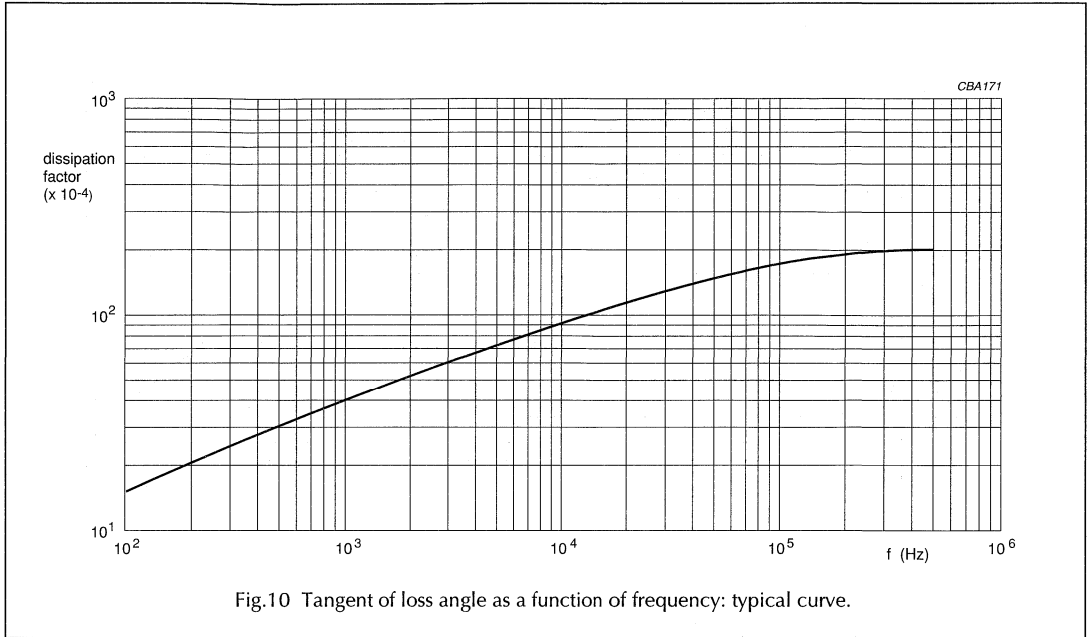


Fig.10 Tangent of loss angle as a function of frequency: typical curve.

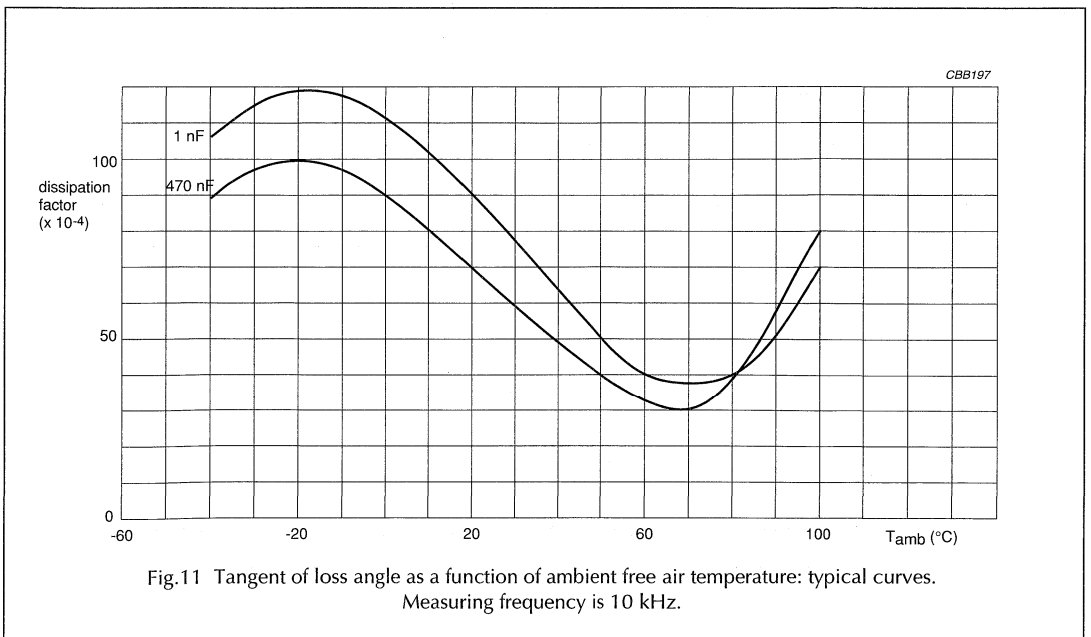
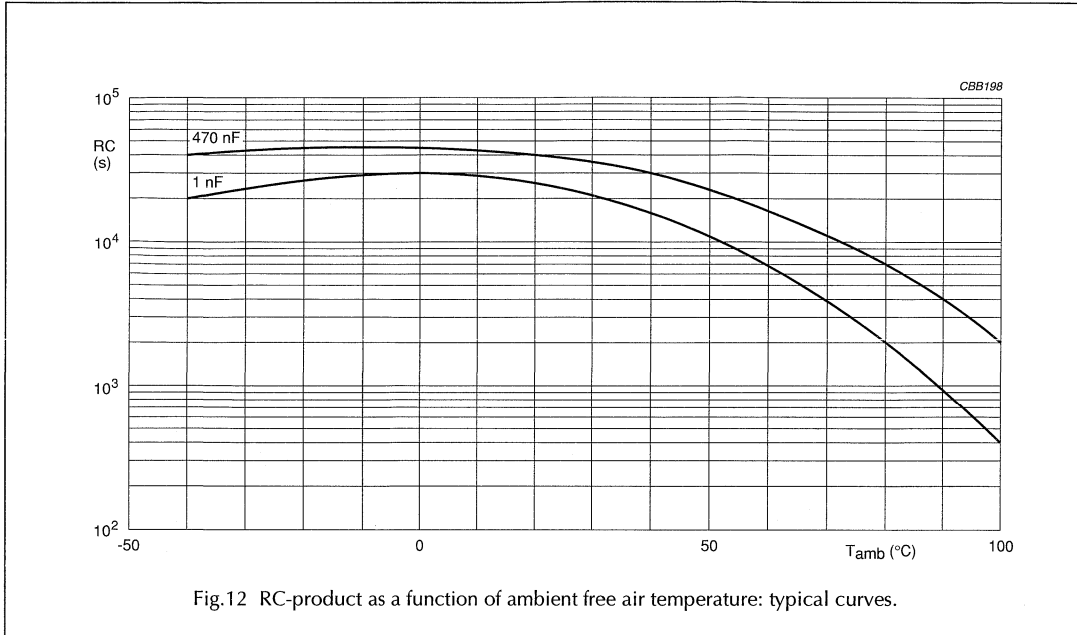


Fig.11 Tangent of loss angle as a function of ambient free air temperature: typical curves. Measuring frequency is 10 kHz.

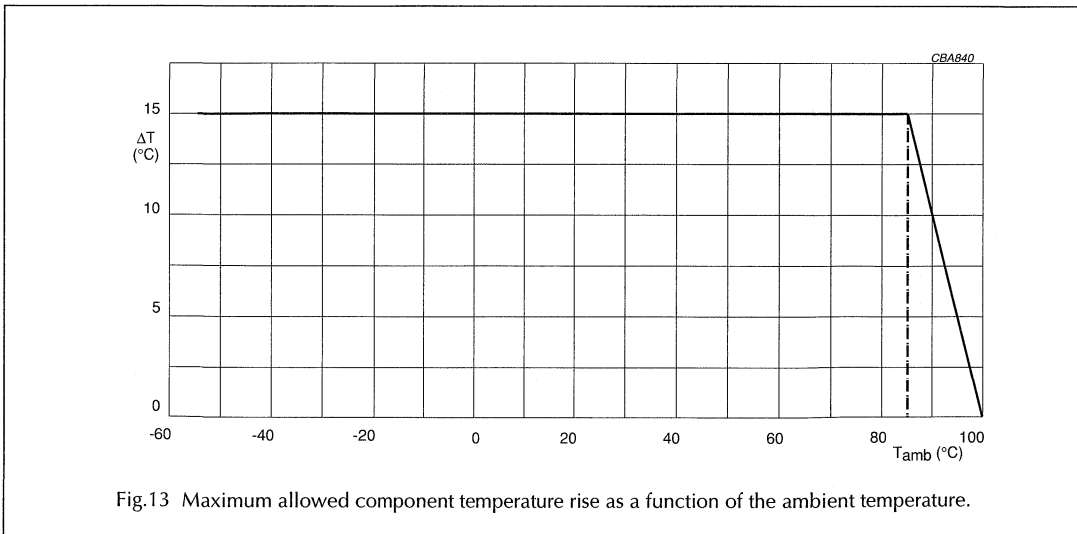
Polyester film capacitors

KT 347

Insulation resistance



Maximum allowed component temperature rise (ΔT) as a function of the ambient temperature (T_{amb})



Polyester film capacitors

KT 347

Heat conductivity (G) as a function of pitch and capacitor body thickness in mW/°C

Table 1 Heat conductivity

b_{\max} (mm)	PITCH (mm)		
	10	15	22.5
4.0	4.0	5.0	–
4.5	4.5	6.0	–
5.0	5.0	6.0	12.0
5.5	6.0	6.5	13.0
6.0	6.0	6.5	13.0
6.5	6.5	8.0	15.0
7.0	–	8.0	15.0
7.5	–	9.0	17.0
8.0	–	9.0	17.0
8.5	–	11.0	18.0
9.0	–	11.0	18.0
9.5	–	12.0	20.0
10.0	–	12.0	20.0
10.5	–	–	22.0
11.0	–	–	22.0

Power dissipation and maximum component temperature rise

The power dissipation must be limited in order not to exceed the maximum allowed component temperature rise as a function of the free air ambient temperature.

The power dissipation can be calculated according chapter "Introduction", section "Maximum power dissipation".

The component temperature rise (ΔT) can be measured (see section "Measuring the component temperature" for more details) or calculated by $\Delta T = P/G$:

- ΔT = component temperature rise (°C).
- P = power dissipation of the component (mW).
- G = heat conductivity of the component (mW/°C).

Polyester film capacitors

KT 347

Measuring the component temperature

A thermocouple must be attached to the capacitor body as in Fig.14.

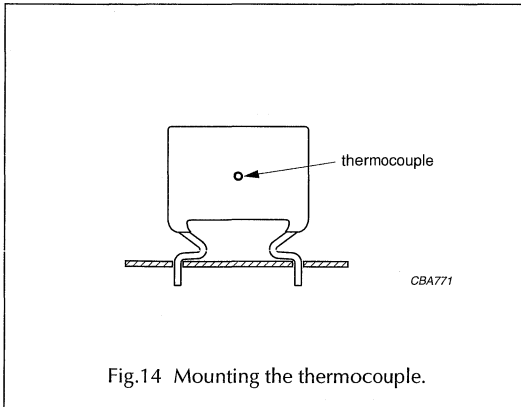


Fig.14 Mounting the thermocouple.

The temperature is measured in unloaded (T_{amb}) and maximum loaded condition (T_c).

The temperature rise is given by $\Delta T = T_c - T_{amb}$.

To avoid radiation or convection, the capacitor should be tested in a wind-free box.

Application note and limiting conditions

To select the capacitor for an application, the following 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 the maximum U_{p-p} to avoid the ionisation inception level.
3. The maximum component surface temperature rise must be lower than the limits in Fig.13.
4. The maximum component surface temperature must be lower than 100 °C.

Example

$C = 470 \text{ nF}$, 100 V used at 10 kHz, 25 V (AC) sinewave and the ambient temperature is 50 °C.

Checking the conditions:

1. The peak voltage $U_p = 35 \text{ V}$ is lower than 100 V (DC).

2. The peak-to-peak voltage 70 V is lower than $2 \times \sqrt{2} \times 50 \text{ V (AC)} = 140 U_{p-p}$.

3. The dissipated power is about 166 mW as calculated with typical $\text{tg}\delta = 0.0090$ at 10 kHz.

This gives a temperature rise of $\frac{166 \text{ mW}}{22 \text{ mW/}^\circ\text{C}} = 7.5 \text{ }^\circ\text{C}$,

which is permitted; see Fig.13.

4. Component temperature will be 57.5 °C, which is lower than 100 °C.

MARKING

Product marking

The capacitors are marked on the top (see Fig.15) with the following information:

1. Manufacturer
2. Rated capacitance code
3. Tolerance on rated capacitance: M or 20%; K or 10%
4. Rated (DC) voltage (e.g. 250 V)
5. Code for dielectric material (KT)
6. Code for factory of origin (HQ).

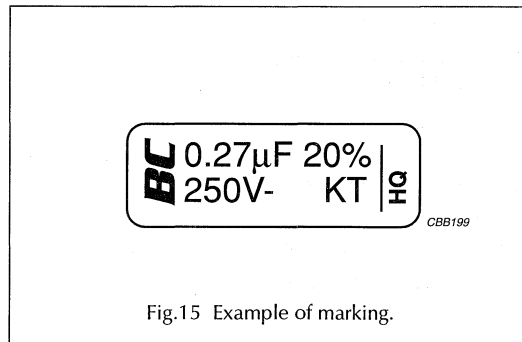


Fig.15 Example of marking.

Polyester film capacitors

KT 347
QUICK REFERENCE TEST REQUIREMENTS

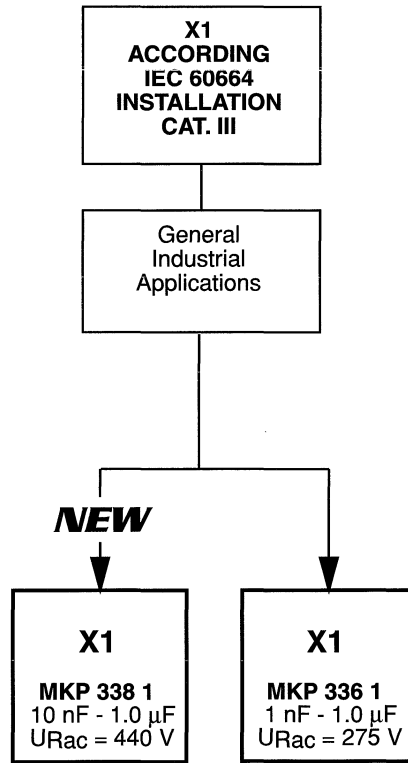
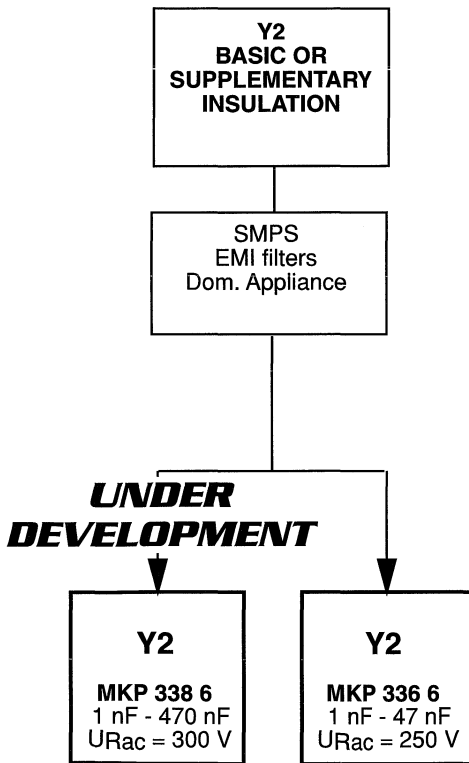
TEST	PROCEDURE (quick reference)	REQUIREMENTS
Robustness of leads		
Tensile: "IEC 60068-2-21"	load 10 N; 10 s	no visible damage legible marking $ \Delta C/C \leq 2\%$
Bending: "IEC 60068-2-21"	load 5 N; $4 \times 90^\circ$	
Resistance to soldering heat "IEC 60068-2-20 A"	solder bath: 260 °C; 10 s	
Robustness of component		
Vibration: "IEC 60068-2-6"	10 to 55 Hz; amplitude 0.75 mm or acceleration 98 m/s ² ; 6 hours	$ \Delta C/C \leq 5\%$
Shock: "IEC 60068-2-27"	half sinewave; 490 m/s ² ; 11 ms	
Climatic sequence		
Dry heat: "IEC 60068-2-2"	16 hours; 100 °C	$ \Delta C/C \leq 5\%$ $R_{ins} \geq 50\%$ of specified value
Damp heat cyclic, first cycle: "IEC 60068-2-30"		
Cold: "IEC 60068-2-1"	2 hours; -40 °C	
Damp heat, remaining cycles: "IEC 60068-2-30"		
Other applicable tests		
Damp heat steady state: "IEC 60068-2-3"	21 days; 40 °C; 90 to 95% RH	$ \Delta C/C \leq 5\%$ $R_{ins} \geq 50\%$ of specified value
Endurance (DC): "IEC 60384-11"	1 000 hours; $1.5 \times U_{Rdc}$; 85 °C $1.2 \times U_{Rdc}$; 100 °C	$ \Delta C/C \leq 10\%$ $R_{ins} \geq 50\%$ of specified value
Heat storage: "IEC 60384-11"	1 000 hours; 100 °C	$ \Delta C/C \leq 5\%$
Resistance to soldering heat with preheating: "IEC 60384-11"	body temperature: 100 °C; bath temperature: 260 °C; dwell time: 10 s	$ \Delta C/C \leq 2\%$

INTERFERENCE SUPPRESSION CAPACITORS

Interference suppression film capacitors HOW TO SELECT

Y-CLASS LINE BYPASS

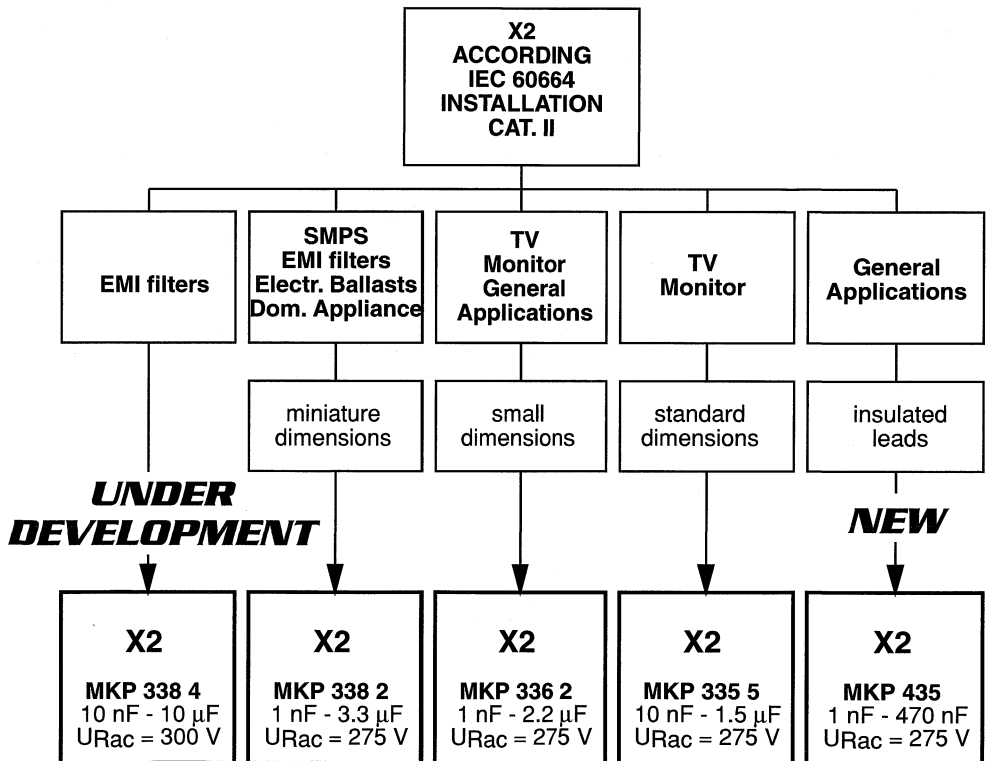
X-CLASS ACROSS THE LINE



CBB327

Interference suppression film capacitors HOW TO SELECT

X-CLASS ACROSS THE LINE



CBB306

Interference suppression

New safety approval

CHANGING EUROPEAN SAFETY APPROVALS

The European Capacitors and Filters manufacturers decided to improve their market access over all Europe with the use of a safety mark that is fully, unconditionally accepted and recognized in European countries.

In a policy of continuous improvement and customer satisfaction manufacturers want to offer their customers the best option in product certification.

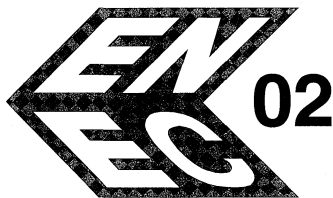
The world is going towards the use of 'one standard, one certification, one mark', this target may be reached in the next ten years, but now in Europe a step forward in this direction has already been done: the ENEC-mark is as valid as all European marks together.

Suppression Capacitors and Filters bearing the ENEC-mark have an open door for market acceptance in all European countries, because the ENEC-mark is considered by European certification bodies as 'their own mark' (see the ENEC official site for the updated list of ENEC members: www.enec.com).

The EECA (European Electronic Component Manufacturers Association) reached an agreement with the ENEC Group in April 2000, and now all Capacitors and Filters manufacturers in the world may apply to any of the European certification bodies for the use of the ENEC-mark to show conformity to the safety standards EN 132400 and EN 133200 (corresponding to IEC 60384-14 and IEC 60939).

The ENEC-mark is already in use for both appliances and components in the electrotechnical field (i.e. luminaires, IT equipment, switches for appliances, transformers, selfballasted lamps, ballasts, and track systems) and is actively supported by European manufacturers associations CELMA (luminaires and components), COTREL (transformers) and EECA (passive components).

During 2001 BCcomponents will change all European safety approvals into this new ENEC-approval for interference suppression film capacitors. The new ENEC-mark together with the identification number (02) of the controlling and certification body (CEBEC, Belgium) will replace all European safety marks as VDE, SEMKO, NEMKO, FIMKO SGS, ÖVE, IMQ, DEMKO and SEV.



Therefore the layout of product marking and packing labelling will change as indicated in the product specifications, where existing and new layouts are printed.

Interference suppression film capacitors MKP 338 6 Y2

MKP RADIAL POTTED TYPE

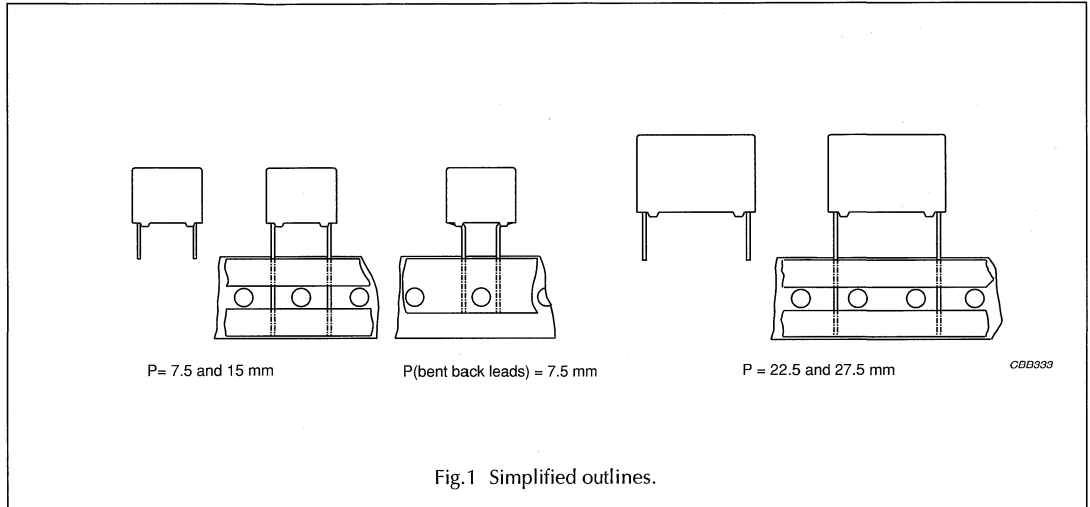
 PITCH 7.5/15/22.5/27.5 mm
 PITCH 7.5 mm (bent back lead)


Fig.1 Simplified outlines.

FEATURES

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

APPLICATIONS

- For Y2-electromagnetic interference suppression
- Specially designed to meet the requirements of the "IEC 60384-14 2nd edition, EN 132400", requiring for Y2 a 5 kV peak pulse voltage test and both the UL1414 and CSA-C22.2 No. 1 specification.

DETAIL SPECIFICATION

For more detailed data and test requirements see "Type detail specification HQN-384-14/121".




QUICK REFERENCE DATA⁽¹⁾

DESCRIPTION	VALUE
Capacitance range (E12 series)	1 to 470 nF
Capacitance tolerance	±20%; ±10%; ±5%
Rated (AC) voltage , 50 to 60 Hz	300 V
Rated (DC) voltage	1 000 V
Climatic category	55/105/56/B
Rated temperature	105 °C
Maximum application temperature	105 °C
Reference specifications	IEC 60384-14 2nd edition and EN 132400
Safety approvals:	
250 V	UL1414; note 2
300 V	UL1283; ENEC; note 2
Materials	qualified in accordance with UL94V-O
Safety class	Y2; line bypass and antenna coupling

Notes

1. Under development.
2. Pending.

Interference suppression film capacitors**MKP 338 6 Y2****SAFETY APPROVALS AND SAFETY TEST REPORT****Approvals**

SAFETY APPROVALS (X2)		VOLTAGE	VALUE	FILE NUMBERS
	UL1414 and CSA-C22.2 No.1	250 V (AC)	1 nF to 470 nF	pending
	UL1283 and CSA-C22.2 No.8	300 V (AC)	1 nF to 470 nF	pending
	ENEC (EN132400)	300 V (AC)	1 nF to 470 nF	pending

Safety test report

SAFETY TEST REPORT	VOLTAGE	VALUE	FILE NUMBERS
CB TEST CERTIFICATE	300 V (AC)	1 nF to 470 nF	pending

The EneC-approval together with the CB-Certificate replace all national approval marks of the following countries (they have already signed the ENEC-Agreement): Austria; Belgium; Czech. Republic; Denmark; Finland; France; Germany; Greece; Hungary; Ireland; Italy; Luxembourg; Netherlands; Norway, Portugal; Slovenian; Spain; Sweden; Switzerland and United Kingdom.

Interference suppression film capacitors

MKP 338 6 Y2

COMPOSITION OF CATALOGUE NUMBER

TYPE AND PITCHES	
338 6 Y2	7.5 mm
	7.5 mm (bent back)
	15.0 mm
	22.5 mm
27.5 mm	

CAPACITANCE
(numerically)

MULTIPLIER (nF)	
0.1	2
1	3
10	4
100	5

Example:
104 = 10 x 10 = 100 nF

2222 338 6. XX X

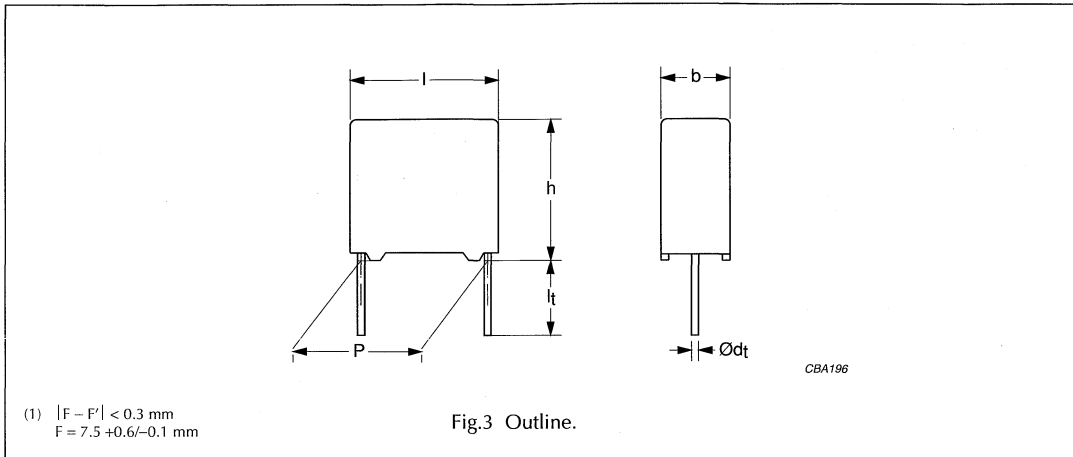
TYPE	PACKAGING	STANDARD DIMENSIONS	C-TOL	PREFERRED TYPES
338 6 Y2	loose in box	lead length 3.5 mm	±20%	60
		lead length 5.0 mm		62
		lead length 25.0 mm		64
	taped	pitch 7.5 mm or bent back to 7.5 mm		66
		ALTERNATIVE PITCH SIZES		ON REQUEST
338 6 Y2	loose in box	lead length 3.5 mm	±20%	6.
		lead length 5.0 mm		6.
		lead length 25.0 mm		6.
		ALTERNATIVE TAPED VERSION		ON REQUEST
338 6 Y2	taped		±20%	6.
		ALTERNATIVE C-TOL		ON REQUEST
338 6 Y2	loose in box	lead length 3.5 mm	±10%	61
			±5%	6.
		lead length 5.0 mm	±10%	63
			±5%	6.
	taped	lead length 25.0 mm	±10%	65
			±5%	6.
		pitch 7.5 mm or bent back to 7.5 mm	±10%	67
			±5%	6.
		±10%	6.	
		±5%	6.	

Interference suppression film capacitors

MKP 338 6 Y2

MKP 338 6 GENERAL DATA

PITCH 7.5 mm



Specific reference data for the 300 V AC (Y2) capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle: $C \leq 470 \text{ nF}$	$\leq 10 \times 10^{-4}$	$\leq 20 \times 10^{-4}$	$\leq 100 \times 10^{-4}$
Rated voltage pulse slope (dU/dt)R at 420 V	100 V/ μs		
R between leads, for $C \leq 0.33 \mu\text{F}$ at 100 V; 1 minute	$>15000 \text{ M}\Omega$		
R between leads and case; 100 V; 1 minute	$>30000 \text{ M}\Omega$		
Withstanding (DC)voltage (cut off current 10 mA); rise time 100 V/s:	3 400 V; 1 minute		
Withstanding (AC) voltage between leads and case	2 100 V; 1 minute		

Available 300 V (AC) Y2 versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 3.5 +1/-0.5 \text{ mm}$	$\pm 20\%$	2222 338 60...	preferred
		$\pm 10\%$	2222 338 61...; note 1	on request
		$\pm 5\%$	2222 338 6...; note 1	on request
	$l_t = 5.0 \pm 1.0 \text{ mm}$	$\pm 20\%$	2222 338 62...	preferred
		$\pm 10\%$	2222 338 63...; note 1	on request
		$\pm 5\%$	2222 338 6...; note 1	on request
	$l_t = 25.0 \pm 2.0 \text{ mm}$	$\pm 20\%$	2222 338 64...	preferred
		$\pm 10\%$	2222 338 65...; note 1	on request
		$\pm 5\%$	2222 338 6...; note 1	on request
Ammopack	$H = 18.5 \text{ mm}$; for $P_0 = 12.7 \text{ mm}$	$\pm 20\%$	2222 338 66...	preferred
		$\pm 10\%$	2222 338 6...; note 1	on request
		$\pm 5\%$	2222 338 6...; note 1	on request

Note

1. Other dimensions for $\pm 10\%$ and $\pm 5\%$ tolerance values.

Interference suppression film capacitors**MKP 338 6 Y2** $U_{Rac} = 300 \text{ V (Y2)}$; $U_{Rdc} = 1000 \text{ V}$

loose and taped

$C^{(1)}$ (μF)	DIMENSIONS $b \times h \times l$ (mm)	MASS (g)	CATALOGUE NUMBER				
			LOOSE IN BOX			AMMOPACK	
			short leads		long leads		$H = 18.5 \text{ mm};$ $P_0 = 12.7 \text{ mm}$
			$l_1 = 3.5+1/-0.5 \text{ mm}$	$l_1 = 5.0 \pm 1.0 \text{ mm}$	$l_1 = 25.0 \pm 2.0 \text{ mm}$		
			C-tol = $\pm 20\%$				C-tol = $\pm 20\%$
catalogue number	last 5 digits			last 5 digits			
Pitch = $7.5 \pm 0.4 \text{ mm}$; $d_t = 0.50 \pm 0.05 \text{ mm}$							
0.001	4.0 × 9.0 × 10.0	0.5	2222 338 60102	.. 62102	.. 64102	.. 66102	
0.0012			2222 338 60122	.. 62122	.. 64122	.. 66122	
0.0015			2222 338 60152	.. 62152	.. 64152	.. 66152	
0.0018			2222 338 60182	.. 62182	.. 64182	.. 66182	
0.0022			2222 338 60222	.. 62222	.. 64222	.. 66222	
0.0027			2222 338 60272	.. 62272	.. 64272	.. 66272	
0.0033	5.0 × 10.5 × 10.0	0.9	2222 338 60332	.. 62332	.. 64332	.. 66332	
0.0039			2222 338 60392	.. 62392	.. 64392	.. 66392	
0.0047	6.0 × 11.5 × 10.0	1.0	2222 338 60472	.. 62472	.. 64472	.. 66472	
0.0056			2222 338 60562	.. 62562	.. 64562	.. 66562	

Note

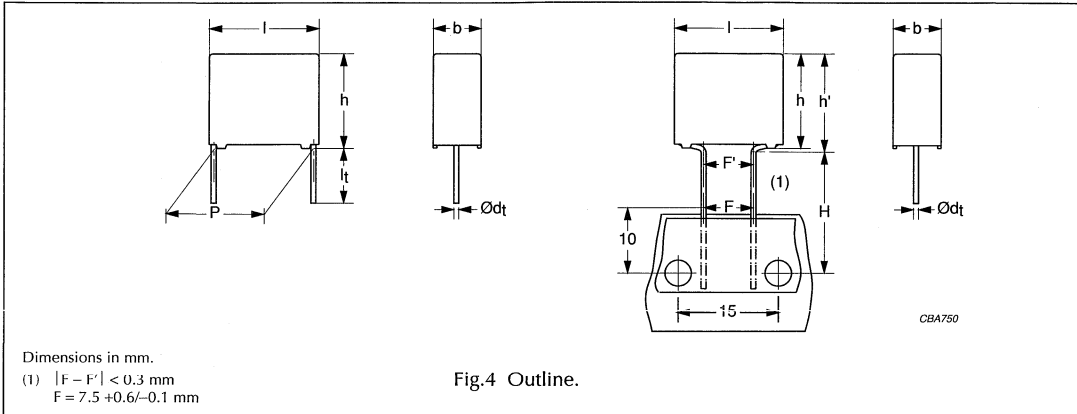
- Under development.

Interference suppression film capacitors

MKP 338 6 Y2

MKP 338 6 GENERAL DATA

PITCH 7.5/15/22.5/27.5 mm
 PITCH 7.5 mm (bent back leads)



Specific reference data for the 300 V AC (Y2) capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle: $C \leq 470 \text{ nF}$	$\leq 10 \times 10^{-4}$	$\leq 20 \times 10^{-4}$	$\leq 100 \times 10^{-4}$
Rated voltage pulse slope (dU/dt)R at 615 V	100 V/ μs		
R between leads, for $C \leq 0.33 \mu\text{F}$ at 100 V; 1 minute	$>15000 \text{ M}\Omega$		
RC between leads, for $C > 0.33 \mu\text{F}$ at 100 V; 1 minute	$>5000 \text{ s}$		
R between leads and case; 100 V; 1 minute	$>30000 \text{ M}\Omega$		
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s:	3 400 V; 1 minute		
Withstanding (AC) voltage between leads and case	2 100 V; 1 minute		

Available 300 V (AC) Y2 versions

PACKAGING ⁽¹⁾	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 3.5 \pm 0.3 \text{ mm}$	$\pm 20\%$	2222 338 60...	preferred
		$\pm 10\%$	2222 338 61...; note 2	on request
		$\pm 5\%$	2222 338 6...; note 2	on request
	$l_t = 5.0 \pm 1.0 \text{ mm}$	$\pm 20\%$	2222 338 62...	preferred
		$\pm 10\%$	2222 338 63...; note 2	on request
		$\pm 5\%$	2222 338 6...; note 2	on request
	$l_t = 25.0 \pm 2.0 \text{ mm}$	$\pm 20\%$	2222 338 64...	preferred
		$\pm 10\%$	2222 338 65...; note 2	on request
		$\pm 5\%$	2222 338 6...; note 2	on request
Taped on reel; bent back	$H = 16.0 \text{ mm}$; for $P_0 = 15.0 \text{ mm}$	$\pm 20\%$	2222 338 66...	preferred
		$\pm 10\%$	2222 338 67...; note 2	on request
		$\pm 5\%$	2222 338 6...; note 2	on request
Taped on reel	$H = 18.5 \text{ mm}$; for $P_0 = 12.7 \text{ mm}$	$\pm 20\%$	2222 338 6...	on request
		$\pm 10\%$	2222 338 6...; note 2	on request
		$\pm 5\%$	2222 338 6...; note 2	on request

Notes

1. Taped on reel pitch = 27.5 mm is not available.
2. Other dimensions for $\pm 10\%$ and $\pm 5\%$ tolerance values.

Interference suppression film capacitors

MKP 338 6 Y2

 $U_{Rac} = 300 \text{ V (Y2)}$; $U_{Rdc} = 1000 \text{ V}$

loose and taped

C ⁽¹⁾ (μF)	DIMENSIONS ⁽²⁾ $b \times h (h') \times l$ (mm)	MASS (g)	CATALOGUE NUMBER				
			LOOSE IN BOX			REEL	
			short leads		long leads		H = 16.0 mm; P ₀ = 15.0 mm
			$l_1 = 3.5 \pm 0.3 \text{ mm}$	$l_1 = 5.0 \pm 1.0 \text{ mm}$	$l_1 = 25.0 \pm 2.0 \text{ mm}$		
			C-tol = $\pm 20\%$				C-tol = $\pm 20\%$
catalogue number	last 5 digits			last 5 digits			
Pitch = 15.0 \pm 0.4 mm; $d_t = 0.60 \pm 0.06 \text{ mm}$					pitch = 7.5 mm (bent back)		
0.0068	5.0 \times 11.0 (12.0) \times 17.5	1.2	2222 338 60682	.. 62682	.. 64682	.. 66682	
0.0082			2222 338 60822	.. 62822	.. 64822	.. 66822	
0.01			2222 338 60103	.. 62103	.. 64103	.. 66103	
0.012			2222 338 60123	.. 62123	.. 64123	.. 66123	
0.015	6.0 \times 12.0 (14.0) \times 17.5	1.4	2222 338 60153	.. 62153	.. 64153	.. 66153	
0.018			2222 338 60183	.. 62183	.. 64183	.. 66183	
Pitch = 15.0 \pm 0.4 mm; $d_t = 0.80 \pm 0.08 \text{ mm}$					pitch = 7.5 mm (bent back)		
0.022	7.0 \times 13.5 (15.0) \times 17.5	1.9	2222 338 60223	.. 62223	.. 64223	.. 66223	
0.027			2222 338 60273	.. 62273	.. 64273	.. 66273	
0.033	8.5 \times 15.0 (17.0) \times 17.5	2.6	2222 338 60333	.. 62333	.. 64333	.. 66333	
0.039			2222 338 60393	.. 62393	.. 64393	.. 66393	
0.047	10.0 \times 16.5 (18.5) \times 17.5	3.1	2222 338 60473	.. 62473	.. 64473	.. 66473	
0.056			2222 338 60563	.. 62563	.. 64563	.. 66563	
Pitch = 22.5 \pm 0.4 mm; $d_t = 0.80 \pm 0.08 \text{ mm}$					pitch = 7.5 mm (bent back)		
0.068	8.5 \times 18.0 \times 26.0	4.4	2222 338 60683	.. 62683	.. 64683	not available	
0.082			2222 338 60823	.. 62823	.. 64823		
0.1	10.0 \times 19.5 \times 26.0	5.5	2222 338 60104	.. 62104	.. 64104		
0.12	12.0 \times 22.0 \times 26.0	7.8	2222 338 60124	.. 62124	.. 64124		
0.15			2222 338 60154	.. 62154	.. 64154		
Pitch = 27.5 \pm 0.4 mm; $d_t = 0.80 \pm 0.08 \text{ mm}$					pitch = 7.5 mm (bent back)		
0.18	11.0 \times 21.0 \times 31.0	7.8	2222 338 60184	.. 62184	.. 64184	not available	
0.22	13.0 \times 23.0 \times 31.0	10.4	2222 338 60224	.. 62224	.. 64224		
0.27	15.0 \times 25.0 \times 31.0	12.8	2222 338 60274	.. 62274	.. 64274		
0.33	18.0 \times 28.0 \times 31.0	17.2	2222 338 60334	.. 62334	.. 64334		
0.39			2222 338 60394	.. 62394	.. 64394		
0.47	18.0 \times 28.0 \times 31.0	20.4	2222 338 60474	.. 62474	.. 64474		

Notes

- Under development.
- Dimensions in brackets for bent back leads.

Interference suppression film capacitors

MKP 338 6 Y2

CONSTRUCTION

Description

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

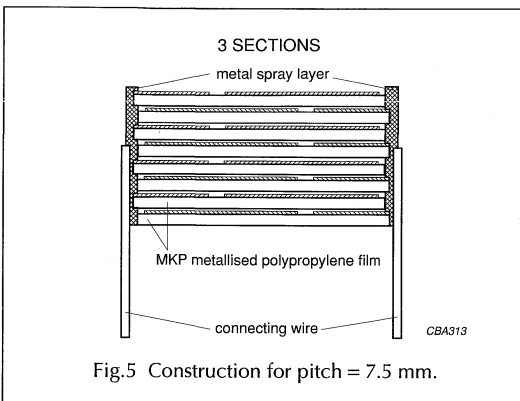


Fig.5 Construction for pitch = 7.5 mm.

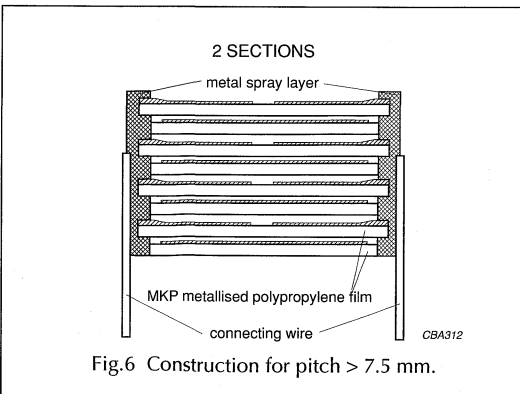


Fig.6 Construction for pitch > 7.5 mm.

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 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 Fig.7:

- Eccentricity as in Fig.7. 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 60717" as reference: $h_{\max} \leq h + 0.3$ mm or $h_{\max} \leq h' + 0.3$ mm.

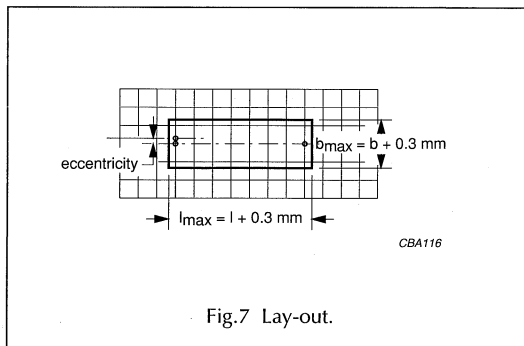


Fig.7 Lay-out.

Storage temperature

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

RATINGS AND CHARACTERISTICS REFERENCE CONDITIONS

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 $50 \pm 2\%$.

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

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 tape specifications refer to this handbook, chapter "Packaging information".

Interference suppression film capacitors

MKP 338 6 Y2

CHARACTERISTICS

Capacitance

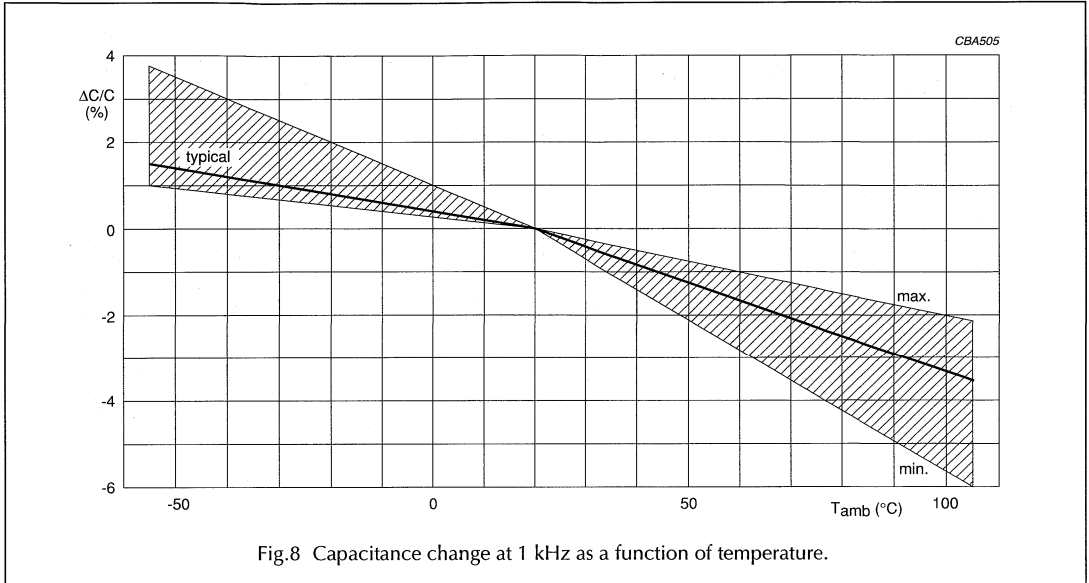


Fig.8 Capacitance change at 1 kHz as a function of temperature.

Tangent of loss angle

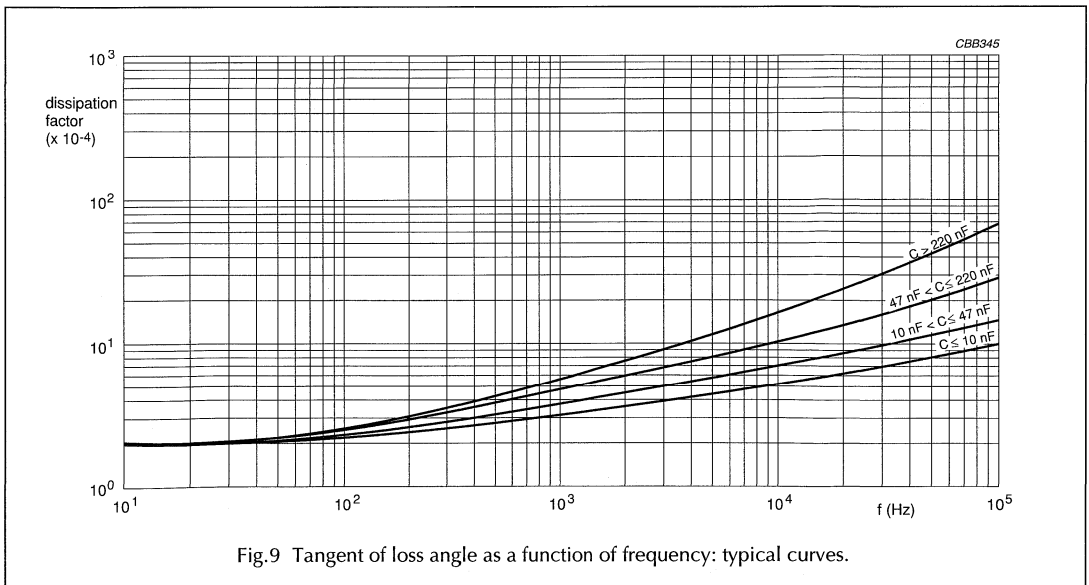


Fig.9 Tangent of loss angle as a function of frequency: typical curves.

Interference suppression film capacitors

MKP 338 6 Y2

Impedance

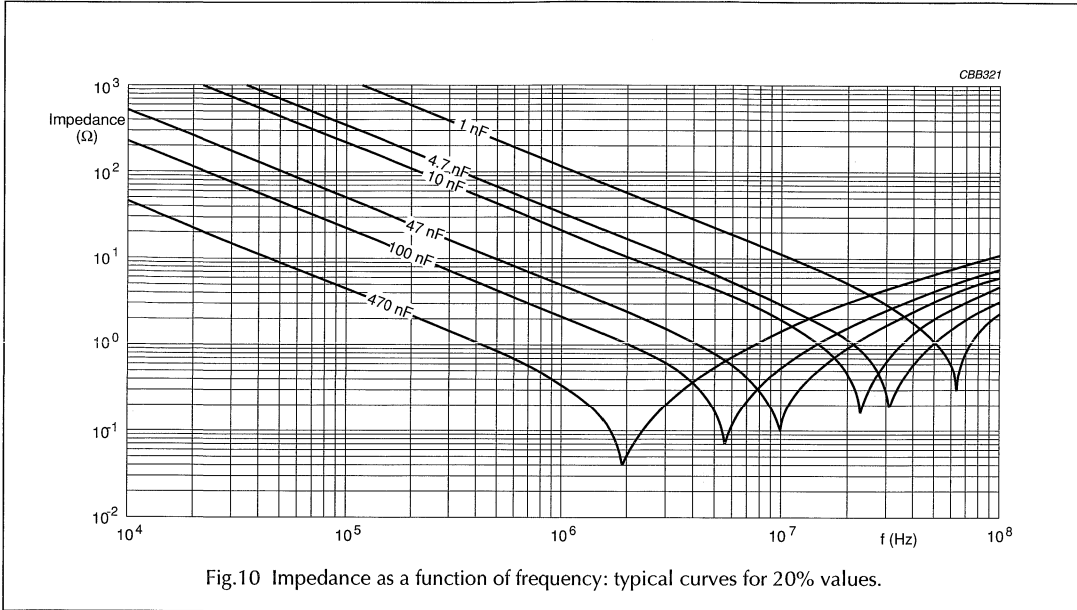


Fig.10 Impedance as a function of frequency: typical curves for 20% values.

Resonant frequency

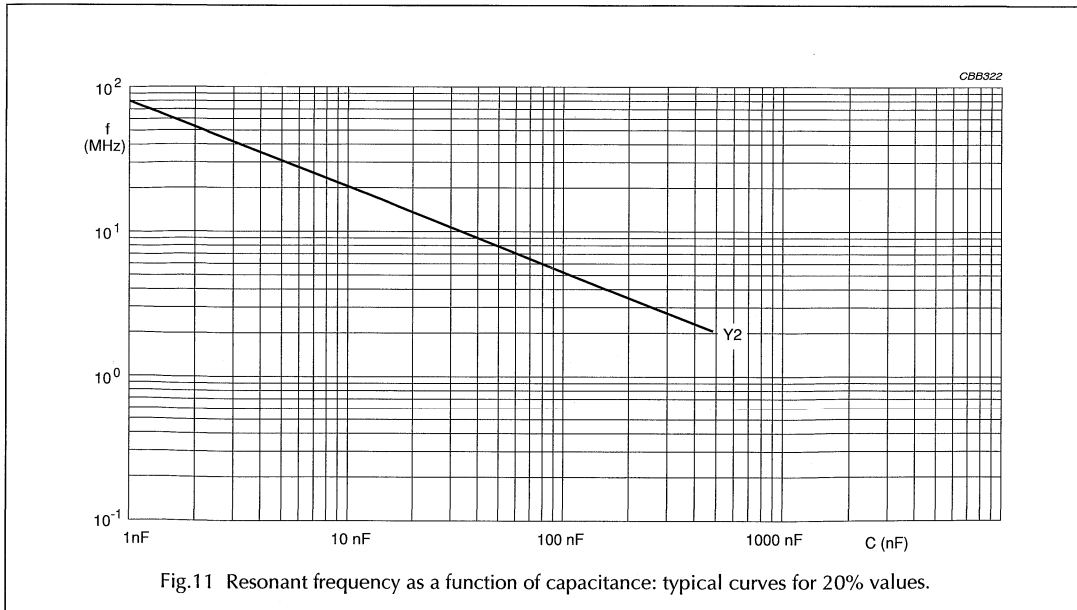
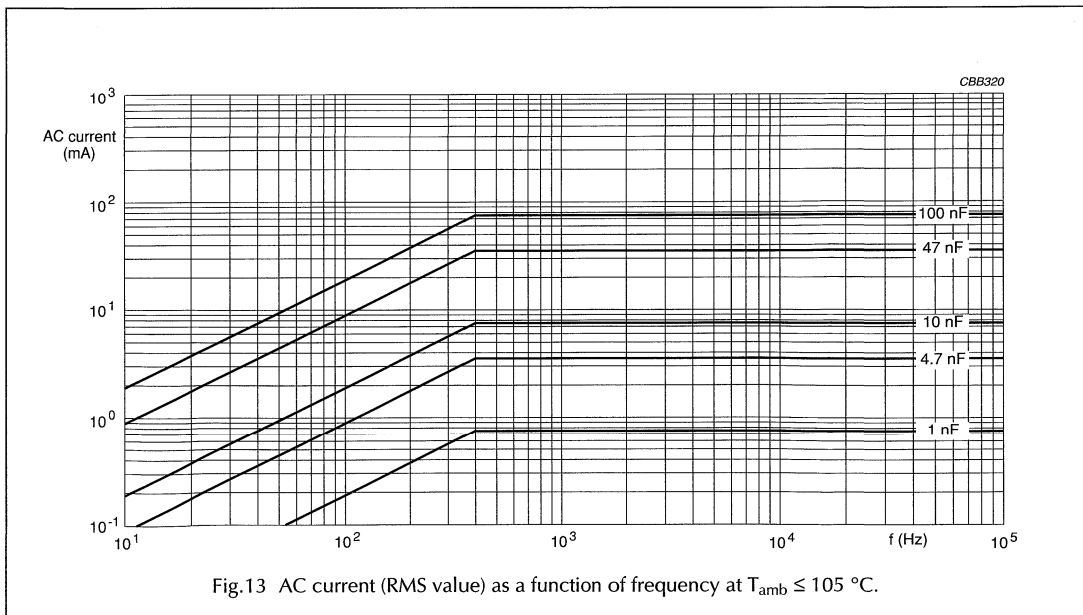
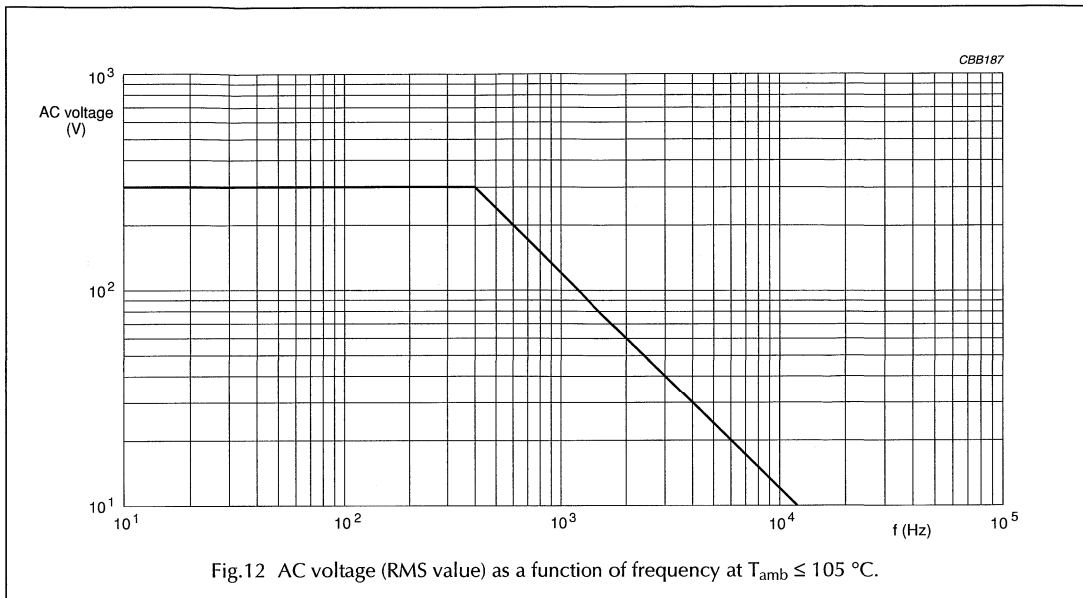


Fig.11 Resonant frequency as a function of capacitance: typical curves for 20% values.

Interference suppression film capacitors

MKP 338 6 Y2

Maximum RMS voltage and AC current (sinewave) as a function of frequency for $T_{amb} \leq 105\text{ }^{\circ}\text{C}$



Interference suppression film capacitors

MKP 338 6 Y2

Insulation resistance

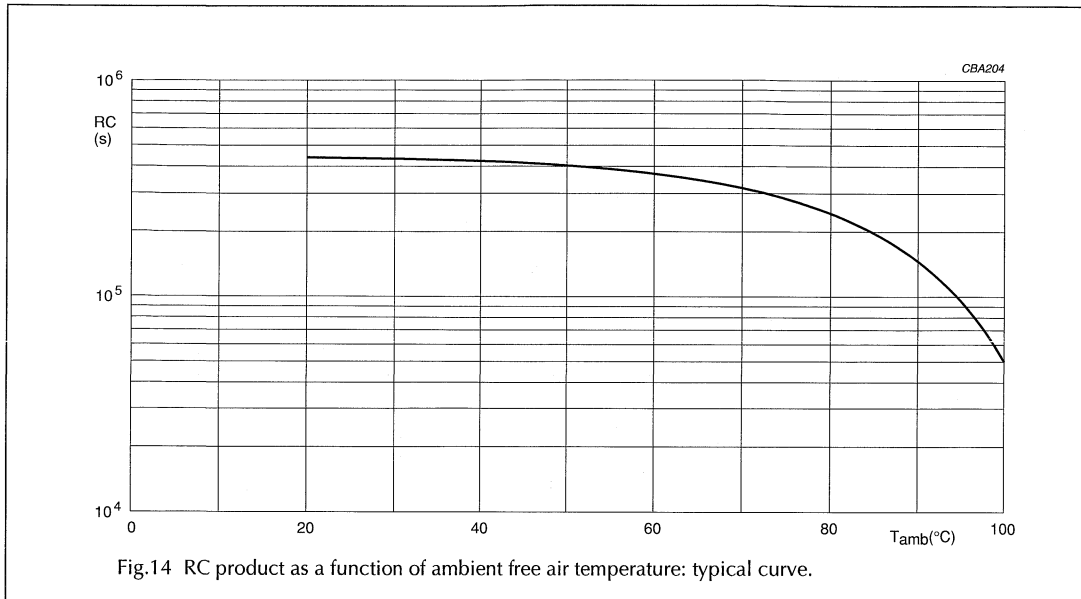


Fig.14 RC product as a function of ambient free air temperature: typical curve.

APPLICATION NOTES

- For Y2 electromagnetic interference suppression in across the line applications (50/60 Hz) with a maximum mains voltage of 300 V (AC) $\pm 10\%$ instability.
- These capacitors are not intended for continuous pulse applications. For these situations, capacitors of the AC and pulse program must be used, such as: 2222 375; 2222 383 or 2222 479
- The maximum ambient temperature must not exceed 105 °C.
- Rated voltage pulse slope:
 - If the pulse voltage is lower than the rated voltage, the values of the specific reference data can be multiplied by 420 V (DC) and divided by the applied voltage.

Interference suppression film capacitors

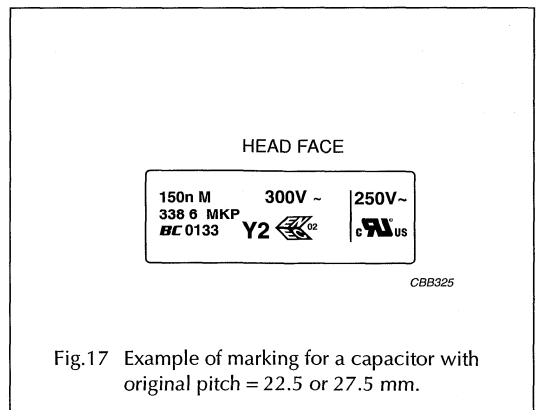
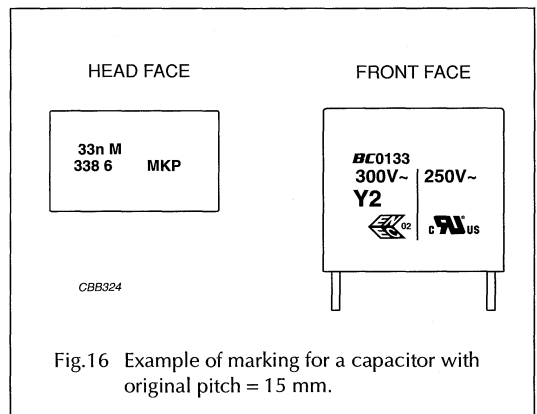
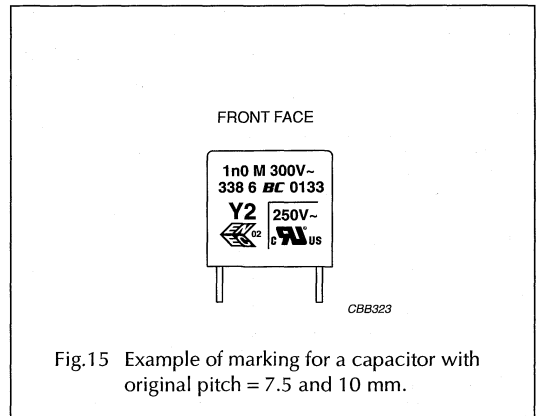
MKP 338 6 Y2

MARKING

Product marking

The capacitors are marked (see Figs 15 to 17) with the following information:

1. Rated capacitance code in accordance with "IEC 60062"
2. Tolerance on rated capacitance; M = ±20%; K = ±10%; J = ±5%
3. Rated (AC) voltage (e.g. 300 V)
4. Sub-class (e.g. Y2)
5. Manufacturer's type designation (e.g. 338 6)
6. Code for dielectric material (MKP) for capacitors with original pitch = 15, 22.5 and 27.5 mm
7. Manufacturer (BC)
8. Year and week of manufacture (e.g. 0133).



Interference suppression film capacitors

MKP 338 6 Y2

QUICK REFERENCE TEST REQUIREMENTS

TEST	PROCEDURE (quick reference)	REQUIREMENTS
Robustness of leads		
Tensile strength: "IEC 60068-2-21"	load 10 N; 10 s	no visible damage legible marking $ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 80 \times 10^{-4}$ ($C \leq 1 \mu\text{F}$); note 1 $\Delta \tan \delta \leq 50 \times 10^{-4}$ ($C > 1 \mu\text{F}$); note 1
Bending: "IEC 60068-2-21"	load 5 N; $4 \times 90^\circ$	
Resistance to soldering heat: "IEC 60068-2-20"	solder bath: 260 °C; 10 s	
Component solvent resistance	isopropyl alcohol; 23 °C; 5 minutes	
Robustness of component		
Rapid change of temperature: "IEC 60068-2-14"	5 cycles 1 cycle = 30 minutes at -55°C and 30 minutes at 105°C	$ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 80 \times 10^{-4}$ ($C \leq 1 \mu\text{F}$); note 1 $\Delta \tan \delta \leq 50 \times 10^{-4}$ ($C > 1 \mu\text{F}$); note 1
Vibration: "IEC 60068-2-6"	10 to 55 Hz; amplitude 0.75 mm; 6 hours	
Shock: "IEC 60068-2-27"	half sinewave; 490 m/s ² ; 11 ms	
Climatic sequence		
Dry heat: "IEC 60068-2-2"	16 hours; 105°C	$ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 80 \times 10^{-4}$ ($C \leq 1 \mu\text{F}$); note 1 $\Delta \tan \delta \leq 50 \times 10^{-4}$ ($C > 1 \mu\text{F}$); note 1 $R_{\text{ins}} \geq 50\%$ of specified value
Damp heat, cyclic, test Db, first cycle: "IEC 60068-2-30"		
Cold: "IEC 60068-2-1"	2 hours; -55°C	
Damp heat, cyclic, test Db, remaining cycles: "IEC 60068-2-30"		
Voltage proof: "IEC 60384-14"	$V_p = 2250 \text{ V (DC)}$; 1 minute	
Other applicable tests		
Damp heat, steady state: "IEC 60068-2-3"	56 days; 40°C ; 90 to 95% RH no load $V_p = 2250 \text{ V (DC)}$; 1 minute	$ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 80 \times 10^{-4}$ ($C \leq 1 \mu\text{F}$); note 1 $\Delta \tan \delta \leq 50 \times 10^{-4}$ ($C > 1 \mu\text{F}$); note 1 $R_{\text{ins}} \geq 50\%$ of specified value
Endurance (AC): "IEC 60384-14"	$3 \times 5 \text{ kV}$ pulse voltage 1 000 hours; $1.7 \times U_{\text{Rac}}$ at 105°C ; once per hour; 0.1 s; 1 000 V (RMS) via resistor of 47Ω ; $V_p = 2250 \text{ V (DC)}$; 1 minute	
		$ \Delta C/C \leq 10\%$ $\Delta \tan \delta \leq 80 \times 10^{-4}$ ($C \leq 1 \mu\text{F}$); note 1 $\Delta \tan \delta \leq 50 \times 10^{-4}$ ($C > 1 \mu\text{F}$); note 1 $R_{\text{ins}} \geq 50\%$ of specified value

Interference suppression film capacitors**MKP 338 6 Y2**

TEST	PROCEDURE (quick reference)	REQUIREMENTS
Charge and discharge: "IEC 60384-14"	10000 cycles; 5 ms; 1.5 × dV/dt	$ \Delta C/C \leq 10\%$ $\Delta \tan \delta \leq 80 \times 10^{-4}$ ($C \leq 1 \mu\text{F}$); note 1 $\Delta \tan \delta \leq 50 \times 10^{-4}$ ($C > 1 \mu\text{F}$); note 1 $R_{\text{ins}} \geq 50\%$ of specified value
Passive flammability: "IEC 60384-14"	class B	no burning
Active flammability: "IEC 60384-14"	20 × 5 kV discharge	no burning
Heat storage: "IEC 60384-14"	1000 hours; 105 °C	$ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 80 \times 10^{-4}$ ($C \leq 1 \mu\text{F}$); note 1 $\Delta \tan \delta \leq 50 \times 10^{-4}$ ($C > 1 \mu\text{F}$); note 1
Resistance to soldering heat with preheating: "IEC 60384-14"	preheating: 105 °C; solder bath: 260 °C; 10 s	$ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 80 \times 10^{-4}$ ($C \leq 1 \mu\text{F}$); note 1 $\Delta \tan \delta \leq 50 \times 10^{-4}$ ($C > 1 \mu\text{F}$); note 1
Active flammability test	voltage proof up to 2 × peak impulse voltage of 4.13 or until breakdown (100 V/sec, current limited 2mA) failed capacitors connected to a 250 V (AC) power supply during 5 minutes.	no burning

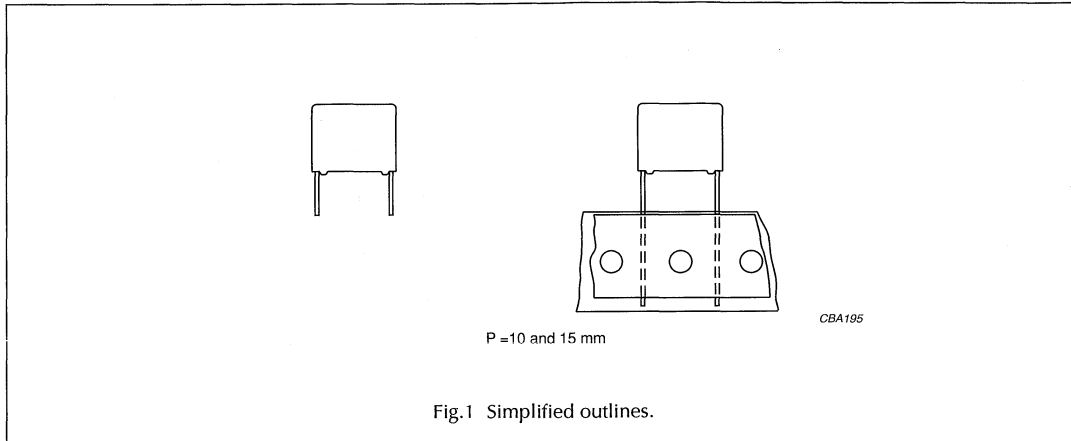
Note

1. Measuring frequency 10 kHz for $C \leq 1 \mu\text{F}$ and 1 kHz for $C > 1 \mu\text{F}$.

Interference suppression film capacitors MKP 336 6 Y2

MKP RADIAL POTTED TYPE

PITCH 10/15 mm



FEATURES

- 10 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-retardant case.

APPLICATIONS

- For Y2-electromagnetic interference suppression
- Specially designed to meet the requirements of the *IEC 60384-14 2nd edition and EN 132400*, requiring a 5 kV peak pulse voltage test and both the UL1414 and CSA-C22.2 No. 1 specification.





DETAIL SPECIFICATION

For more detailed data and test requirements see *"Type detail specification HQN-384-14/109"*.

QUICK REFERENCE DATA

DESCRIPTION	VALUE
Capacitance range (E12 series)	1 to 47 nF
Capacitance tolerance	±20%; ±10%; ±5%
Rated (AC) voltage, 50 to 60 Hz	250 V
Rated (DC) voltage	630 V
Climatic category	55/100/21/B
Rated temperature	100 °C
Maximum application temperature	100 °C
Reference specifications	IEC 60384-14 2 nd edition and EN 132400
Safety approvals	UL1414; UL1283; CSA-C22.2 No 1 SEV; VDE; ÖVE
Materials	qualified in accordance with UL94 V-0
Safety class	Y2; line by pass and antenna coupling

Interference suppression film capacitors**MKP 336 6 Y2****SAFETY APPROVALS AND SAFETY TEST REPORT****Approvals**




SAFETY APPROVALS (Y2)		VOLTAGE	VALUE	FILE NUMBERS
	UL1414	250 V (AC)	1 nF to 47 nF	E 112471
	UL1283	250 V (AC)	1 nF to 47 nF	E 109565
	CSA-C22.2 No.1	250 V (AC)	1 nF to 47 nF	1104860 (LR 94054-6)
	EN132400	250 V (AC)	1 nF to 47 nF	ENEC/B03/2001

Safety test report

SAFETY TEST REPORT	VOLTAGE	VALUE	FILE NUMBERS
CB TEST CERTIFICATE	250 V (AC)	1 nF to 47 nF: 55/100/21/B	DE-1-7483

The Enec-approval together with the CB-Certificate replace all national approval marks of the following countries (they have already signed the ENEC-Agreement): Austria; Belgium; Czech. Republic; Denmark; Finland; France; Germany; Greece; Hungary; Ireland; Italy; Luxembourg; Netherlands; Norway, Portugal; Slovenian; Spain; Sweden; Switzerland and United Kingdom.

Safety approvals to be replaced by ENEC during 2001

SAFETY APPROVALS (Y2)	VOLTAGE	VALUE	FILE NUMBERS	
	SEV (EN132400)	250 V (AC)	1 nF to 47 nF	99.7 70456.01
	VDE (EN132400)	250 V (AC)	1 nF to 47 nF	83620
	ÖVE (EN132400)	250 V (AC)	1 nF to 47 nF	E 260-007

Interference suppression film capacitors

MKP 336 6 Y2

COMPOSITION OF CATALOGUE NUMBER

TYPE AND PITCHES	
336 6	10.0 mm
Y2	15.0 mm

MULTIPLIER (nF)	
0.1	2
1	3

CAPACITANCE
(numerically)

Example:
103 = 10 x 1 = 10 nF

2222 336 6. XX X

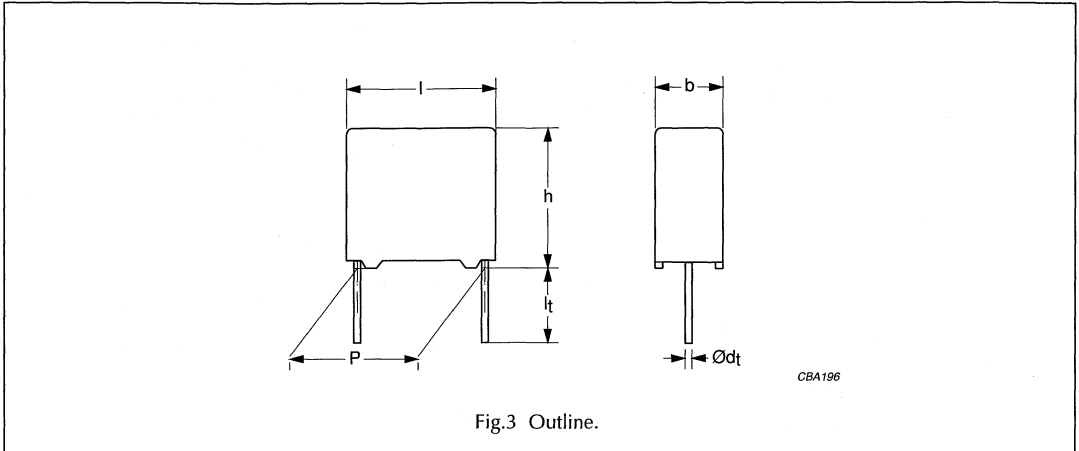
TYPE	PACKAGING	LEAD CONFIGURATION	C-TOL	PREFERRED TYPES
336 6 Y2	loose in box	lead length 3.5 mm	±20%	60
		lead length 25.0 mm		66
				ON REQUEST
336 6 Y2	loose in box	lead length 3.5 mm	±10%	61
		lead length 25.0 mm		67
	taped on reel		±20%	63
			±10%	64

Interference suppression film capacitors

MKP 336 6 Y2

MKP 336 6 GENERAL DATA

PITCH 10/15 mm



Specific reference data for the 250 V AC (Y2) capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle	$\leq 10 \times 10^{-4}$	$\leq 30 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 355 V (DC)	200 V/ μ s	
R between leads, for $C \leq 0.33 \mu$ F at 100 V; 1 minute	>15000 M Ω	
R between leads and case; 100 V; 1 minute	>30000 M Ω	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	2700 V; 1 minute	
Withstanding (AC) voltage between leads and case	2000 V; 1 minute	

Available 250 V AC (Y2) versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 3.5 +1/-0.5$ mm; note 1	$\pm 20\%$	2222 336 60...	preferred
		$\pm 10\%$	2222 336 61...; note 2	on request
	$l_t = 25.0 \pm 2.0$ mm	$\pm 20\%$	2222 336 66...	preferred
		$\pm 10\%$	2222 336 67...; note 2	on request
Taped on reel	$H = 18.5$ mm; $P_0 = 12.7$ mm	$\pm 20\%$	2222 336 63...	on request
		$\pm 10\%$	2222 336 64...; note 2	on request

Notes

- $l_t = 3.5 \pm 0.3$ mm for pitch = 15 mm.
- Other dimensions for $\pm 10\%$ tolerance values.

Interference suppression film capacitors

MKP 336 6 Y2

 $U_{Rac} = 250 \text{ V (Y2)}$; $U_{Rdc} = 630 \text{ V}$

C (μF)	DIMENSIONS ⁽¹⁾ $b \times h \times l$ (mm)	MASS (g)	CATALOGUE NUMBER	
			LOOSE IN BOX	
			$l_t = 3.5 +1/-0.5 \text{ mm}^{(2)}$	$l_t = 25.0 \pm 2.0 \text{ mm}$
			C-tol = $\pm 20\%$	
			catalogue number	last 5 digits
Pitch = $10.0 \pm 0.4 \text{ mm}$; $d_t = 0.60 \pm 0.06 \text{ mm}$				
0.001	$4.0 \times 10.0 \times 12.5$	0.6	2222 336 60102	.. 66102
0.0015			2222 336 60152	.. 66152
0.0022			2222 336 60222	.. 66222
0.0033	$5.0 \times 11.0 \times 12.5$	0.9	2222 336 60332	.. 66332
0.0047	$6.0 \times 12.0 \times 12.5$	1.0	2222 336 60472	.. 66472
0.0068			2222 336 60682	.. 66682
Pitch = $15.0 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$				
0.0068	$5.0 \times 11.0 \times 17.5$	1.2	2222 336 69005	.. 69009
0.01			2222 336 60103	.. 66103
0.015	$6.0 \times 12.0 \times 17.5$	1.4	2222 336 60153	.. 66153
0.022	$7.0 \times 13.5 \times 17.5$	1.9	2222 336 60223	.. 66223
0.033	$8.5 \times 15.0 \times 17.5$	2.6	2222 336 60333	.. 66333
0.047	$10.0 \times 16.5 \times 17.5$	3.1	2222 336 60473	.. 66473

Notes

- Specified dimensions only valid for $\pm 20\%$ tolerance values.
- $l_t = 3.5 \pm 0.3 \text{ mm}$ for pitch = 15 mm.

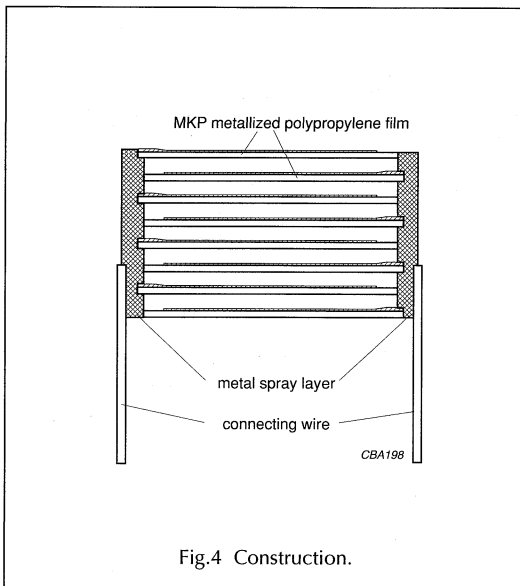
Interference suppression film capacitors

MKP 336 6 Y2

CONSTRUCTION

Description

- Low-inductive wound cell of metallized polypropylene (PP) film, potted with epoxy resin in a flame-retardant 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 tape specifications refer to this handbook, chapter "Packaging information".

SPECIFIC METHOD OF MOUNTING TO WITHSTAND VIBRATION AND SHOCK

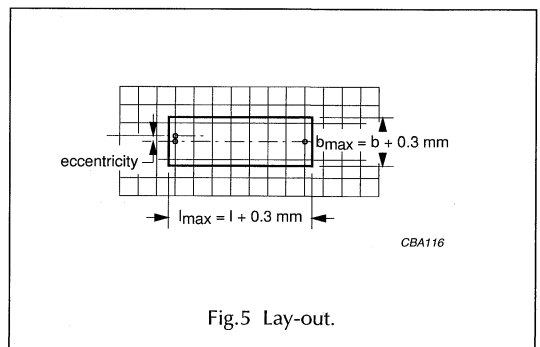
To withstand vibration and shock tests, it must be ensured that the stand-off pips are in good contact with the printed-circuit board:

- 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 Fig.5:

- Eccentricity as in Fig.5. 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 60717" as reference: $h_{\max} \leq h + 0.3 \text{ mm}$.



Storage temperature

- Storage temperature: $T_{\text{stg}} = -25 \text{ to } +40 \text{ }^\circ\text{C}$ with RH maximum 80% without condensation.

RATINGS AND CHARACTERISTICS REFERENCE CONDITIONS

Unless otherwise specified, all electrical values apply at an ambient free air temperature of $23 \pm 1 \text{ }^\circ\text{C}$, an atmospheric pressure of 86 to 106 kPa and a relative humidity of $50 \pm 2\%$.

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

Interference suppression film capacitors

MKP 336 6 Y2

CHARACTERISTICS

Capacitance

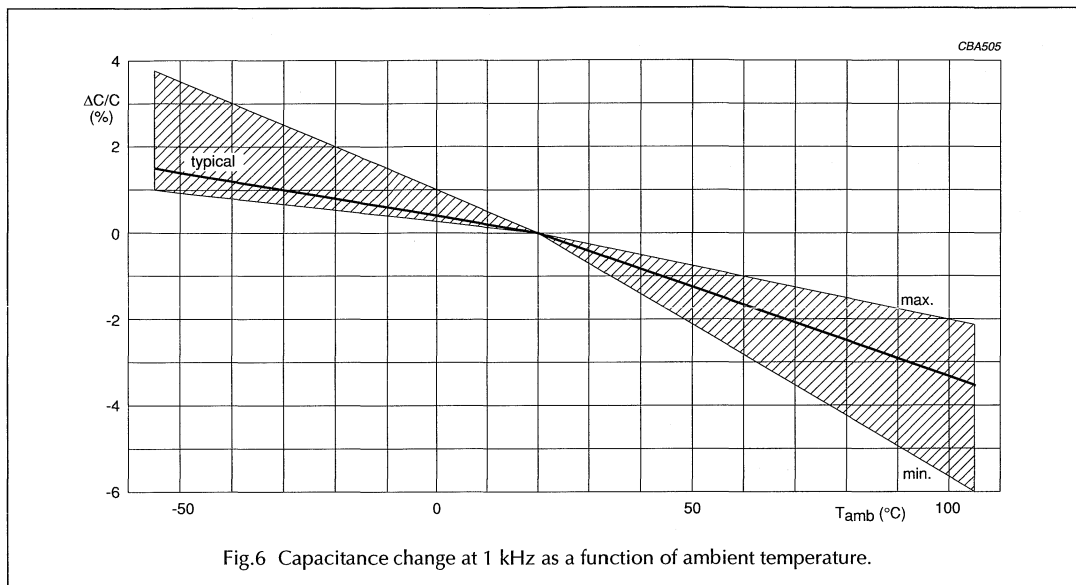


Fig.6 Capacitance change at 1 kHz as a function of ambient temperature.

Tangent of loss angle

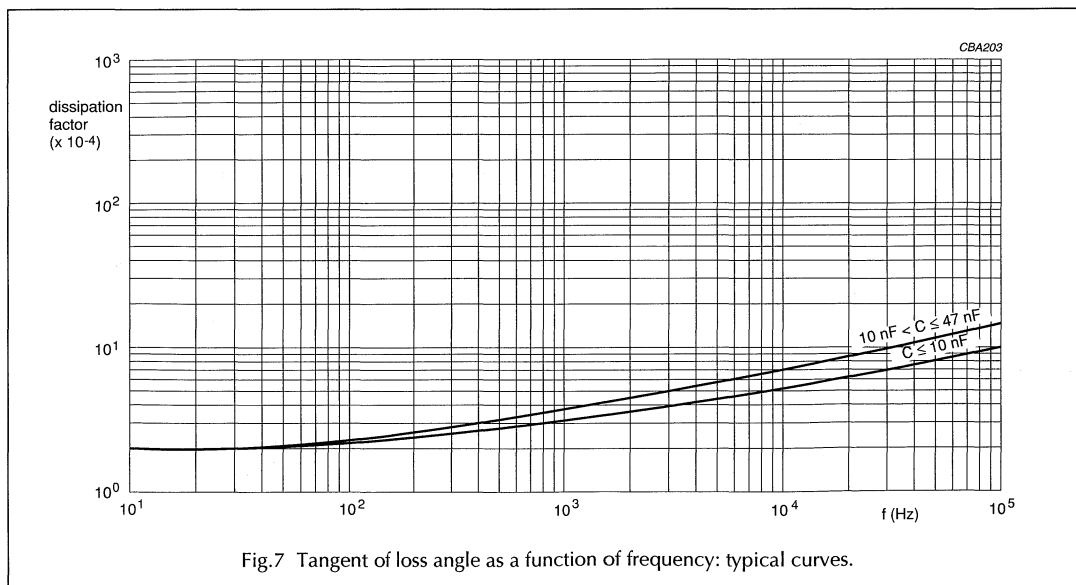
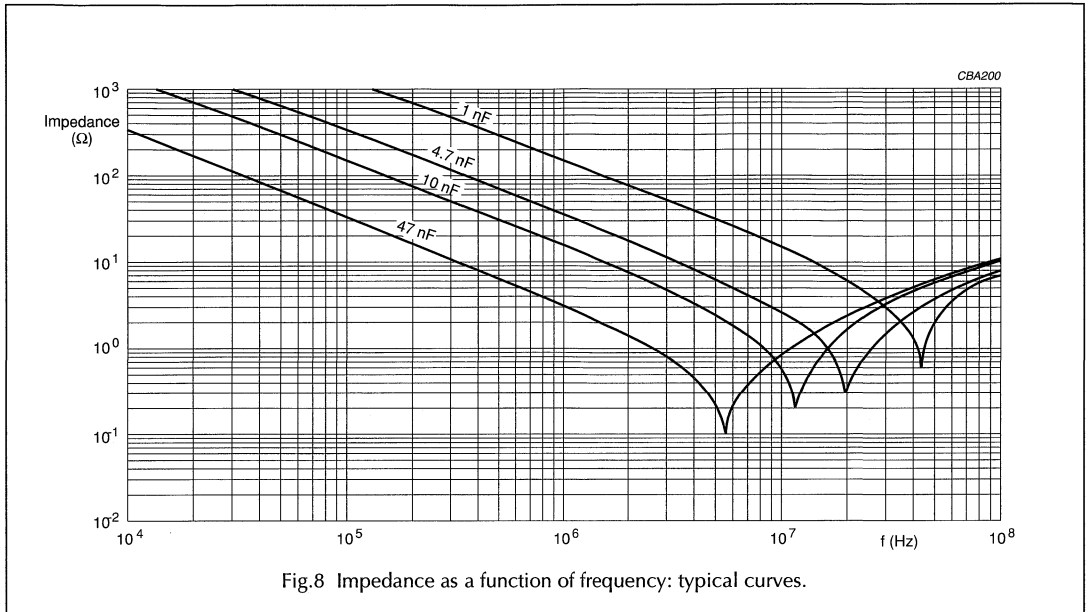


Fig.7 Tangent of loss angle as a function of frequency: typical curves.

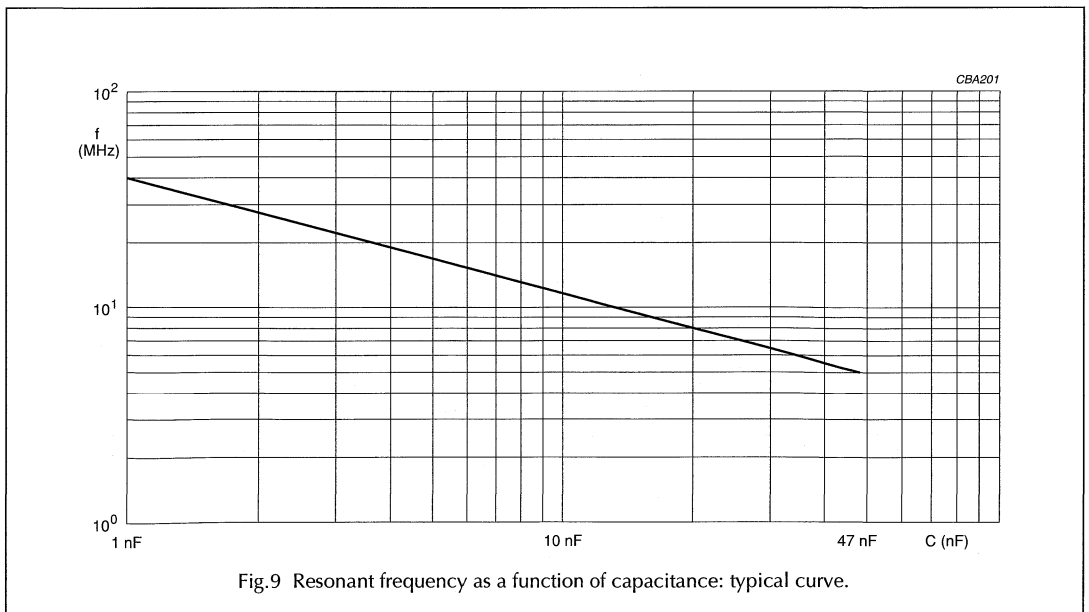
Interference suppression film capacitors

MKP 336 6 Y2

Impedance



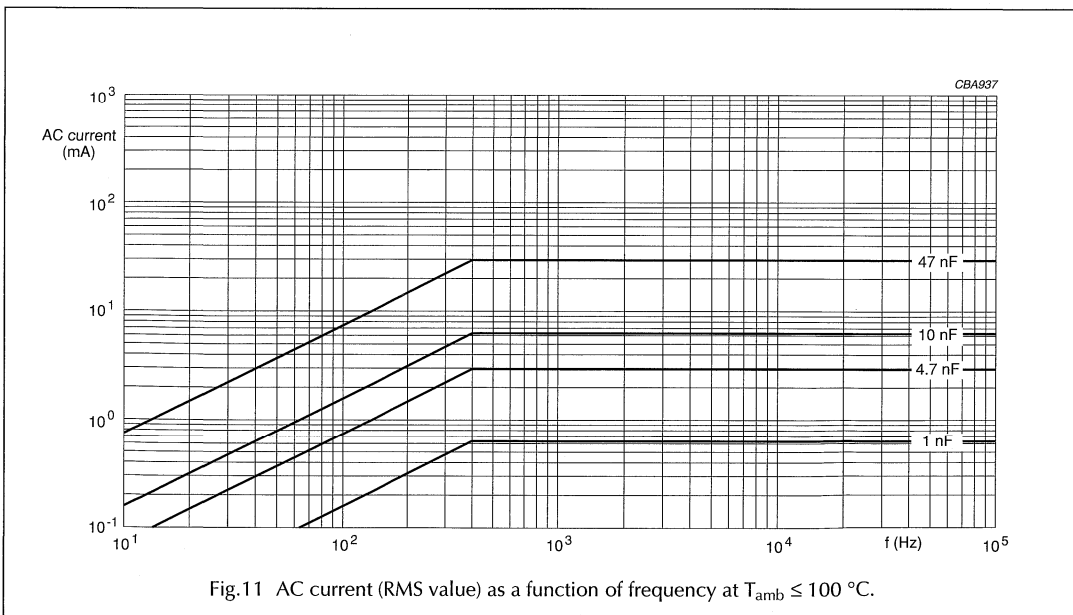
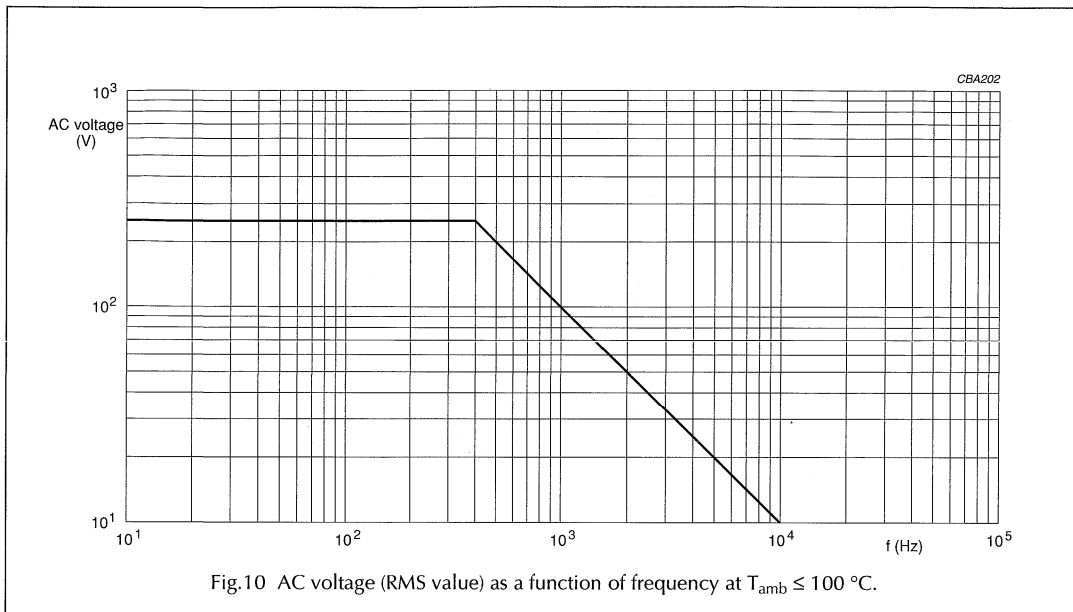
Resonant frequency



Interference suppression film capacitors

MKP 336 6 Y2

Maximum RMS voltage and AC current (sinewave) as a function of frequency for $T_{amb} \leq 100 \text{ }^\circ\text{C}$



Interference suppression film capacitors

MKP 336 6 Y2

Insulation resistance

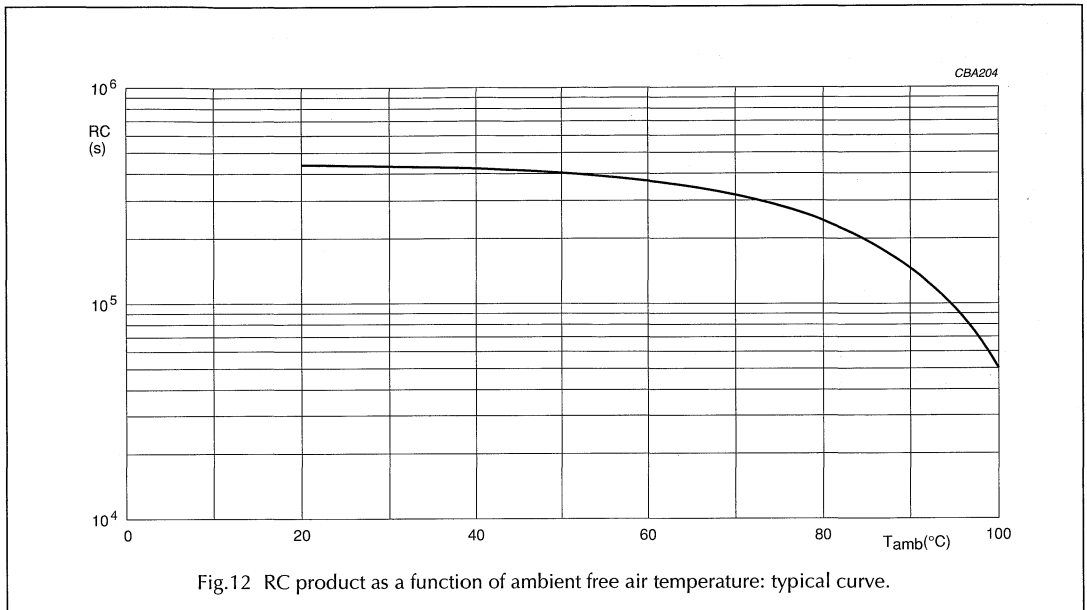


Fig.12 RC product as a function of ambient free air temperature: typical curve.

APPLICATION NOTES

- For Y2 electromagnetic interference suppression between line and earth (50/60 Hz) with maximum mains voltage between line and earth of 250 V (AC) $\pm 10\%$ instability.
- These capacitors are not intended for continuous pulse applications. For these situations, capacitors of the AC and pulse program must be used, such as: 2222 375; 2222 383 or 2222 479
- The maximum ambient temperature must not exceed 100 °C.
- Rated voltage pulse slope:
 - If the pulse voltage is lower than the rated voltage, the values of the specific reference data can be multiplied by 355 V (DC) and divided by the applied voltage.

Interference suppression film capacitors

MKP 336 6 Y2

MARKING

Product marking

The capacitors are marked on the top and the side for pitch = 15 mm (see Fig.14 or 16) or on one side for pitch = 10 mm (see Fig.13 or 15) with the following information:

1. Rated capacitance code in accordance with "IEC 60062"
2. Tolerance on rated capacitance: M = $\pm 20\%$; K = $\pm 10\%$; J = $\pm 5\%$
3. Rated (AC) voltage (250 V~)
4. Sub-class (Y2)
5. Manufacturer's type designation (336 6)
6. Code for dielectric material (MKP) for pitch = 15 mm
7. Manufacturer (BC)
8. Year and week of manufacture (e.g. 0133).

NEW MARKING (INTRODUCED DURING 2001)

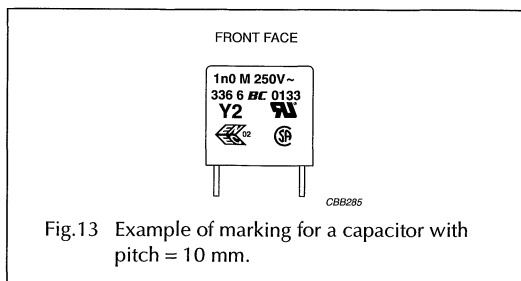


Fig.13 Example of marking for a capacitor with pitch = 10 mm.

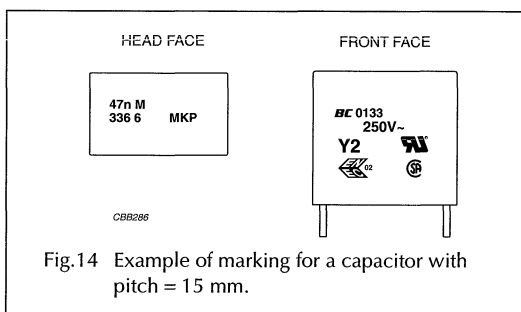


Fig.14 Example of marking for a capacitor with pitch = 15 mm.

PRESENT MARKING

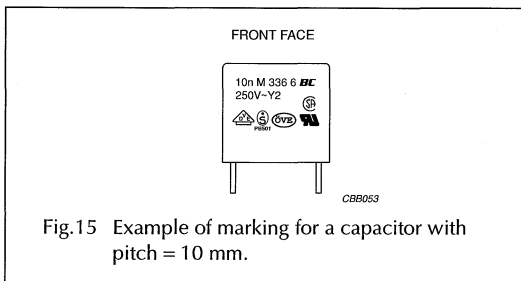


Fig.15 Example of marking for a capacitor with pitch = 10 mm.

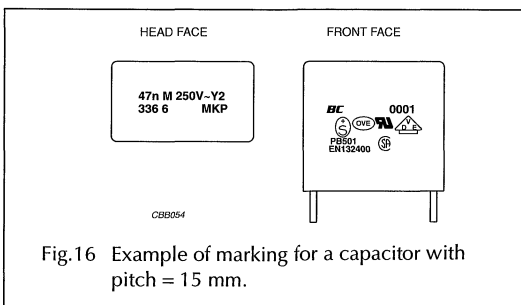


Fig.16 Example of marking for a capacitor with pitch = 15 mm.

Interference suppression film capacitors

MKP 336 6 Y2

QUICK REFERENCE TEST REQUIREMENTS

TEST	PROCEDURE (quick reference)	REQUIREMENTS
Robustness of leads		
Tensile strength: "IEC 60068-2-21"	load 10 N; 10 s	no visible damage legible marking
Bending: "IEC 60068-2-21"	load 5 N; $4 \times 90^\circ$	$ \Delta C/C \leq 5\%$
Component solvent resistance	isopropyl alcohol; 23 °C; 5 minutes	$\Delta \tan \delta \leq 80 \times 10^{-4}$
Robustness of component		
Rapid change of temperature: "IEC 60068-2-14"	5 cycles 1 cycle = 30 minutes at -55 °C and 30 minutes at 100 °C	$ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 80 \times 10^{-4}$
Vibration: "IEC 60068-2-6"	10 to 55 Hz; amplitude 0.75 mm; 6 hours	
Shock: "IEC 60068-2-27"	half sinewave; 490 m/s ² ; 11 ms	
Climatic sequence		
Dry heat: "IEC 60068-2-2"	16 hours; 100 °C	$ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 80 \times 10^{-4}$ $R_{ins} \geq 50\%$ of specified value
Damp heat, cyclic, test Db, first cycle: "IEC 60068-2-30"		
Cold: "IEC 60068-2-1"	2 hours; -55 °C	
Damp heat, cyclic, test Db, remaining cycles: "IEC 60068-2-30"		
Voltage proof: "IEC 60384-14"	$V_p = 2250$ V (DC); 1 minute	
Other applicable tests		
Damp heat, steady state: "IEC 60068-2-3"	21 days; 40 °C; 90 to 95% RH no load $V_p = 2250$ V (DC); 1 minute	$ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 70 \times 10^{-4}$ $R_{ins} \geq 50\%$ of specified value
Endurance (AC): "IEC 60384-14"	3×5 kV pulse voltage; 1000 hours; $1.7 \times U_{Rac}$ at 100 °C; once per hour; 0.1 s; 1000 V (RMS) via resistor of 47 Ω ; $V_p = 2250$ V (DC); 1 minute	$ \Delta C/C \leq 10\%$ $\Delta \tan \delta \leq 80 \times 10^{-4}$ $R_{ins} \geq 50\%$ of specified value
Charge and discharge: "IEC 60384-14"	10000 cycles; 5 ms; $1.5 \times dV/dt$	$ \Delta C/C \leq 10\%$ $\Delta \tan \delta \leq 80 \times 10^{-4}$ $R_{ins} \geq 50\%$ of specified value
Passive flammability: "IEC 60384-14"	class B	no burning

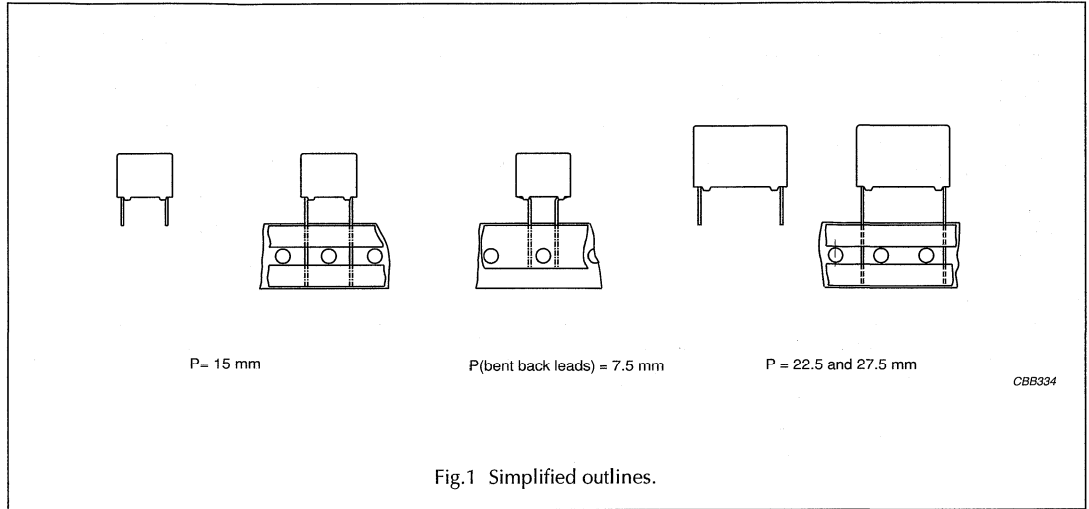
Interference suppression film capacitors**MKP 336 6 Y2**

TEST	PROCEDURE (quick reference)	REQUIREMENTS
Active flammability: <i>"IEC 60384-14"</i>	20 × 5 kV discharge	no burning
Heat storage: <i>"IEC 60384-14"</i>	1000 hours; 100 °C	$\Delta C/C$ ≤ 5% $\Delta \tan \delta \leq 80 \times 10^{-4}$
Resistance to soldering heat with preheating: <i>"IEC 60384-14"</i>	preheating: 100 °C; solder bath: 260 °C; 10 s	$\Delta C/C$ ≤ 5% $\Delta \tan \delta \leq 80 \times 10^{-4}$
Active flammability test	voltage proof up to 2 × peak impulse voltage of 4.13 or until breakdown (100 V/sec, current limited 2mA) failed capacitors connected to a 250 V (AC) power supply during 5 minutes.	no burning

Interference suppression film capacitors MKP 338 1 X1

MKP RADIAL POTTED TYPE

PITCH 15/22.5/27.5 mm
PITCH 7.5 mm (bent back leads)



FEATURES

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

APPLICATIONS

- For X1 electromagnetic interference suppression
- Specially designed to meet the requirements of the "IEC 60384-14 2nd edition and EN 132400", requiring a 4 kV peak pulse voltage test UL1414 and CSA-C22.2 No. 1 specifications.

DETAIL SPECIFICATION

For more detailed data and test requirements see "Type detail specification HQN-384-14/119".




QUICK REFERENCE DATA

DESCRIPTION	VALUE
Capacitance range (E12 series)	0.01 to 1 µF
Capacitance tolerance	±20%; ±10%; ±5%
Rated (AC) voltage, 50 to 60 Hz	440 V
Rated (DC) voltage	1 000 V
Climatic category	55/105/56/B
Rated temperature	105 °C
Maximum application temperature	105 °C
Reference specifications	IEC 60384-14 2 nd edition and EN 132400
Safety approvals:	
250 V	UL1414
440 V	UL1283; note 1
440 V	FI
Materials	qualified in accordance with UL94V-O
Safety class	X1; across the line

Note

1. Pending.

Interference suppression film capacitors**MKP 338 1 X1****SAFETY APPROVALS AND SAFETY TEST REPORT****Approvals**


SAFETY APPROVALS (X1)		VOLTAGE	VALUE	FILE NUMBERS
	UL1414	250 V (AC)	10 nF to 1 µF	E112471
	UL1283 and CSA 22.2.8	440 V (AC)	10 nF to 1 µF	pending
	EN132400	440 V (AC)	10 nF to 1 µF	ENEC/B04/2001

Safety test report

SAFETY TEST REPORT	VOLTAGE	VALUE	FILE NUMBERS
CB TEST CERTIFICATE	440 V (AC)	10 nF to 1 µF: 55/105/56/B	FI 1653

The EneC-approval together with the CB-Certificate replace all national approval marks of the following countries (they have already signed the ENEC-Agreement): Austria; Belgium; Czech. Republic; Denmark; Finland; France; Germany; Greece; Hungary; Ireland; Italy; Luxembourg; Netherlands; Norway; Portugal; Slovenian; Spain; Sweden; Switzerland and United Kingdom.

Safety approvals to be replaced by ENEC during 2001

SAFETY APPROVALS (X1)	VOLTAGE	VALUE	FILE NUMBERS
	FI (EN132400)	440 V (AC)	10 nF to 1 µF
			FI 15350

Interference suppression film capacitors

MKP 338 1 X1

COMPOSITION OF CATALOGUE NUMBER

TYPE AND PITCHES	
338 1	7.5 mm (bent back)
X1	15.0 mm
	22.5 mm
	27.5 mm

CAPACITANCE
(numerically)

MULTIPLIER (nF)	
0.1	2
1	3
10	4
100	5

Example:
104 = 10 x 10 = 100 nF

2222 338 1. XX X

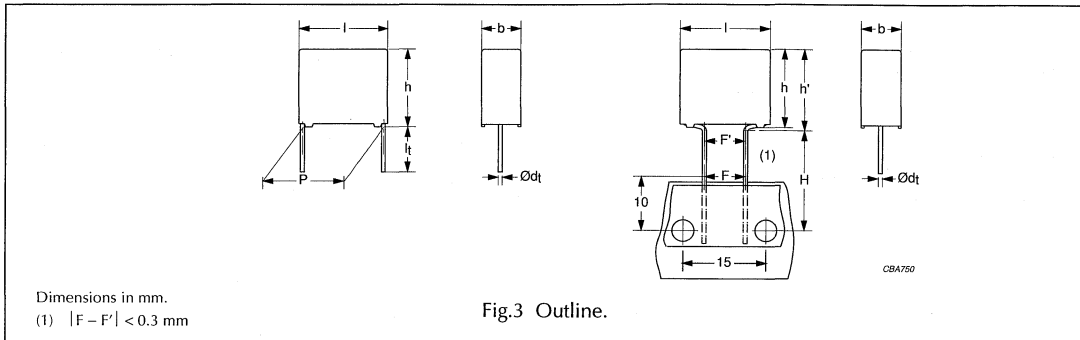
TYPE	PACKAGING	STANDARD DIMENSIONS	C-TOL	PREFERRED TYPES
338 1 X1	loose in box	lead length 3.5 mm	±20%	10
		lead length 5.0 mm		12
		lead length 25.0 mm		14
	taped on reel	bent back to 7.5 mm		16
		ALTERNATIVE TAPED VERSIONS		ON REQUEST
338 1 X1	taped on reel		±20%	17
		ALTERNATIVE C-TOL		ON REQUEST
338 1 X1	loose in box	lead length 3.5 mm	±10%	1....
			±5%	1....
		lead length 5.0 mm	±10%	1....
			±5%	1....
	taped on reel	lead length 25.0 mm	±10%	1....
			±5%	1....
		bent back to 7.5 mm	±10%	1....
			±5%	1....

Interference suppression film capacitors

MKP 338 1 X1

MKP 338 1 GENERAL DATA

PITCH 15/22.5/27.5 mm and pitch 7.5 mm (bent back leads)



Specific reference data for the 440 V AC (X1) capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle: C ≤ 470 nF C > 470 nF	≤10 × 10 ⁻⁴ ≤20 × 10 ⁻⁴	≤20 × 10 ⁻⁴ ≤70 × 10 ⁻⁴	≤100 × 10 ⁻⁴ -
Rated voltage pulse slope (dU/dt)R at 615 V: P = 15.0 mm P = 22.5 mm P = 27.5 mm	250 V/μs 150 V/μs 100 V/μs		
R between leads, for C ≤ 0.33 μF at 100 V; 1 minute	>15000 MΩ		
RC between leads, for C > 0.33 μF at 100 V; 1 minute	>5000 s		
R between leads and case; 100 V; 1 minute	>30000 MΩ		
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	3400 V; 1 minute		
Withstanding (AC) voltage between leads and case	2380 V; 1 minute		

Available 440 V AC (X1) versions

PACKAGING ⁽¹⁾	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	l _t = 3.5 ±0.3 mm	±20%	2222 338 10...	preferred
		±10%	2222 338 1....; note 2	on request
		±5%	2222 338 1....; note 2	on request
	l _t = 5.0 ±1.0 mm	±20%	2222 338 12...	preferred
		±10%	2222 338 1....; note 2	on request
		±5%	2222 338 1....; note 2	on request
l _t = 25.0 ±2.0 mm	±20%	2222 338 14...	preferred	
	±10%	2222 338 1....; note 2	on request	
	±5%	2222 338 1....; note 2	on request	
Taped on reel; bent back	H = 16.0 mm; for P ₀ = 15.0 mm	±20%	2222 338 16...	preferred
		±10%	2222 338 1....; note 2	on request
		±5%	2222 338 1....; note 2	on request
Taped on reel	H = 18.5 mm; for P ₀ = 12.7 mm	±20%	2222 338 17...	on request
		±10%	2222 338 1....; note 2	on request
		±5%	2222 338 1....; note 2	on request

Notes

1. Taped on reel pitch = 27.5 mm is not available.
2. Other dimensions for ±10 and ±5% tolerance values.

Interference suppression film capacitors

MKP 338 1 X1

 $U_{Rac} = 440 \text{ V (X1)}$; $U_{Rdc} = 1000 \text{ V}$

C (μF)	DIMENSIONS ⁽¹⁾ $b \times h \times l$ (mm)	MASS (g)	CATALOGUE NUMBER				
			LOOSE IN BOX			REEL DIAMETER 500 mm	
			short leads		long leads		H = 16.0 mm; P ₀ = 15.0 mm
			$l_t = 3.5 \pm 0.3 \text{ mm}$	$l_t = 5.0 \pm 1.0 \text{ mm}$	$l_t = 25.0 \pm 2.0 \text{ mm}$		
			C-tol = $\pm 20\%$				C-tol = $\pm 20\%$
catalogue number		last 5 digits			last 5 digits		
Pitch = 15.0 \pm 0.4 mm; $d_t = 0.60 \pm 0.06 \text{ mm}$						pitch = 7.5 mm (bent back)	
0.01	5.0 \times 11.0 (13.0) \times 17.5	1.2	2222 338 10103	.. 12103	.. 14103	.. 16103	
0.015			2222 338 10153	.. 12153	.. 14153	.. 16153	
0.022			2222 338 10223	.. 12223	.. 14223	.. 16223	
0.033	6.0 \times 12.0 (14.0) \times 17.5	1.4	2222 338 10333	.. 12333	.. 14333	.. 16333	
Pitch = 15.0 \pm 0.4 mm; $d_t = 0.80 \pm 0.08 \text{ mm}$						pitch = 7.5 mm (bent back)	
0.047	7.0 \times 13.5 (15.5) \times 17.5	1.9	2222 338 10473	.. 12473	.. 14473	.. 16473	
0.068	8.5 \times 15.0 (17.0) \times 17.5	2.6	2222 338 10683	.. 12683	.. 14683	.. 16683	
0.1	10.0 \times 16.5 (18.5) \times 17.5	3.1	2222 338 10104	.. 12104	.. 14104	.. 16104	
Pitch = 22.5 \pm 0.4 mm; $d_t = 0.80 \pm 0.08 \text{ mm}$						pitch = 7.5 mm (bent back)	
0.15	8.5 \times 18.0 \times 26.0	4.4	2222 338 10154	.. 12154	.. 14154	not available	
0.22	10.0 \times 19.5 \times 26.0	5.5	2222 338 10224	.. 12224	.. 14224		
Pitch = 27.5 \pm 0.4 mm; $d_t = 0.80 \pm 0.08 \text{ mm}$						pitch = 7.5 mm (bent back)	
0.33	13.0 \times 23.0 \times 31.0	10.4	2222 338 10334	.. 12334	.. 14334	not available	
0.47	15.0 \times 25.0 \times 31.0	12.8	2222 338 10474	.. 12474	.. 14474		
0.68	18.0 \times 28.0 \times 31.0	17.2	2222 338 10684	.. 12684	.. 14684		
1	21.0 \times 31.0 \times 31.0	20.4	2222 338 10105	.. 12105	.. 14105		

Note

1. Dimensions in brackets for bent back leads.

Interference suppression film capacitors

MKP 338 1 X1

CONSTRUCTION

Description

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

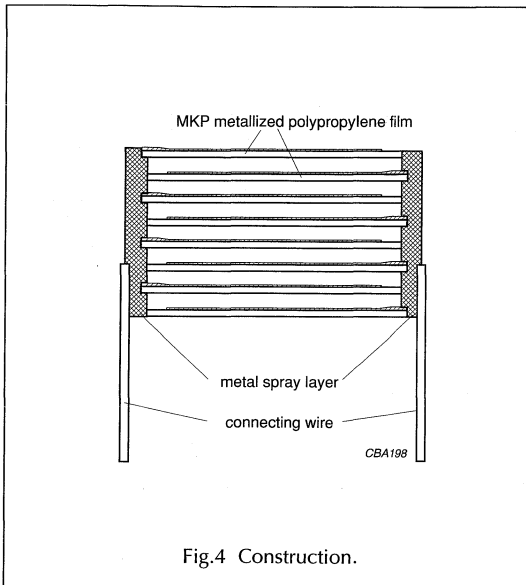


Fig.4 Construction.

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 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 Fig.5:

- Eccentricity as in Fig.5. 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 60717" as reference: $h_{\max} \leq h + 0.3$ mm.

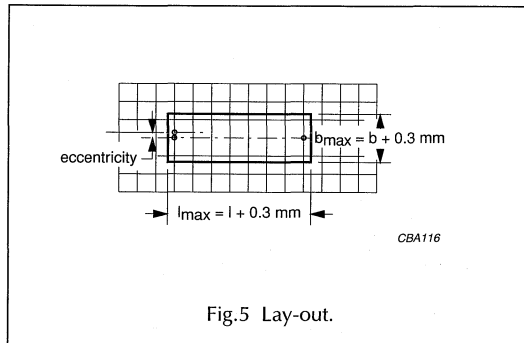


Fig.5 Lay-out.

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 tape specifications refer to this handbook, chapter "Packaging information".

Storage temperature

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

RATINGS AND CHARACTERISTICS REFERENCE CONDITIONS

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 $50 \pm 2\%$.

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

Interference suppression film capacitors

MKP 338 1 X1

CHARACTERISTICS

Capacitance

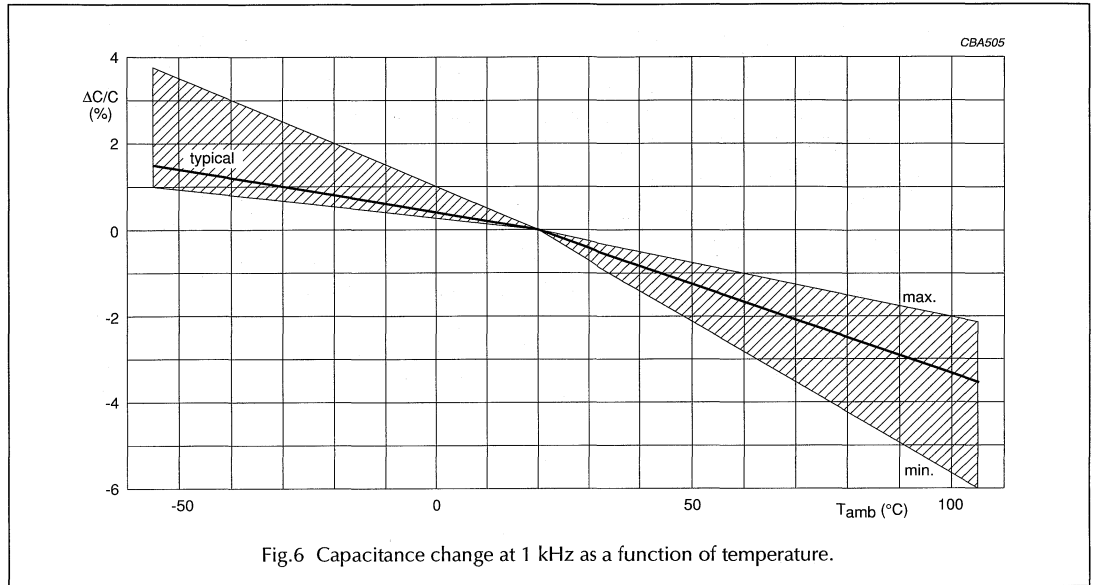


Fig.6 Capacitance change at 1 kHz as a function of temperature.

Tangent of loss angle

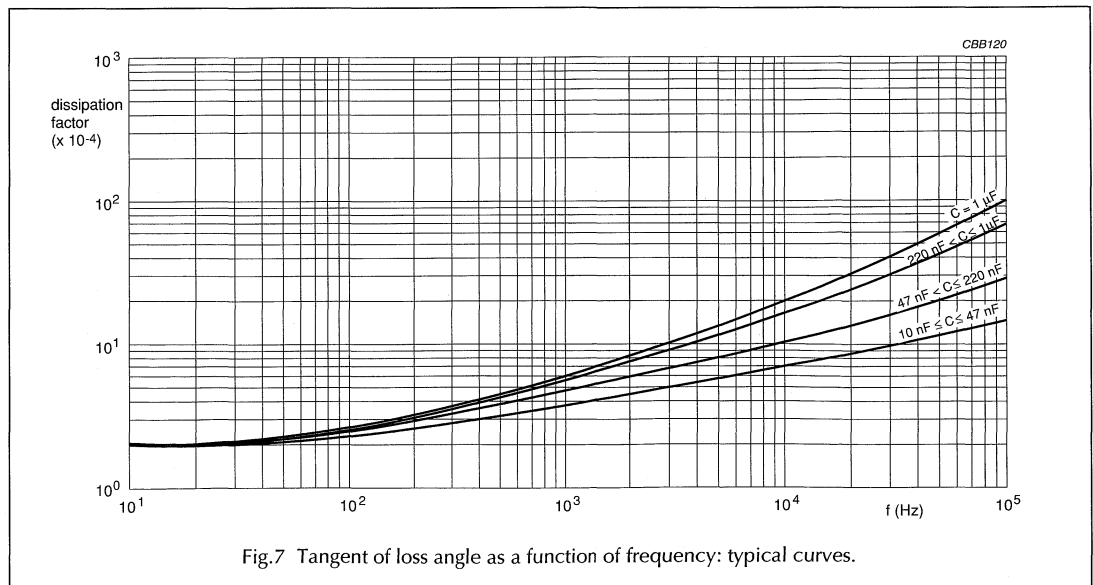


Fig.7 Tangent of loss angle as a function of frequency: typical curves.

Interference suppression film capacitors

MKP 338 1 X1

Impedance

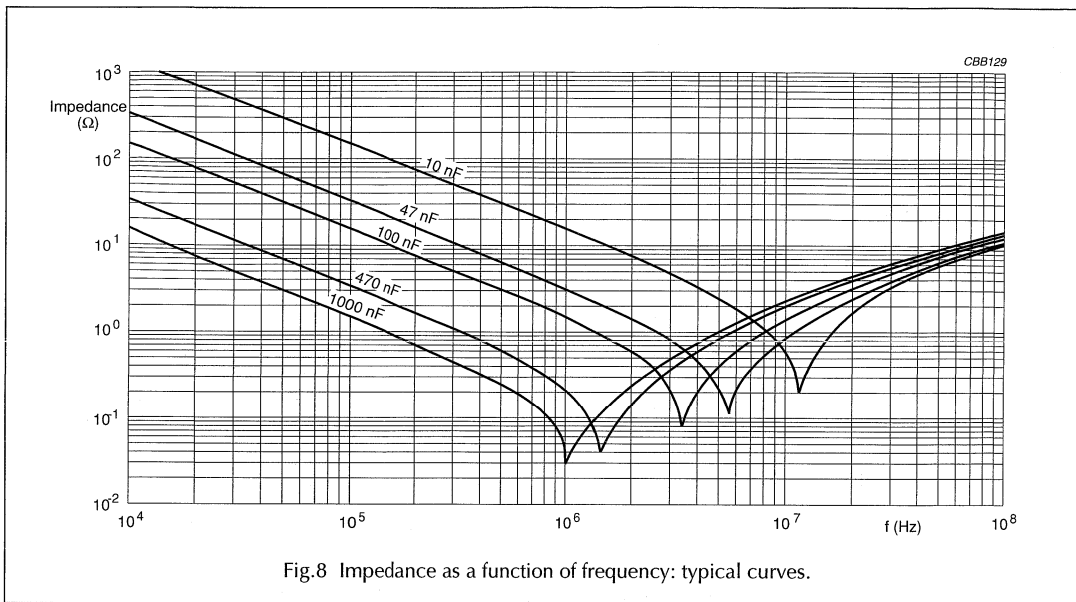


Fig.8 Impedance as a function of frequency: typical curves.

Resonant frequency

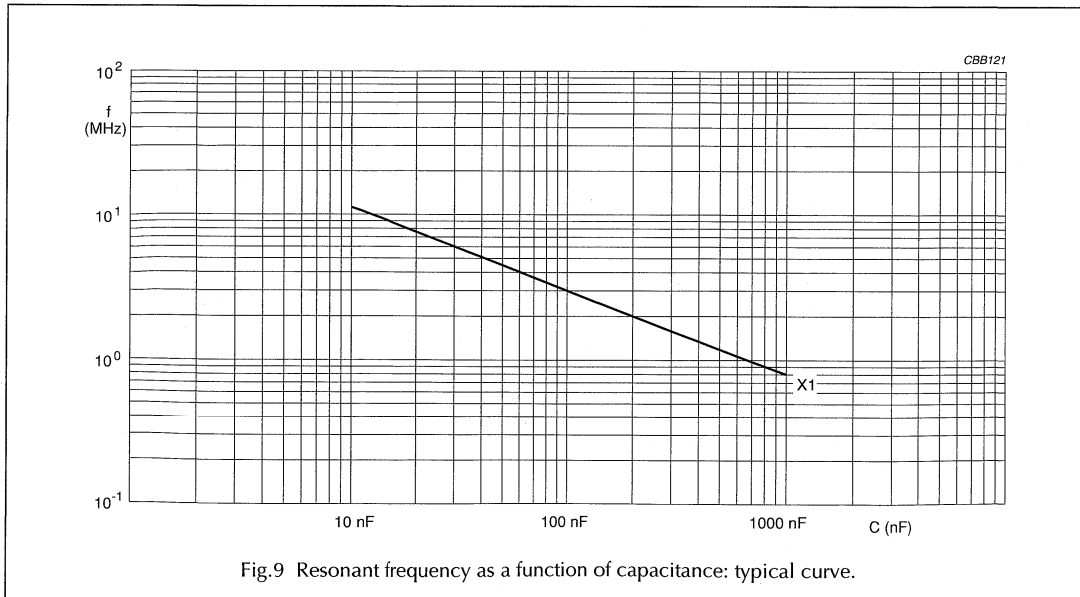
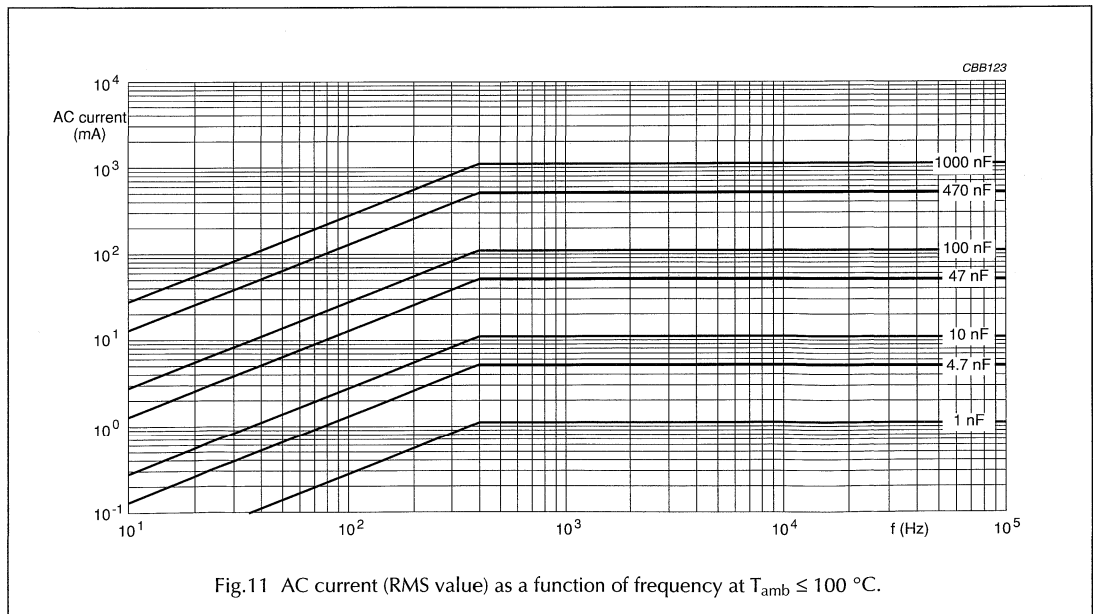
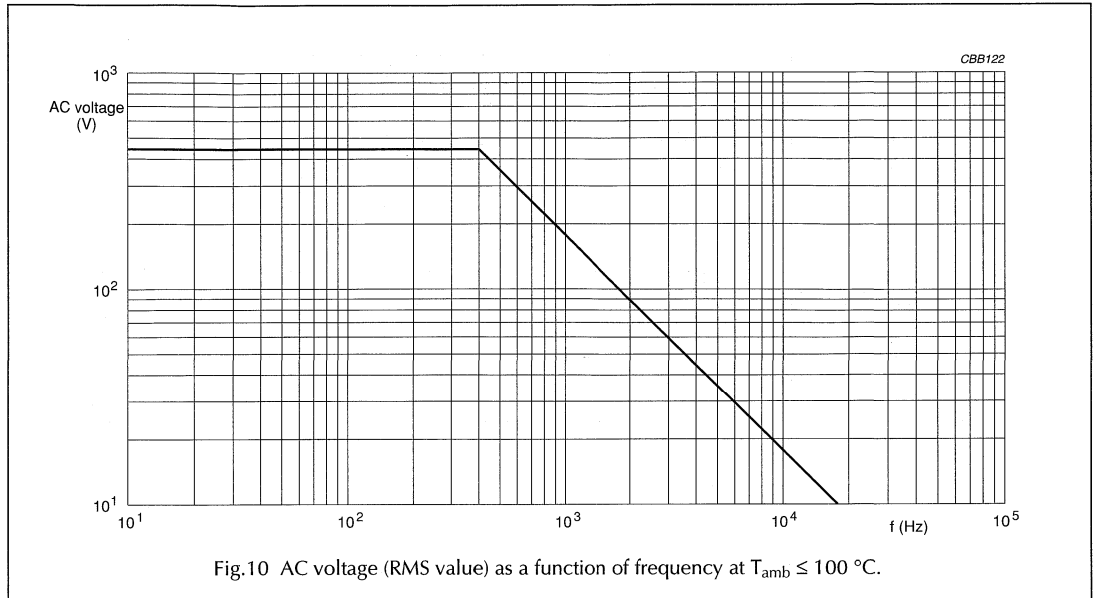


Fig.9 Resonant frequency as a function of capacitance: typical curve.

Interference suppression film capacitors

MKP 338 1 X1

Maximum RMS voltage and AC current (sinewave) as a function of frequency for $T_{amb} \leq 100\text{ }^{\circ}\text{C}$



Interference suppression film capacitors

MKP 338 1 X1

Insulation resistance

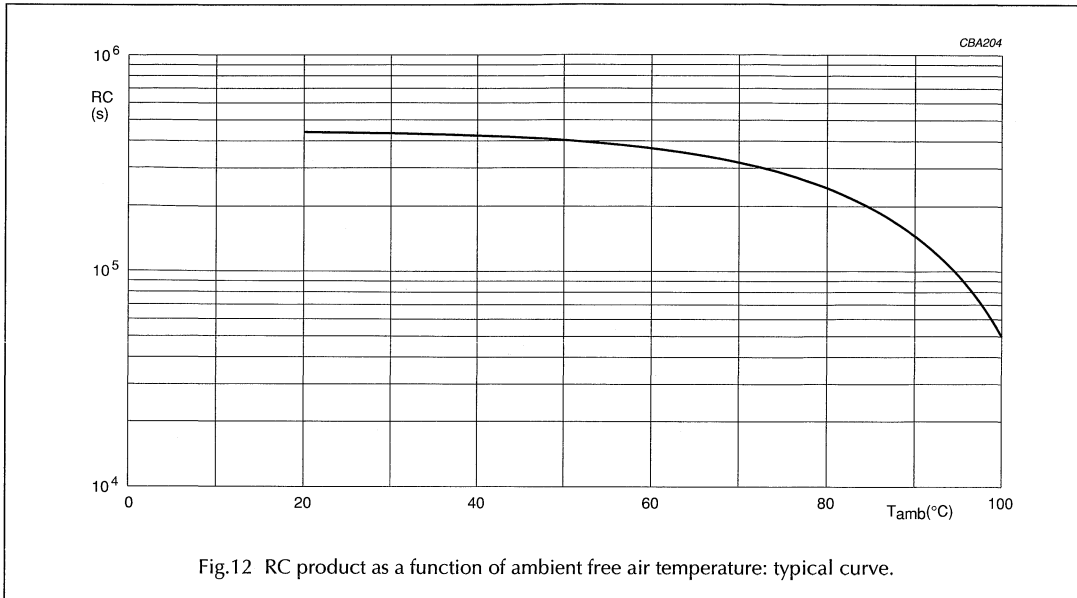


Fig.12 RC product as a function of ambient free air temperature: typical curve.

APPLICATION NOTES

- For X1 electromagnetic interference suppression in across the line applications (50/60 Hz) with a maximum mains voltage of 440 V (AC) $\pm 10\%$ instability.
- These capacitors are not intended for continuous pulse applications. For these situations, capacitors of the AC and pulse program must be used, such as: 2222 375; 2222 383 or 2222 479
- The maximum ambient temperature must not exceed 105 °C.
- Rated voltage pulse slope:
 - If the pulse voltage is lower than the rated voltage, the values of the specific reference data can be multiplied by 615 V (DC) and divided by the applied voltage.

Interference suppression film capacitors

MKP 338 1 X1

MARKING

Product marking

The capacitors are marked on the top for pitch ≥ 22.5 mm (see Fig.14 or 16), or on the top and one side for pitch = 15 mm (see Fig.13 or 14) with the following information:

1. Rated capacitance code in accordance with "IEC 60062"
2. Tolerance on rated capacitance; M = $\pm 20\%$; K = $\pm 10\%$; J = $\pm 5\%$
3. Rated (AC) voltage (440 V)
4. Sub-class (e.g. X1)
5. Manufacturer's type designation (e.g. 338 1)
6. Code for dielectric material (MKP)
7. Manufacturer (BC)
8. Year and week of manufacture (e.g. 0133).

NEW MARKING (INTRODUCED DURING 2001)

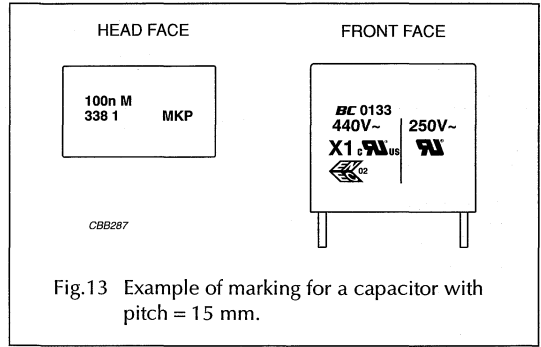


Fig.13 Example of marking for a capacitor with pitch = 15 mm.

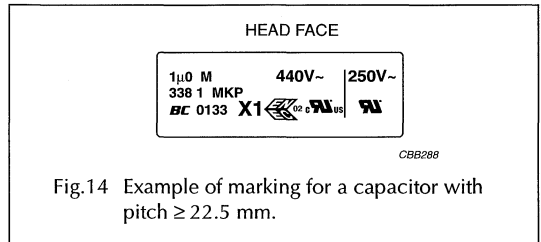


Fig.14 Example of marking for a capacitor with pitch ≥ 22.5 mm.

PRESENT MARKING

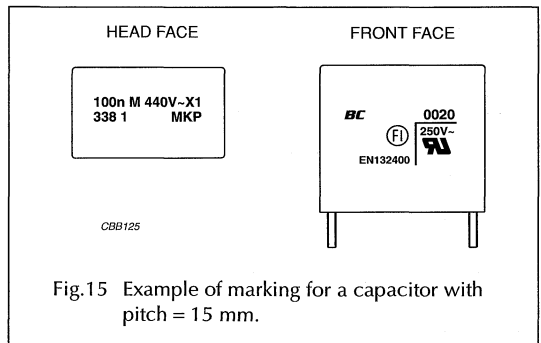


Fig.15 Example of marking for a capacitor with pitch = 15 mm.

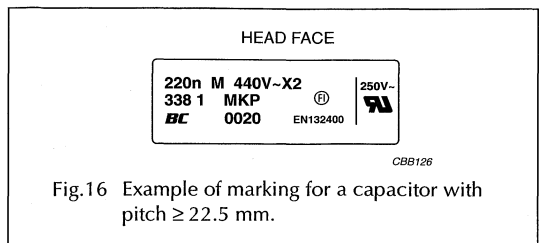


Fig.16 Example of marking for a capacitor with pitch ≥ 22.5 mm.

Interference suppression film capacitors

MKP 338 1 X1

QUICK REFERENCE TEST REQUIREMENTS

TEST	PROCEDURE (quick reference)	REQUIREMENTS
Robustness of leads		
Tensile strength: "IEC 60068-2-21"	load 10 N; 10 s	no visible damage legible marking $ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 80 \times 10^{-4}$ at 10 kHz
Bending: "IEC 60068-2-21"	load 5 N; 4 × 90 °	
Resistance to soldering heat: "IEC 60068-2-20"	solder bath: 260 °C; 10 s solder bath: 350 °C; 3.5 s	
Component solvent resistance	isopropyl alcohol; 23 °C; 5 minutes	
Robustness of component		
Rapid change of temperature: "IEC 60068-2-14"	5 cycles 1 cycle = 30 minutes at -55 °C and 30 minutes at 100 °C	$ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 80 \times 10^{-4}$ at 10 kHz
Vibration: "IEC 60068-2-6"	10 to 55 Hz; amplitude 0.75 mm; 6 hours	
Shock: "IEC 60068-2-27"	half sinewave; 490 m/s ² ; 11 ms	
Climatic sequence		
Dry heat: "IEC 60068-2-2"	16 hours; 100 °C	$ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 80 \times 10^{-4}$ at 10 kHz $R_{ins} \geq 50\%$ of specified value
Damp heat, cyclic, test Db, first cycle: "IEC 60068-2-30"		
Cold: "IEC 60068-2-1"	2 hours; -55 °C	
Damp heat, cyclic, test Db, remaining cycles: "IEC 60068-2-30"		
Voltage proof: "IEC 60384-14"	$V_p = 1200$ V (DC); 1 minute	
Other applicable tests		
Damp heat, steady state: "IEC 60068-2-3"	21 days; 40 °C; 90 to 95% RH no load $V_p = 1200$ V (DC); 1 minute	$ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 70 \times 10^{-4}$ $R_{ins} \geq 50\%$ of specified value
Endurance (AC): "IEC 60384-14"	3 × 4.0 kV pulse voltage 1 000 hours; 1.25 × U_{RAC} at 100 °C; once per hour; 0.1 s; 1 000 V (RMS) via resistor of 47 Ω; $V_p = 1200$ V (DC); 1 minute	$ \Delta C/C \leq 10\%$ $\Delta \tan \delta \leq 80 \times 10^{-4}$ at 10 kHz $R_{ins} \geq 50\%$ of specified value

Interference suppression film capacitors**MKP 338 1 X1**

TEST	PROCEDURE (quick reference)	REQUIREMENTS
Charge and discharge: "IEC 60384-14"	10000 cycles; 5 ms; 1.5 × dV/dt	$ \Delta C/C \leq 10\%$ $\Delta \tan \delta \leq 80 \times 10^{-4}$ at 10 kHz $R_{ins} \geq 50\%$ of specified value
Passive flammability: "IEC 60384-14"	class B	no burning
Active flammability: "IEC 60384-14"	20 × 4 kV discharge	no burning
Heat storage: "IEC 60384-14"	1000 hours; 100 °C	$ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 80 \times 10^{-4}$ at 10 kHz
Resistance to soldering heat with preheating: "IEC 60384-14"	preheating: 100 °C; solder bath: 260 °C; 10 s	$ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 80 \times 10^{-4}$ at 10 kHz
Active flammability test	voltage proof up to 2 × peak impulse voltage of 4.13 or until breakdown (100 V/sec, current limited 2mA) failed capacitors connected to a 250 V (AC) power supply during 5 minutes	no burning

Interference suppression film capacitors MKP 336 1 X1

MKP RADIAL POTTED TYPE

PITCH 10/15/22.5/27.5 mm

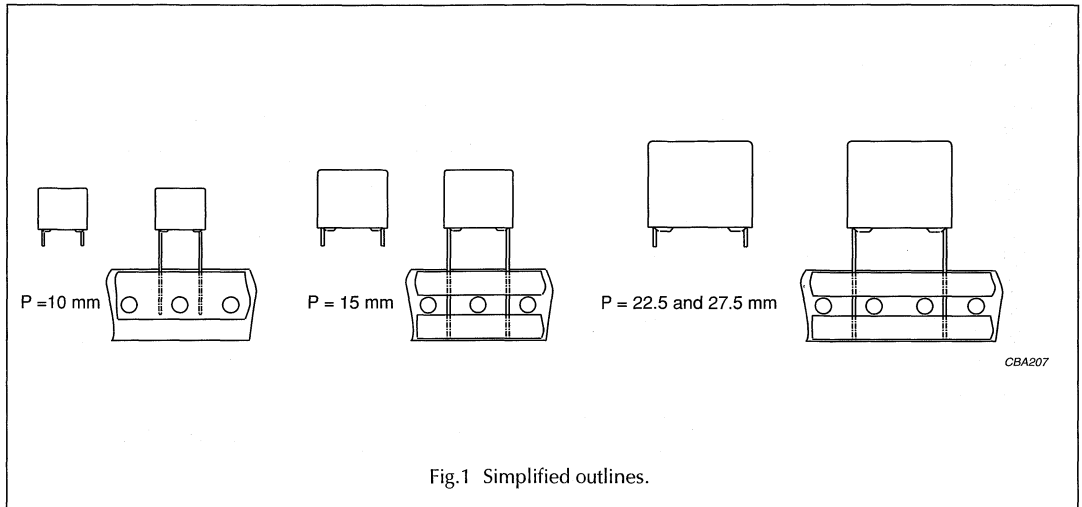


Fig.1 Simplified outlines.

FEATURES

- 10 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-retardant case.

APPLICATIONS

- For X1 electromagnetic interference suppression
- Specially designed to meet the requirements of the "IEC 60384-14 2nd edition and EN 132400", requiring a 4 kV peak pulse voltage test UL1414 and CSA-C22.2 No. 1 specifications.





DETAIL SPECIFICATION

For more detailed data and test requirements see "Type detail specification HQN-384-14/108".

QUICK REFERENCE DATA

DESCRIPTION	VALUE
Capacitance range (E12 series)	0.001 to 1 μ F
Capacitance tolerance	$\pm 20\%$; $\pm 10\%$; $\pm 5\%$
Rated (AC) voltage, 50 to 60 Hz	275 V
Rated (DC) voltage	630 V
Climatic category	55/100/21/B
Rated temperature	100 °C
Maximum application temperature	100 °C
Reference specifications	IEC 60384-14 2 nd edition and EN 132400
Safety approvals:	
250 V	UL1414; CSA-C22.2 No 1
275 V	UL1283
275 V	SEV; VDE; FI; N; D; S; IMQ; ÖVE
Materials	qualified in accordance with UL94V-O
Safety class	X1; across the line

Interference suppression film capacitors**MKP 336 1 X1****SAFETY APPROVALS AND SAFETY TEST REPORT****Approvals**









SAFETY APPROVALS (X1)		VOLTAGE	VALUE	FILE NUMBERS
	UL1414	250 V (AC)	1 nF to 1 µF	E 112471
	UL1283	275 V (AC)	1 nF to 1 µF	E 109565
	CSA-C22.2 No.1	250 V (AC)	1 nF to 1 µF	1104860 (LR 94054-6)
	EN132400	275 V (AC)	1 nF to 1 µF	ENEC/B01/2001

Safety test report

SAFETY TEST REPORT	VOLTAGE	VALUE	FILE NUMBERS
CB TEST CERTIFICATE	275 V (AC)	1 nF to 1 µF: 55/100/21/B	DE-1-7482

The EneC-approval together with the CB-Certificate replace all national approval marks of the following countries (they have already signed the ENEC-Agreement): Austria; Belgium; Czech. Republic; Denmark; Finland; France; Germany; Greece; Hungary; Ireland; Italy; Luxembourg; Netherlands; Norway, Portugal; Slovenian; Spain; Sweden; Switzerland and United Kingdom.

Safety approvals to be replaced by ENEC during 2001

SAFETY APPROVALS (X1)		VOLTAGE	VALUE	FILE NUMBERS
	SEV (EN132400)	275 V (AC)	1 nF to 1 µF	99,6 60107,01
	VDE (EN132400)	275 V (AC)	1 nF to 1 µF	83619
	FI (EN132400)	275 V (AC)	1 nF to 1 µF	178882
	NEMKO (EN132400)	275 V (AC)	1 nF to 1 µF	P99102660
	DEMKO (EN132400)	275 V (AC)	1 nF to 1 µF	99-06011
	SEMKO (EN132400)	275 V (AC)	1 nF to 1 µF	9447024
	IMQ (EN132400)	275 V (AC)	1 nF to 1 µF	V 3731
	ÖVE (EN132400)	275 V (AC)	1 nF to 1 µF	E 260-001

Interference suppression film capacitors

MKP 336 1 X1

COMPOSITION OF CATALOGUE NUMBER

TYPE AND PITCHES	
336 1	10.0 mm
	15.0 mm
X1	22.5 mm
	27.5 mm

CAPACITANCE
(numerically)

MULTIPLIER (nF)	
0.1	2
1	3
10	4
100	5

Example:
104 = 10 x 10 = 100 nF

2222 336 1. XX X

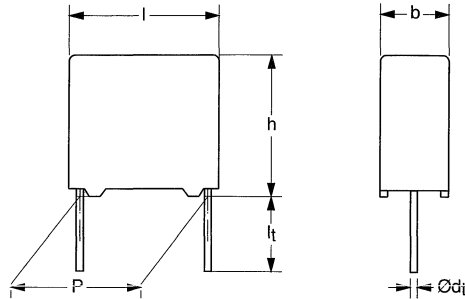
TYPE	PACKAGING	LEAD CONFIGURATION	C-TOL	PREFERRED TYPES
336 1 X1	loose in box	lead length 3.5 mm	±20%	10
		lead length 25.0 mm		16
				ON REQUEST
336 1 X1	loose in box	lead length 3.5 mm	±10%	11
		lead length 25.0 mm		17
	taped		±20%	13
			±10%	14

Interference suppression film capacitors

MKP 336 1 X1

MKP 336 1 GENERAL DATA

PITCH 10/15 mm



CBA196

Fig.3 Outline.

Specific reference data for the 275 V AC (X1) capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: $C \leq 100$ nF	$\leq 10 \times 10^{-4}$	$\leq 50 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 385 V (DC): P = 10 mm P = 15 mm	200 V/ μ s 500 V/ μ s	
R between leads, for $C \leq 0.33$ μ F at 100 V; 1 minute	>15 000 M Ω	
R between leads and case; 100 V; 1 minute	>30 000 M Ω	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	3 400 V; 1 minute	
Withstanding (AC) voltage between leads and case	2 050 V; 1 minute	

Available 275 V AC (X1) versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 3.5 \pm 1/-0.5$ mm; note 1	$\pm 20\%$	2222 336 10...	preferred
		$\pm 10\%$	2222 336 11...; note 2	on request
	$l_t = 25.0 \pm 2.0$ mm	$\pm 20\%$	2222 336 16...	preferred
		$\pm 10\%$	2222 336 17...; note 2	on request
Taped on reel	H = 18.5 mm; $P_0 = 12.7$ mm	$\pm 20\%$	2222 336 13...	on request
		$\pm 10\%$	2222 336 14...; note 2	on request

Notes

- $l_t = 3.5 \pm 0.3$ mm for pitch = 15 mm.
- Other dimensions for $\pm 10\%$ tolerance values.

Interference suppression film capacitors

MKP 336 1 X1

 $U_{Rac} = 275 \text{ V (X1)}$; $U_{Rdc} = 630 \text{ V}$

C (μF)	DIMENSIONS ⁽¹⁾ b × h × l (mm)	MASS (g)	CATALOGUE NUMBER	
			LOOSE IN BOX	
			$l_t = 3.5 +1/-0.5\text{mm}^{(2)}$	$l_t = 25.0 \pm 2.0 \text{ mm}$
			C-tol = $\pm 20\%$	
			catalogue number	last 5 digits
Pitch = 10.0 ± 0.4 mm; $d_t = 0.60 \pm 0.06$ mm				
0.001	4.0 × 10.0 × 12.5	0.6	2222 336 10102	.. 16102
0.0015			2222 336 10152	.. 16152
0.0022			2222 336 10222	.. 16222
0.0033	5.0 × 11.0 × 12.5	0.9	2222 336 10332	.. 16332
0.0047			2222 336 10472	.. 16472
0.0068			2222 336 10682	.. 16682
0.01	6.0 × 12.0 × 12.5	1.0	2222 336 10103	.. 16103
Pitch = 15.0 ± 0.4 mm; $d_t = 0.80 \pm 0.08$ mm				
0.01	5.0 × 11.0 × 17.5	1.2	2222 336 19001	.. 19007
0.015			2222 336 10153	.. 16153
0.022			2222 336 10223	.. 16223
0.033	6.0 × 12.0 × 17.5	1.4	2222 336 10333	.. 16333
0.047	7.0 × 13.5 × 17.5	1.9	2222 336 10473	.. 16473
0.068	8.5 × 15.0 × 17.5	2.6	2222 336 10683	.. 16683
0.1	10.0 × 16.5 × 17.5	3.1	2222 336 10104	.. 16104

Notes

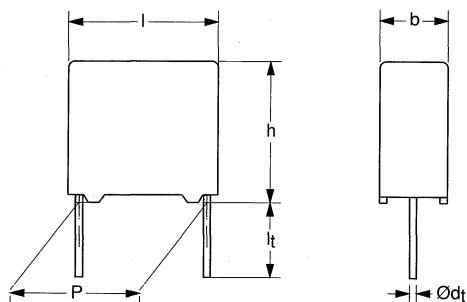
- Specified dimensions only valid for $\pm 20\%$ tolerance values.
- $l_t = 3.5 \pm 0.3$ mm for pitch = 15 mm.

Interference suppression film capacitors

MKP 336 1 X1

MKP 336 1 GENERAL DATA

PITCH 22.5/27.5 mm



CBA196

Fig.4 Outline.

Specific reference data for the 275 V AC (X1) capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: 100 nF < C ≤ 470 nF C > 470 nF	≤20 × 10 ⁻⁴ ≤70 × 10 ⁻⁴	≤100 × 10 ⁻⁴ -
Rated voltage pulse slope (dU/dt) _R at 385 V (DC): P = 22.5 mm P = 27.5 mm	300 V/μs 200 V/μs	
R between leads, for C ≤ 0.33 μF at 100 V; 1 minute	>15000 MΩ	
RC between leads, for C > 0.33 μF at 100 V; 1 minute	>5000 s	
R between leads and case; 100 V; 1 minute	>30000 MΩ	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	3400 V; 1 minute	
Withstanding (AC) voltage between leads and case	2050 V; 1 minute	

Available 275 V AC (X1) versions

PACKAGING ⁽¹⁾	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	l _t = 3.5 ±0.3 mm	±20%	2222 336 10...	preferred
		±10%	2222 336 11...; note 2	on request
	l _t = 25.0 ±2.0 mm	±20%	2222 336 16...	preferred
		±10%	2222 336 17...; note 2	on request
Taped on reel	l _t = 18.5 mm; P ₀ = 12.7 mm	±20%	2222 336 13...	on request
		±10%	2222 336 14...; note 2	on request

Notes

1. Taped on reel pitch = 27.5 mm is not available.
2. Other dimensions for ±10% tolerance values.

Interference suppression film capacitors

MKP 336 1 X1

 $U_{\text{Rac}} = 275 \text{ V (X1)}$; $U_{\text{Rdc}} = 630 \text{ V}$

C (μF)	DIMENSIONS ⁽¹⁾ b × h × l (mm)	MASS (g)	CATALOGUE NUMBER	
			LOOSE IN BOX	
			$l_t = 3.5 \pm 0.3 \text{ mm}$	$l_t = 25.0 \pm 2.0 \text{ mm}$
			C-tol = $\pm 20\%$	
			catalogue number	last 5 digits
Pitch = $22.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$				
0.1	7.0 × 16.5 × 26.0	3.2	2222 336 19003	.. 19008
0.15	8.5 × 18.0 × 26.0	4.4	2222 336 10154	.. 16154
0.22	10.0 × 19.5 × 26.0	5.5	2222 336 10224	.. 16224
Pitch = $27.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$				
0.22	11.0 × 21.0 × 31.0	7.8	2222 336 19005	.. 19009
0.33	13.0 × 23.0 × 31.0	10.4	2222 336 10334	.. 16334
0.47	15.0 × 25.0 × 31.0	12.8	2222 336 10474	.. 16474
0.68	18.0 × 28.0 × 31.0	17.2	2222 336 10684	.. 16684
1	21.0 × 31.0 × 31.0	20.4	2222 336 10105	.. 16105

Note

1. Specified dimensions only valid for $\pm 20\%$ tolerance values.

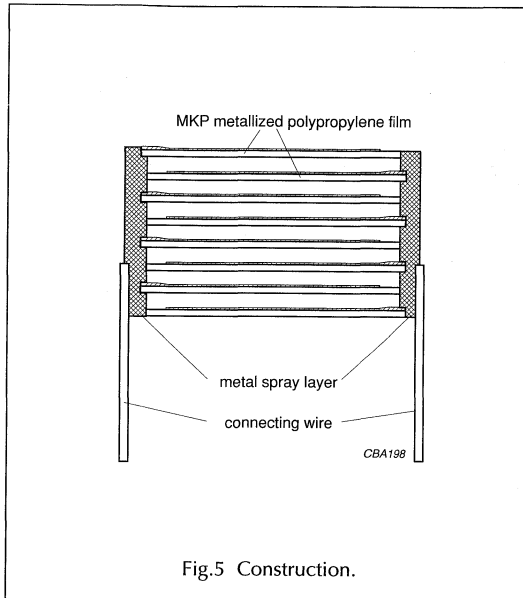
Interference suppression film capacitors

MKP 336 1 X1

CONSTRUCTION

Description

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



SPECIFIC METHOD OF MOUNTING TO WITHSTAND VIBRATION AND SHOCK

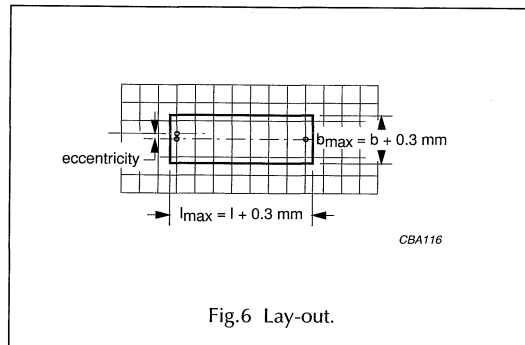
In order to withstand vibration and shock tests, it must be ensured that the stand-off pips are in good contact with the printed-circuit board:

- For pitches ≤ 15 mm 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 Fig.6:

- Eccentricity as in Fig.6. 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 60717" as reference: $h_{\max} \leq h + 0.3$ mm.



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 tape specifications refer to this handbook, chapter "Packaging information".

Storage temperature

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

RATINGS AND CHARACTERISTICS REFERENCE CONDITIONS

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 $50 \pm 2\%$.

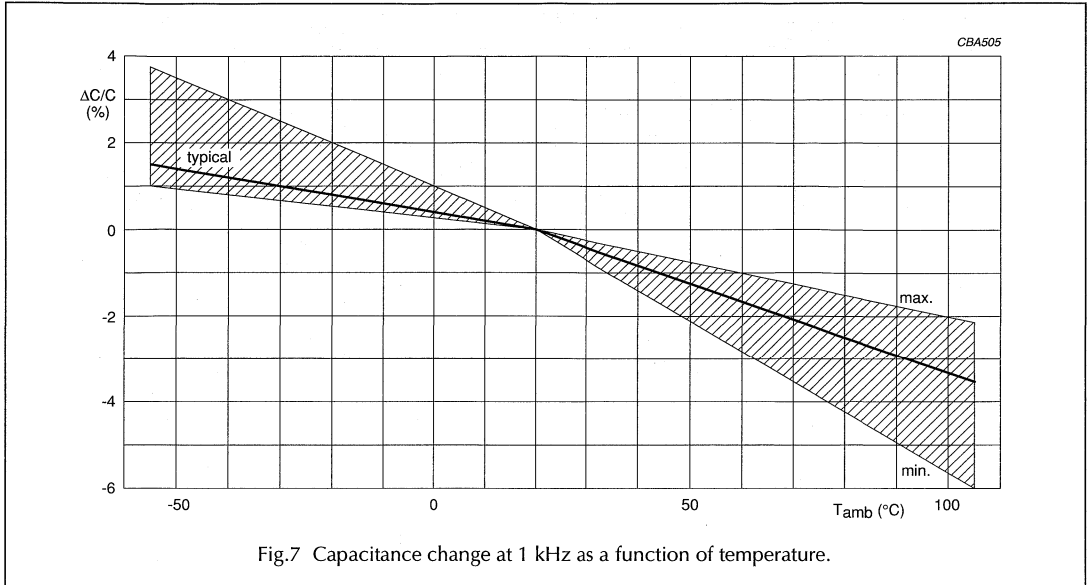
For reference testing, a conditioning period shall be applied over 96 ± 4 hours by heating the products in a circulating air oven at the rated temperature and a relative humidity not exceeding 20%.

Interference suppression film capacitors

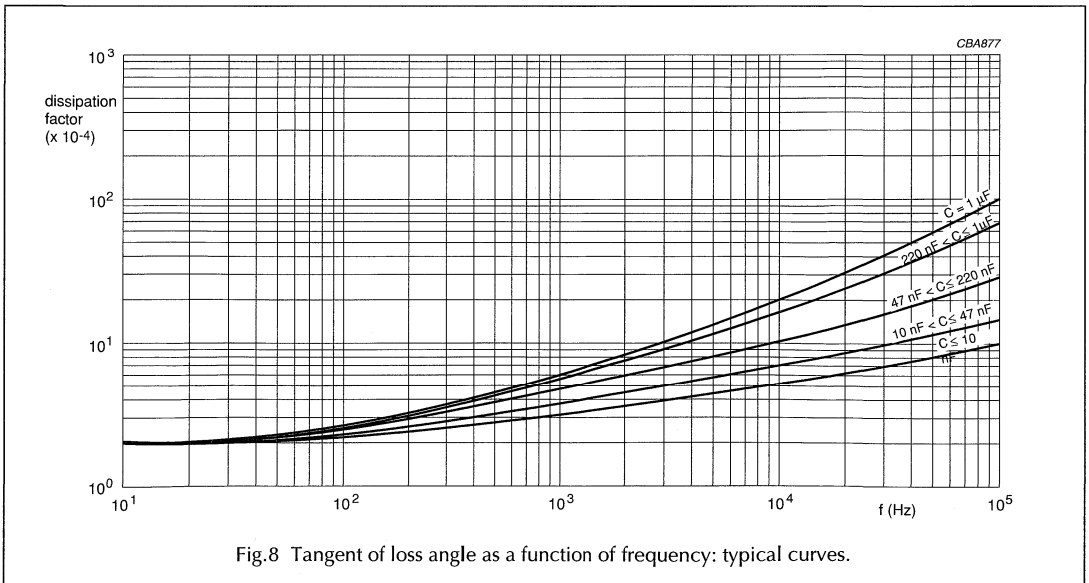
MKP 336 1 X1

CHARACTERISTICS

Capacitance



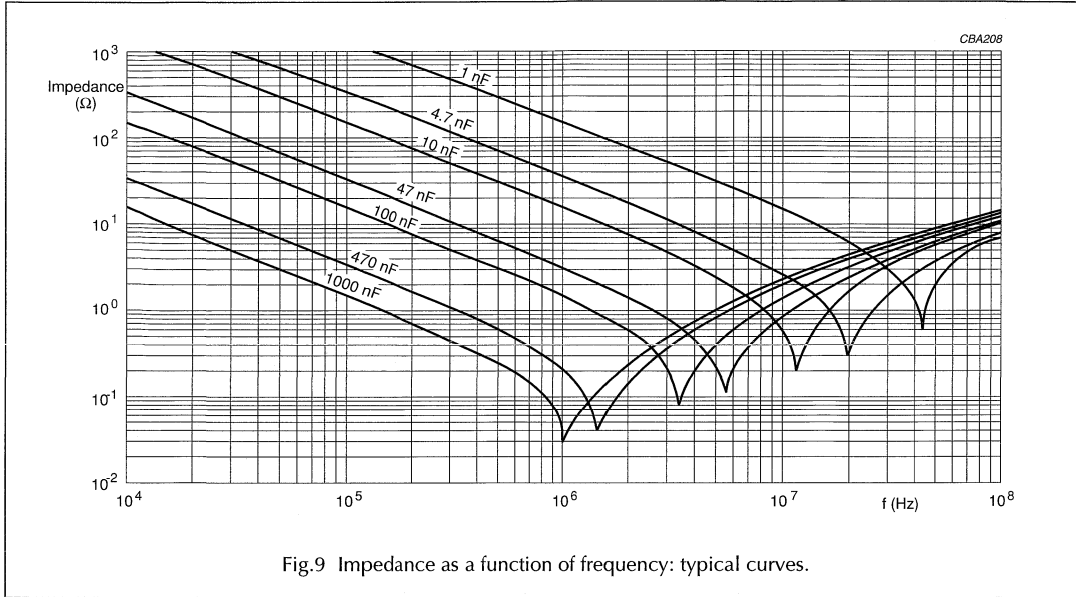
Tangent of loss angle



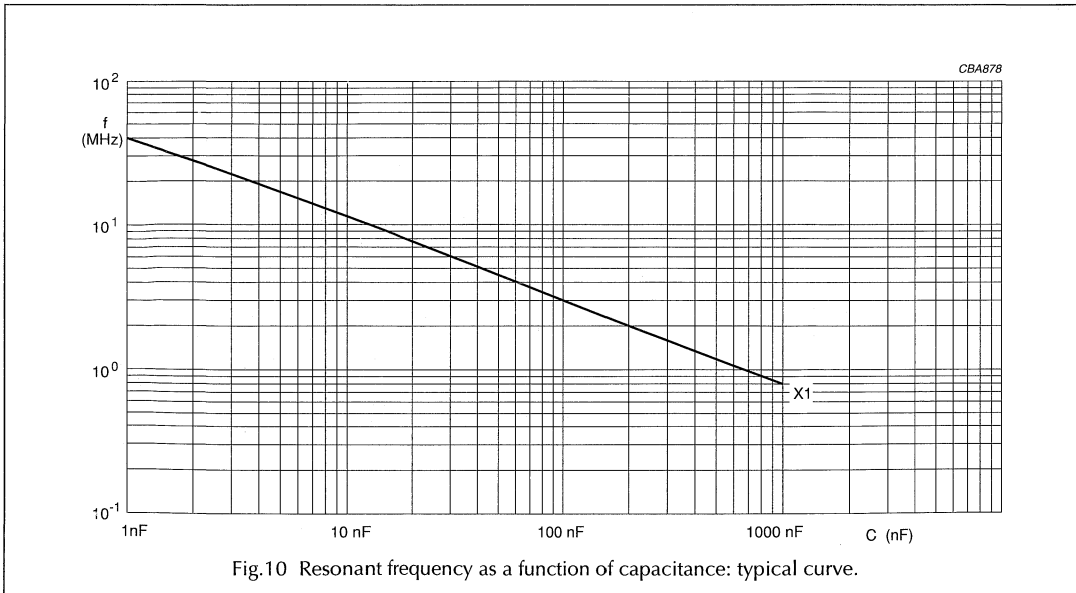
Interference suppression film capacitors

MKP 336 1 X1

Impedance



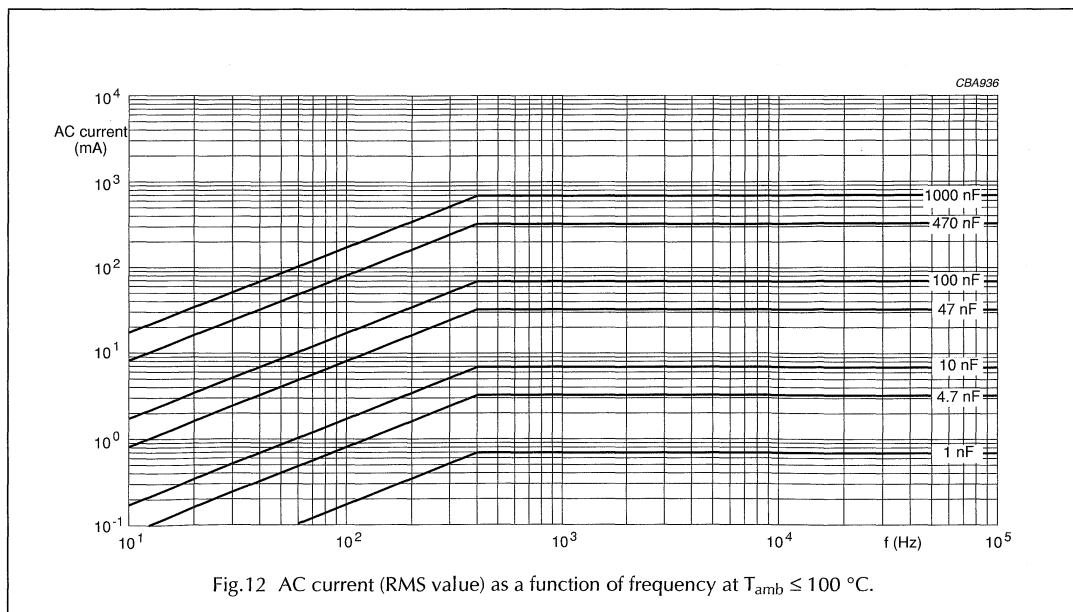
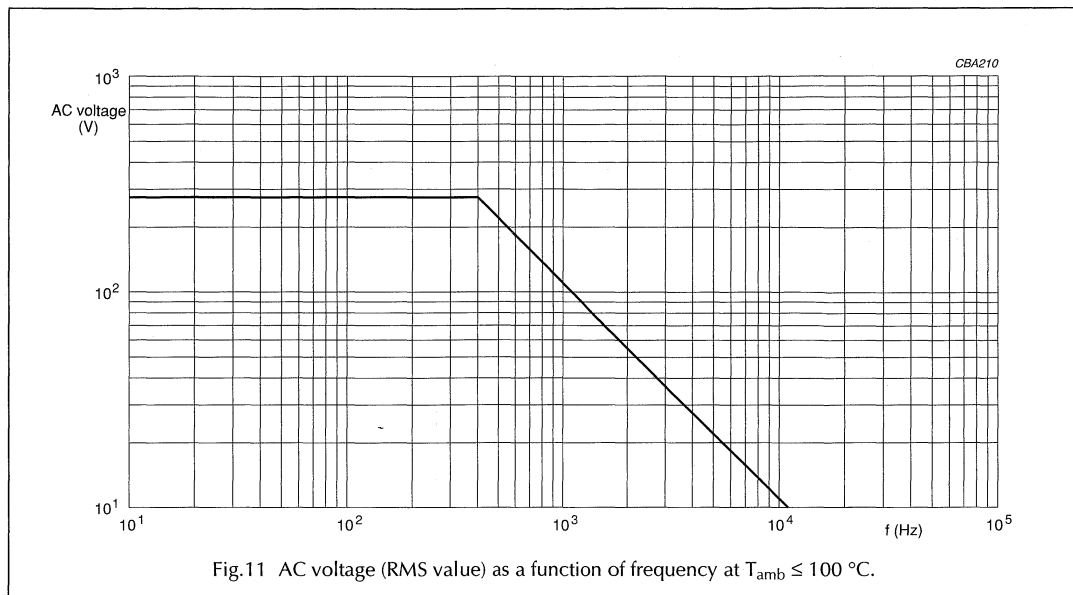
Resonant frequency



Interference suppression film capacitors

MKP 336 1 X1

Maximum RMS voltage and AC current (sinewave) as a function of frequency for $T_{amb} \leq 100\text{ }^{\circ}\text{C}$



Interference suppression film capacitors

MKP 336 1 X1

Insulation resistance

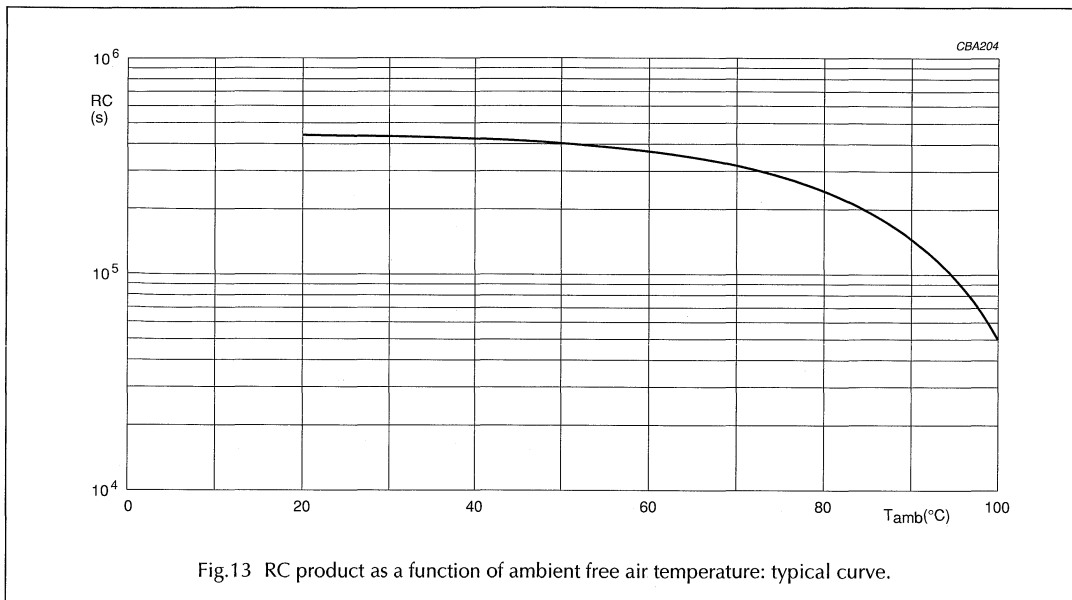


Fig.13 RC product as a function of ambient free air temperature: typical curve.

APPLICATION NOTES

- For X1 electromagnetic interference suppression in across the line applications (50/60 Hz) with a maximum mains voltage of 275 V (AC) $\pm 10\%$ instability.
- These capacitors are not intended for continuous pulse applications. For these situations, capacitors of the AC and pulse program must be used, such as: 2222 375; 2222 383 or 2222 479
- The maximum ambient temperature must not exceed 100 °C.
- Rated voltage pulse slope:
 - If the pulse voltage is lower than the rated voltage, the values of the specific reference data can be multiplied by 385 V (DC) and divided by the applied voltage.

Interference suppression film capacitors

MKP 336 1 X1

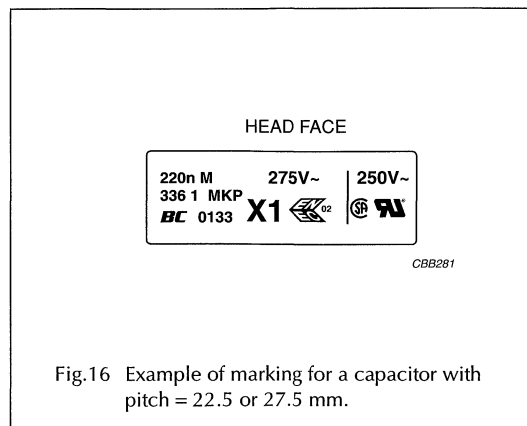
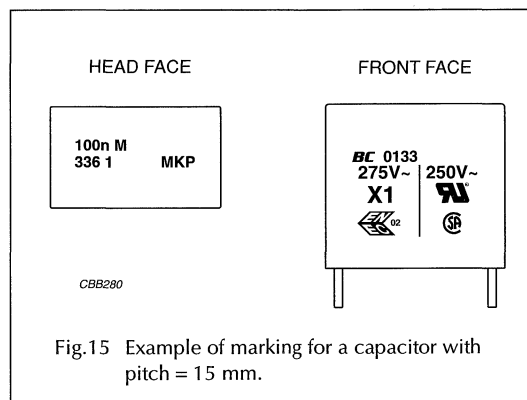
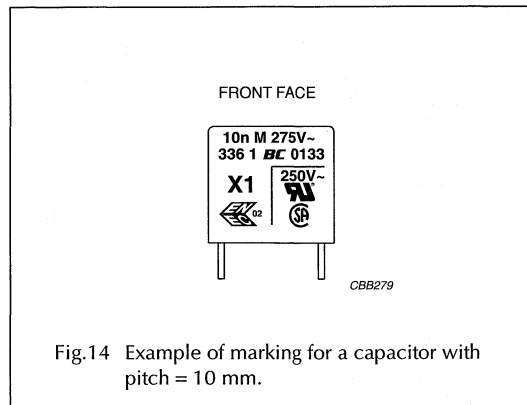
MARKING

Product marking

NEW MARKING (INTRODUCED DURING 2001)

The capacitors are marked on the top for pitch ≥ 22.5 mm (see Fig.16), on the top and one side for pitch = 15 mm (see Fig.15) or on one side for pitch = 10 mm (see Fig.14) with the following information:

1. Rated capacitance code in accordance with "IEC 60062"
2. Tolerance on rated capacitance; M = $\pm 20\%$; K = $\pm 10\%$; J = $\pm 5\%$
3. Rated (AC) voltage (275 V)
4. Sub-class (e.g. X1)
5. Manufacturer's type designation (e.g. 336 1)
6. Code for dielectric material (MKP) for pitch ≥ 15 mm
7. Manufacturer (BC)
8. Year and week of manufacture (e.g. 0133).



Interference suppression film capacitors

MKP 336 1 X1

PRESENT MARKING

The capacitors are marked on the top for pitch ≥ 22.5 mm (see Fig.19), on the top and one side for pitch = 15 mm (see Fig.18) or on one side for pitch = 10 mm (see Fig.17) with the following information:

1. Rated capacitance code in accordance with "IEC 60062"
2. Tolerance on rated capacitance; M = $\pm 20\%$; K = $\pm 10\%$; J = $\pm 5\%$
3. Rated (AC) voltage (275 V)
4. Sub-class (e.g. X1)
5. Manufacturer's type designation (e.g. 336 1)
6. Better recognition for X 1: ●
7. Code for dielectric material (MKP) for pitch ≥ 15 mm
8. Manufacturer (BC)
9. Year and week of manufacture (e.g. 0001) for pitch ≥ 15 mm.

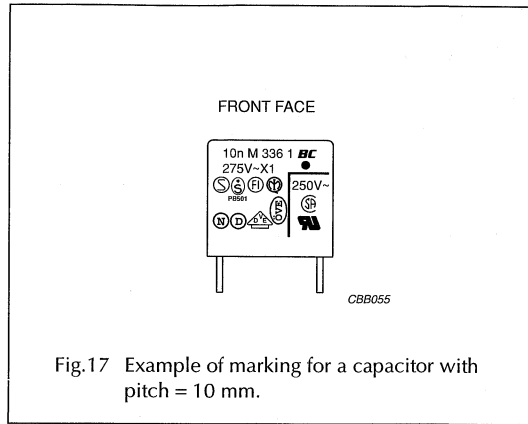


Fig.17 Example of marking for a capacitor with pitch = 10 mm.

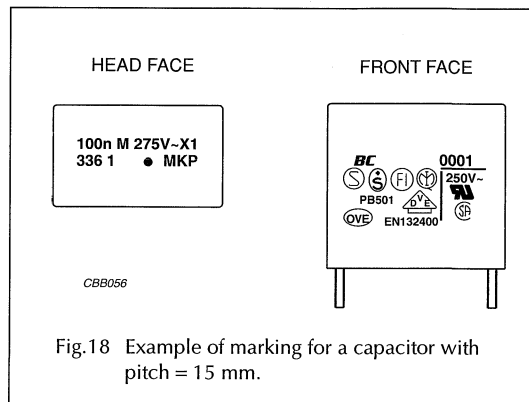


Fig.18 Example of marking for a capacitor with pitch = 15 mm.

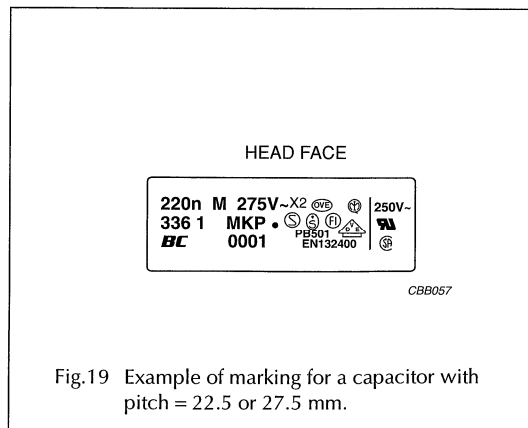


Fig.19 Example of marking for a capacitor with pitch = 22.5 or 27.5 mm.

Interference suppression film capacitors

MKP 336 1 X1

QUICK REFERENCE TEST REQUIREMENTS

TEST	PROCEDURE (quick reference)	REQUIREMENTS
Robustness of leads		
Tensile strength: "IEC 60068-2-21"	load 10 N; 10 s	no visible damage legible marking $ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 100 \times 10^{-4}$ ($C \leq 100$ nF); note 1 $\Delta \tan \delta \leq 200 \times 10^{-4}$ (100 nF < $C \leq 470$ nF); note 1 $\Delta \tan \delta \leq 70 \times 10^{-4}$ ($C > 470$ nF); note 1
Bending: "IEC 60068-2-21"	load 5 N; $4 \times 90^\circ$	
Resistance to soldering heat: "IEC 60068-2-20"	solder bath: 260 °C; 10 s	
Component solvent resistance	isopropyl alcohol; 23 °C; 5 minutes	
Robustness of component		
Rapid change of temperature: "IEC 60068-2-14"	5 cycles 1 cycle = 30 minutes at -55 °C and 30 minutes at 100 °C	$ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 100 \times 10^{-4}$ ($C \leq 100$ nF); note 1 $\Delta \tan \delta \leq 200 \times 10^{-4}$ (100 nF < $C \leq 470$ nF); note 1 $\Delta \tan \delta \leq 70 \times 10^{-4}$ ($C > 470$ nF); note 1
Vibration: "IEC 60068-2-6"	10 to 55 Hz; amplitude 0.75 mm; 6 hours	
Shock: "IEC 60068-2-27"	half sinewave; 490 m/s ² ; 11 ms	
Climatic sequence		
Dry heat: "IEC 60068-2-2"	16 hours; 100 °C	$ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 100 \times 10^{-4}$ ($C \leq 100$ nF); note 1 $\Delta \tan \delta \leq 200 \times 10^{-4}$ (100 nF < $C \leq 470$ nF); note 1 $\Delta \tan \delta \leq 70 \times 10^{-4}$ ($C > 470$ nF); note 1 $R_{ins} \geq 50\%$ of specified value
Damp heat, cyclic, test Db, first cycle: "IEC 60068-2-30"		
Cold: "IEC 60068-2-1"	2 hours; -55 °C	
Damp heat, cyclic, test Db, remaining cycles: "IEC 60068-2-30"		
Voltage proof: "IEC 60384-14"	$V_p = 1200$ V (DC); 1 minute	
Other applicable tests		
Damp heat, steady state: "IEC 60068-2-3"	21 days; 40 °C; 90 to 95% RH no load $V_p = 1200$ V (DC); 1 minute	$ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 70 \times 10^{-4}$ $R_{ins} \geq 50\%$ of specified value
Endurance (AC): "IEC 60384-14"	3×4.0 kV pulse voltage 1000 hours; $1.25 \times U_{Rac}$ at 100 °C; once per hour; 0.1 s; 1000 V (RMS) via resistor of 47 Ω; $V_p = 1200$ V (DC); 1 minute	$ \Delta C/C \leq 10\%$ $\Delta \tan \delta \leq 100 \times 10^{-4}$ ($C \leq 100$ nF); note 1 $\Delta \tan \delta \leq 200 \times 10^{-4}$ (100 nF < $C \leq 470$ nF); note 1 $\Delta \tan \delta \leq 70 \times 10^{-4}$ ($C > 470$ nF); note 1 $R_{ins} \geq 50\%$ of specified value

Interference suppression film capacitors

MKP 336 1 X1

TEST	PROCEDURE (quick reference)	REQUIREMENTS
Charge and discharge: "IEC 60384-14"	10000 cycles; 5 ms; 1.5 × dV/dt	$ \Delta C/C \leq 10\%$ $\Delta \tan \delta \leq 100 \times 10^{-4}$ ($C \leq 100$ nF); note 1 $\Delta \tan \delta \leq 200 \times 10^{-4}$ (100 nF < $C \leq 470$ nF); note 1 $\Delta \tan \delta \leq 70 \times 10^{-4}$ ($C > 470$ nF); note 1 $R_{ins} \geq 50\%$ of specified value
Passive flammability: "IEC 60384-14"	class B	no burning
Active flammability: "IEC 60384-14"	20 × 4 kV discharge	no burning
Heat storage: "IEC 60384-14"	1000 hours; 100 °C	$ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 100 \times 10^{-4}$ ($C \leq 100$ nF); note 1 $\Delta \tan \delta \leq 200 \times 10^{-4}$ (100 nF < $C \leq 470$ nF); note 1 $\Delta \tan \delta \leq 70 \times 10^{-4}$ ($C > 470$ nF); note 1
Resistance to soldering heat with preheating: "IEC 60384-14"	preheating: 100 °C; solder bath: 260 °C; 10 s	$ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 100 \times 10^{-4}$ ($C \leq 100$ nF); note 1 $\Delta \tan \delta \leq 200 \times 10^{-4}$ (100 nF < $C \leq 470$ nF); note 1 $\Delta \tan \delta \leq 70 \times 10^{-4}$ ($C > 470$ nF); note 1
Active flammability test	voltage proof up to 2 × peak impulse voltage of 4.13 or until breakdown (100 V/sec, current limited 2mA) failed capacitors connected to a 250 V (AC) power supply during 5 minutes	no burning

Note

1. Measuring frequency 100 kHz for $C \leq 470$ nF and 10 kHz for $C > 470$ nF.

Interference suppression film capacitors MKP 338 4 X2

MKP RADIAL POTTED TYPE

PITCH 15/22.5/27.5/37.5/55 mm

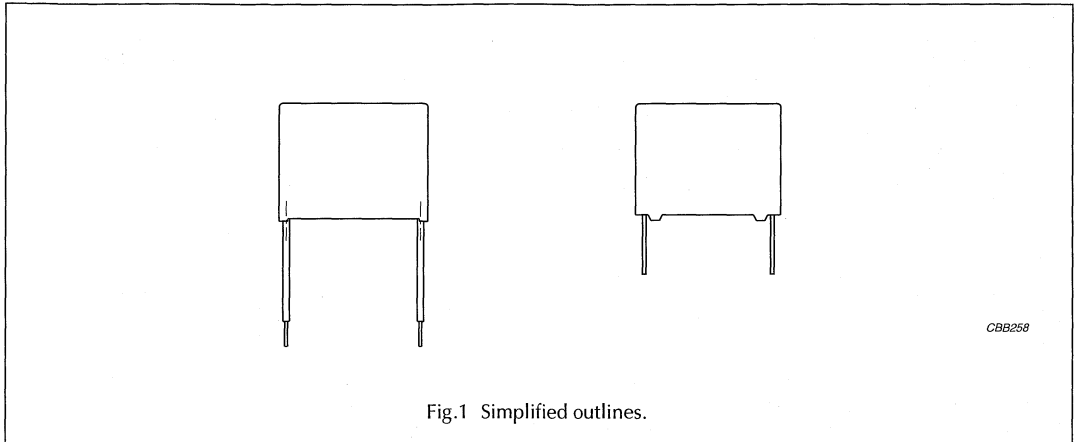


Fig.1 Simplified outlines.

FEATURES

- 15 to 55 mm lead pitch
- Supplied loose in box
- Consists of a low-inductive wound cell of metallized polypropylene film, potted in a flame-retardant case
- Fixed and insulated leads.

APPLICATIONS

- For X2 electromagnetic interference suppression
- Specially designed to meet the requirements of the "IEC 60384-14 2nd edition and EN 132400", requiring a 2.5 kV peak pulse voltage test, and the UL1283 specifications.

DETAIL SPECIFICATION

For more detailed data and test requirements see "Type detail specification HQN-384-14/120".



QUICK REFERENCE DATA⁽¹⁾

DESCRIPTION	VALUE
Capacitance range (E12 series)	0.01 to 10 μ F
Capacitance tolerance	$\pm 20\%$; $\pm 10\%$
Rated (AC) voltage, 50 to 60 Hz	300 V
Rated (DC) voltage	630 V
Climatic category	55/105/56/B
Rated temperature	105 °C
Maximum application temperature	105 °C
Reference specifications	IEC 60384-14 2nd edition and EN 132400
Safety approvals:	ENEC; UL1283 and CSA-C22.2 No.8
Materials	qualified in accordance with UL94V-O
Safety class	X2; across the line

Note

1. Under development.

Interference suppression film capacitors**MKP 338 4 X2****SAFETY APPROVALS AND SAFETY TEST REPORT****Approvals**

SAFETY APPROVALS (X2)		VOLTAGE	VALUE	FILE NUMBERS
	UL1283 and CSA-C22.2 No.8	300 V (AC)	10 nF to 10 µF	pending
	EN132400	300 V (AC)	10 nF to 10 µF	pending

Safety test report

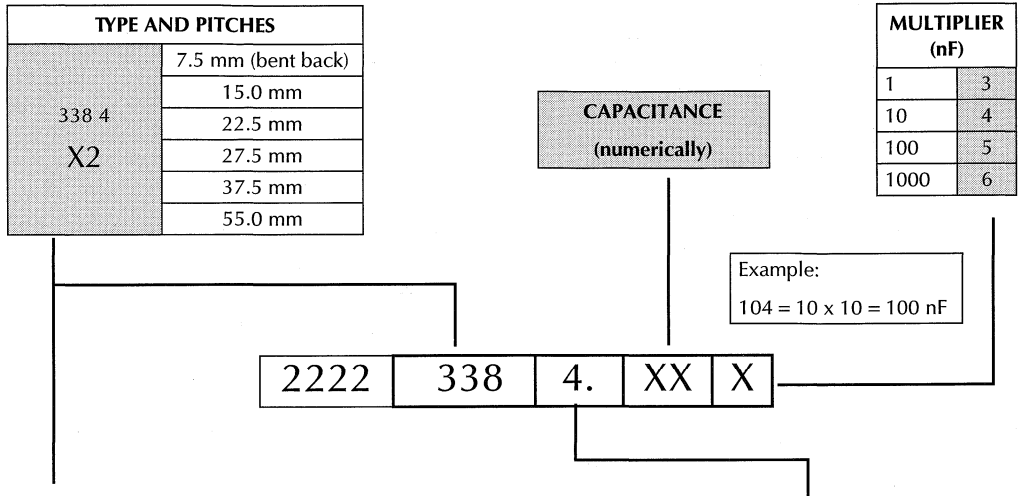
SAFETY TEST REPORT	VOLTAGE	VALUE	FILE NUMBERS
CB TEST CERTIFICATE	300 V (AC)	10 nF to 10 µF: 55/105/56/B	pending

The Enec-approval together with the CB-Certificate replace all national approval marks of the following countries (they have already signed the ENEC-Agreement): Austria; Belgium; Czech. Republic; Denmark; Finland; France; Germany; Greece; Hungary; Ireland; Italy; Luxembourg; Netherlands; Norway, Portugal; Slovenian; Spain; Sweden; Switzerland and United Kingdom.

Interference suppression film capacitors

MKP 338 4 X2

COMPOSITION OF CATALOGUE NUMBER



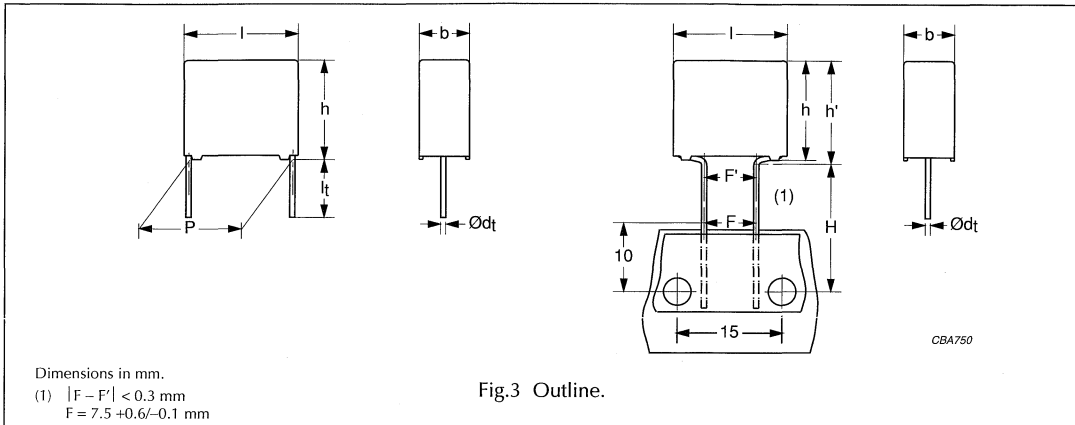
TYPE	PACKAGING	LEAD CONFIGURATION	C-TOL	PREFERRED TYPES
338 4 X2	loose in box	lead length 3.5 mm	±20%	44
		lead length 5.0 mm		40
		lead length 25.0 mm		41
	taped	15.0 mm bent back to 7.5 mm		4.
				ON REQUEST
338 4 X2	loose in box	insulated leads stranded Cu-wire 0.5 mm ² for 37.5 and 55 mm pitch	±10%	4.
		lead length 3.5 mm		45
		lead length 5.0 mm		42
		lead length 25.0 mm		43
	taped	15.0 mm bent back to 7.5 mm		4.
				4.

Interference suppression film capacitors

MKP 338 4 X2

MKP 338 GENERAL DATA

PITCH 15/22.5/27.5 mm
PITCH 7.5 mm (bent back leads)



Specific reference data for the 300 V AC (X2) capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle: $C \leq 470$ nF 470 nF $< C \leq 1$ μ F 1 μ F $< C \leq 3.3$ μ F	$\leq 10 \times 10^{-4}$	$\leq 20 \times 10^{-4}$	$\leq 100 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 420 V (DC)		100 V/ μ s	
R between leads, for $C \leq 0.33$ μ F at 100 V; 1 minute		>15000 M Ω	
RC between leads, for $C > 0.33$ μ F at 100 V; 1 minute		>5000 s	
R between leads and case; 100 V; 1 minute		>30000 M Ω	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s: $C \leq 1$ μ F 1 μ F $< C \leq 3.3$ μ F		2200 V; 1 minute 1850 V; 1 minute	
Withstanding (AC) voltage between leads and case		2200 V; 1 minute	

Available 300 V AC (X2) versions

PACKAGING ⁽¹⁾	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	lead length 3.5 mm	$\pm 20\%$	2222 338 44...	preferred
		$\pm 10\%$	2222 338 45...; note 2	on request
	lead length 5.0 mm	$\pm 20\%$	2222 338 40...	preferred
		$\pm 10\%$	2222 338 42...; note 2	on request
		$\pm 20\%$	2222 338 41...	preferred
Taped	15.0 mm bent back to 7.5 mm	$\pm 10\%$	2222 338 43...; note 2	on request
		$\pm 20\%$	2222 338 4....	preferred
		$\pm 10\%$	2222 338 4...; note 2	on request

Notes

1. Taped on reel pitch = 27.5 mm is not available.
2. Other dimensions for $\pm 10\%$ tolerance values.

Interference suppression film capacitors

MKP 338 4 X2

 $U_{Rac} = 300 \text{ V (X2)}$; $U_{Rdc} = 630 \text{ V}$

loose and taped

C ⁽¹⁾ (μF)	DIMENSIONS ⁽²⁾ $b \times h \times l$ (mm)	MASS (g)	CATALOGUE NUMBER			
			LOOSE IN BOX			REEL
			$l_t = 3.5 \pm 0.3\text{mm}$	$l_t = 5.0 \pm 0.3\text{mm}$	$l_t = 25.0 \pm 2.0\text{mm}$	H = 16.0 mm; P ₀ = 15.0 mm
			C-tol = $\pm 20\%$			
			catalogue number	last 5 digits	last 5 digits	last 5 digits
Pitch = 15.0 \pm 0.4 mm; d_t = 0.60 \pm 0.06 mm						pitch = 7.5 mm (bent back)
0.01	5.0 \times 11.0 (13.0) \times 17.5	1.2	2222 338 44103	.. 40103	.. 41103	.. 48001
0.015			2222 338 44153	.. 40153	.. 41153	.. 48002
0.022			2222 338 44223	.. 40223	.. 41223	.. 48003
0.033			2222 338 44333	.. 40333	.. 41333	.. 48004
0.047			2222 338 44473	.. 40473	.. 41473	.. 48005
0.068			2222 338 44683	.. 40683	.. 41683	.. 48006
0.1	6.0 \times 12.0 (14.0) \times 17.5	1.4	2222 338 44104	.. 40104	.. 41104	.. 48007
Pitch = 15.0 \pm 0.4 mm; d_t = 0.80 \pm 0.08 mm						pitch = 7.5 mm (bent back)
0.15	7.0 \times 13.5 (15.5) \times 17.5	1.9	2222 338 44154	.. 40154	.. 41154	.. 48008
0.22	8.5 \times 15.0 (17.0) \times 17.5	2.6	2222 338 44224	.. 40224	.. 41224	.. 48009
0.33	10.0 \times 16.5 (18.5) \times 17.5	3.1	2222 338 44334	.. 40334	.. 41334	.. 48011
Pitch = 22.5 \pm 0.4 mm; d_t = 0.80 \pm 0.08 mm						pitch = 7.5 mm (bent back)
0.47	8.5 \times 18.0 \times 26.0	4.5	2222 338 44474	.. 40474	.. 41474	not available
0.68	10.0 \times 19.5 \times 26.0	5.5	2222 338 44684	.. 40684	.. 41684	
1.0	12.0 \times 22.0 \times 26.0	7.8	2222 338 44105	.. 40105	.. 41105	
Pitch = 27.5 \pm 0.4 mm; d_t = 0.80 \pm 0.08 mm						pitch = 7.5 mm (bent back)
1.5	15.0 \times 25.0 \times 31.0	12.8	2222 338 44155	.. 40155	.. 41155	not available
2.2	18.0 \times 28.0 \times 31.0	17.2	2222 338 44225	.. 40225	.. 41225	
3.3	21.0 \times 31.0 \times 31.0	20.4	2222 338 44335	.. 40335	.. 41335	

Notes

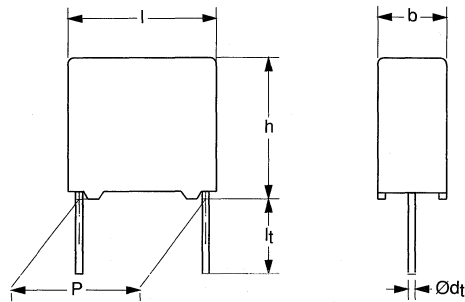
- Under development.
- Dimensions in brackets for bent back leads.

Interference suppression film capacitors

MKP 338 4 X2

MKP GENERAL DATA

PITCH 37.5/55 mm



CBA196

Fig.4 Outline.

Specific reference data for the 300 V AC (X2) capacitors

DESCRIPTION	VALUE
Tangent of loss angle	at 1 kHz
2.2 μF < C \leq 4.7 μF	$\leq 50 \times 10^{-4}$
4.7 μF < C \leq 10 μF	$\leq 100 \times 10^{-4}$
Rated voltage pulse slope (dU/dt) _R at 420 V (DC)	100 V/ μs
RC between leads at 100 V; 1 minute	>5000 s
R between leads and case; 100 V; 1 minute	>30000 M Ω
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	1400 V; 1 minute
Withstanding (AC) voltage between leads and case	2200 V; 1 minute

Available 300 V AC (X2) versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	lead length 5.0 mm; note 1	$\pm 20\%$	2222 338 40...	preferred
		$\pm 10\%$	2222 338 42...; note 2	on request
	lead length 25.0 mm; note 1	$\pm 20\%$	2222 338 41...	preferred
		$\pm 10\%$	2222 338 43...; note 2	on request
	insulated leads stranded Cu-wire 0.5 mm ² for 37.5 and 55 mm pitch	$\pm 20\%$	2222 338 4....	on request
		$\pm 10\%$	2222 338 4....; note 2	on request

Notes

- Lead length 3.5 mm for pitch = 37.5 and 55 mm is not available.
- Other dimensions for $\pm 10\%$ tolerance values.

Interference suppression film capacitors

MKP 338 4 X2

 $U_{Rac} = 300 \text{ V (X2)}$; $U_{Rdc} = 630 \text{ V}$

loose

C ⁽¹⁾ (μF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER	
			LOOSE IN BOX	
			$l_1 = 5.0 \pm 1.0 \text{ mm}$	$l_1 = 25.0 \pm 2.0 \text{ mm}$
			C-tol = $\pm 20\%$	
			catalogue number	last 5 digits
Pitch = $37.5 \pm 0.7 \text{ mm}$; $d_t = 1.0 \pm 0.1 \text{ mm}$				
4.7	18.0 × 35.0 × 42.0	30.0	2222 338 40475	... 41475
6.8	21.0 × 38.0 × 42.0	35.0	2222 338 40685	... 41685
Pitch = $55.0 \pm 1.0 \text{ mm}$; $d_t = 1.0 \pm 0.1 \text{ mm}$				
10.0	21.0 × 38.0 × 59.5	50.0	2222 338 40106	... 41106

Note

- Under development.

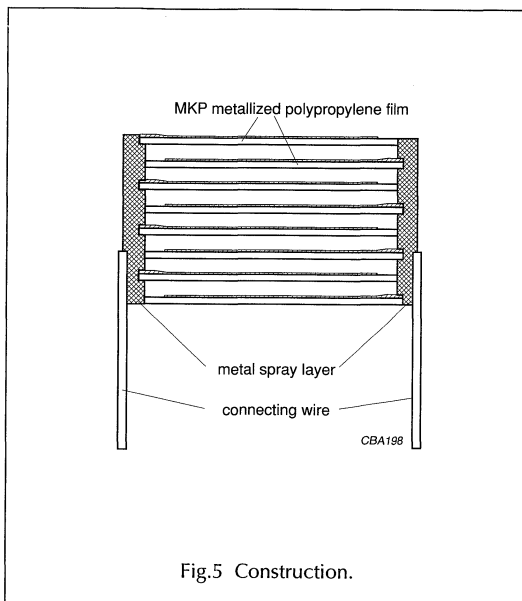
Interference suppression film capacitors

MKP 338 4 X2

CONSTRUCTION

Description

- Low-inductive wound cell of metallized polypropylene (PP) film, potted with epoxy resin (for original pitch ≤ 27.5 mm) and polyurethane and epoxy resin (for pitch >27.5 mm) in a flame-retardant case
- Radial leads, solder-coated
- Small stand-off pips allow removal of solder flux etc. during cleaning of the printed-circuit board
- Radial insulated leads; stranded Cu-wire with PVC isolation for pitch >27.5 mm on request



SPECIFIC METHOD OF MOUNTING TO WITHSTAND VIBRATION AND SHOCK

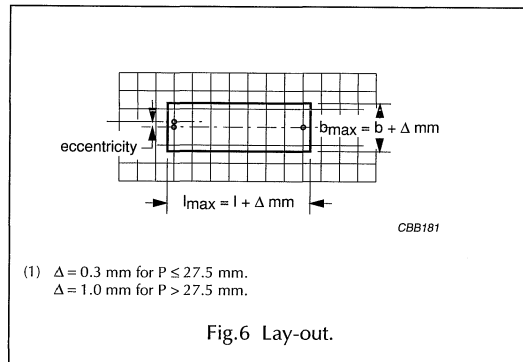
In order to withstand vibration and shock tests, it must be ensured that the stand-off pips are in good contact with the printed-circuit board:

- For pitches ≤ 15 mm 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 Fig.6:

- Eccentricity as in Fig.6. 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 60717" as reference: $h_{\max} \leq h + \Delta$ mm or $h_{\max} \leq h' + \Delta$ mm.



Storage temperature

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

RATINGS AND CHARACTERISTICS REFERENCE CONDITIONS

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 $50 \pm 2\%$.

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

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.

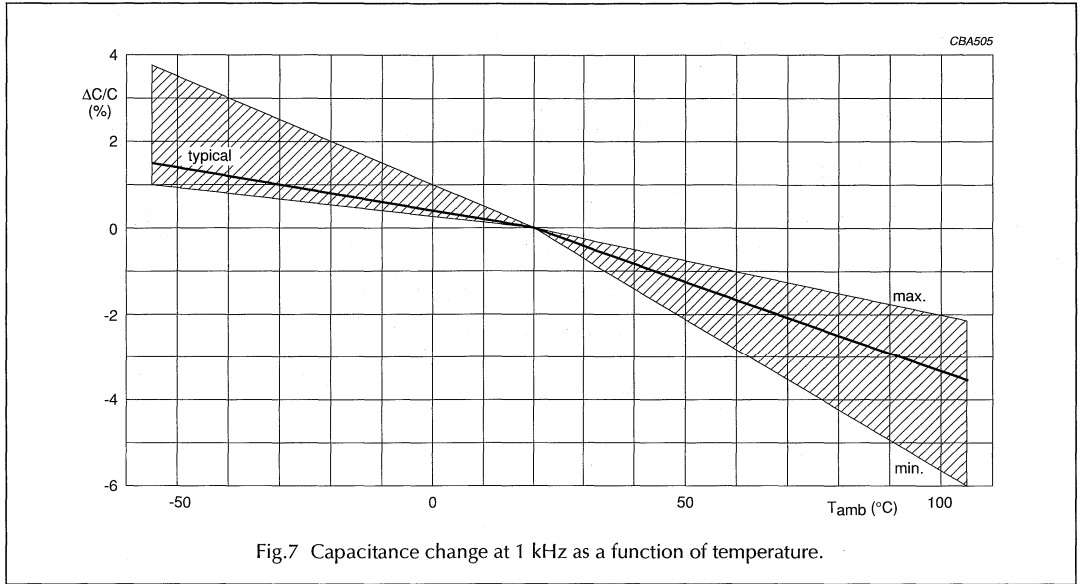
For detailed tape specifications refer to this handbook, chapter "Packaging information".

Interference suppression film capacitors

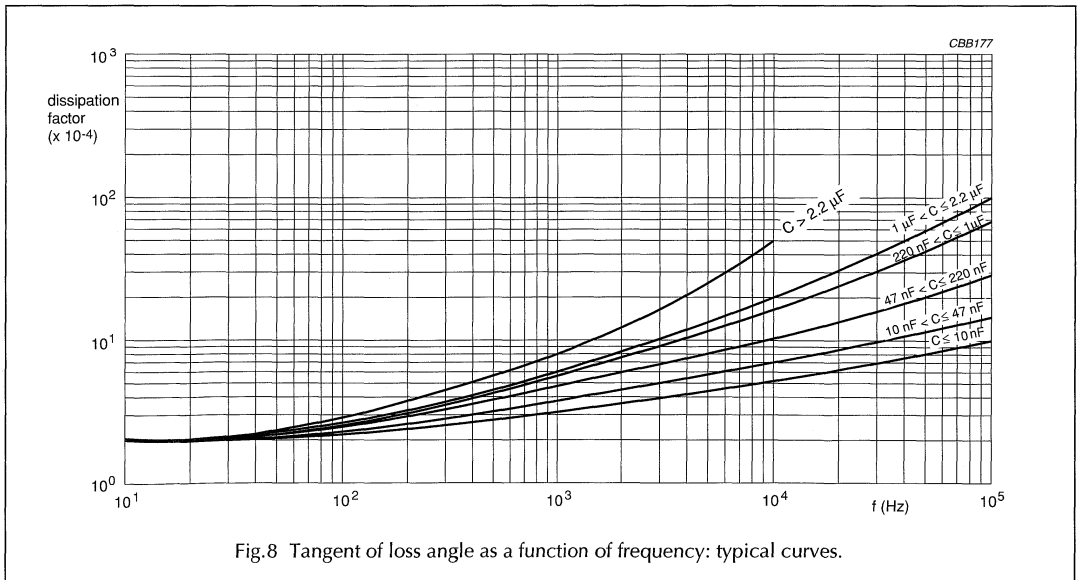
MKP 338 4 X2

CHARACTERISTICS

Capacitance



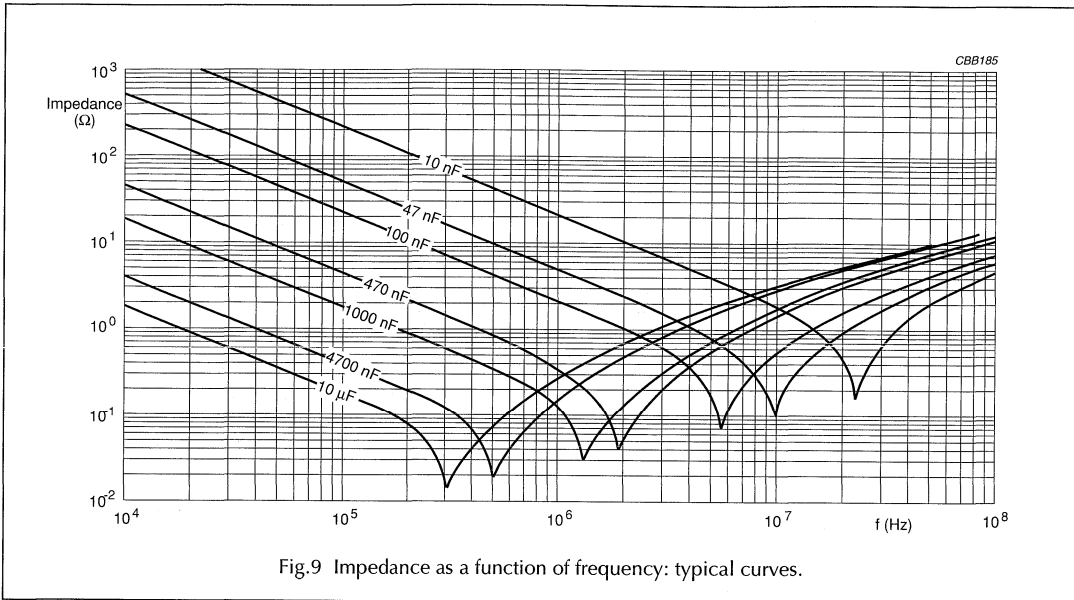
Tangent of loss angle



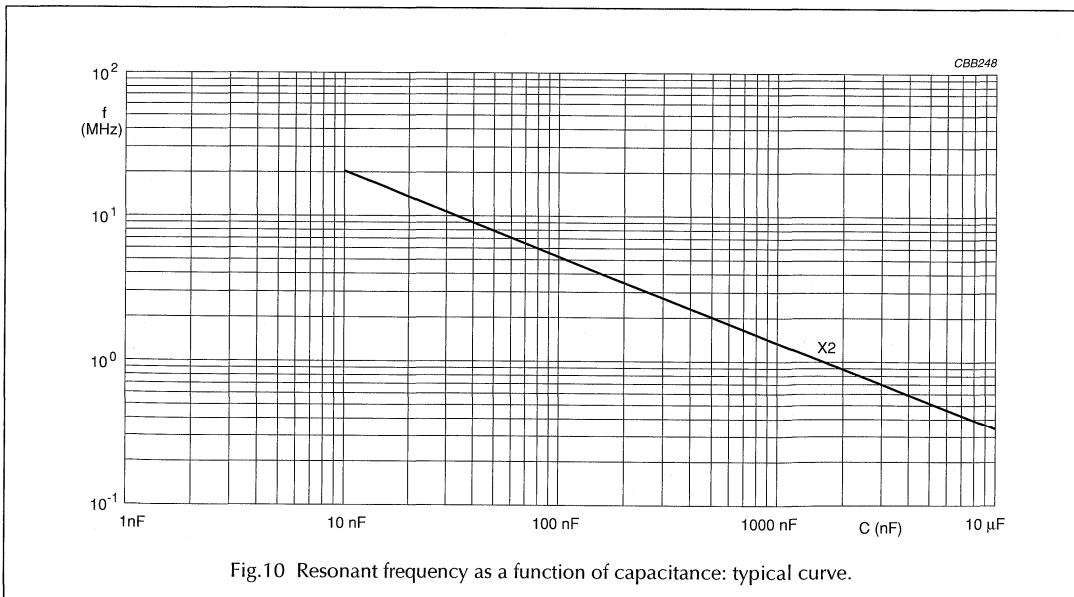
Interference suppression film capacitors

MKP 338 4 X2

Impedance



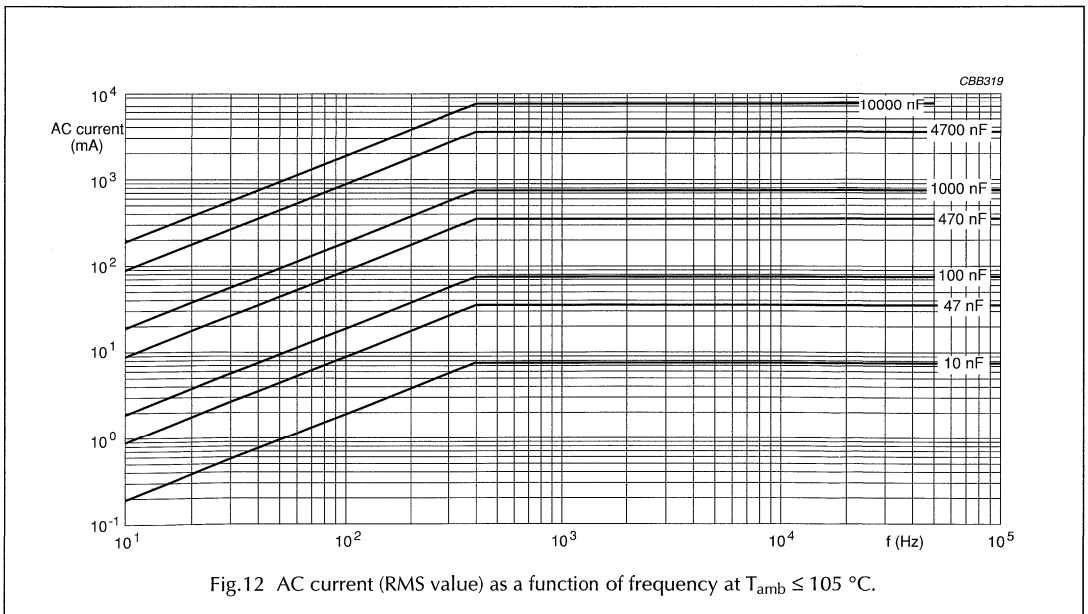
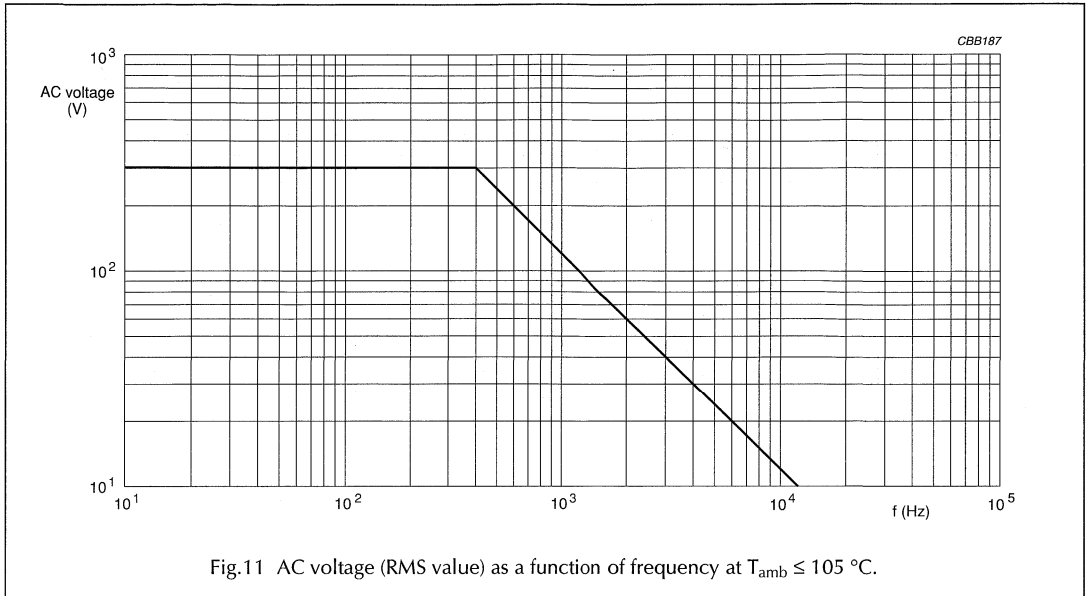
Resonant frequency



Interference suppression film capacitors

MKP 338 4 X2

Maximum RMS voltage and AC current (sinewave) as a function of frequency for $T_{amb} \leq 105 \text{ }^\circ\text{C}$



Interference suppression film capacitors

MKP 338 4 X2

Insulation resistance

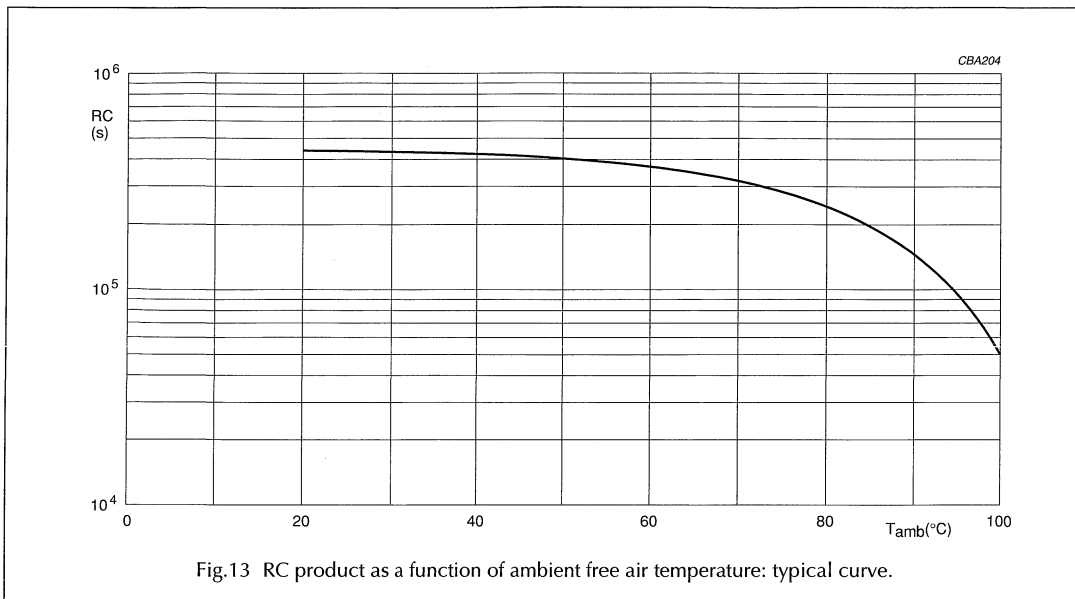


Fig.13 RC product as a function of ambient free air temperature: typical curve.

APPLICATION NOTES

- For X2 electromagnetic interference suppression in across the line applications (50/60 Hz) with a maximum mains voltage of 300 V (AC) $\pm 10\%$ instability.
- These capacitors are not intended for continuous pulse applications. For these situations, capacitors of the AC and pulse program must be used, such as: 2222 375; 2222 383 or 2222 479
- The maximum ambient temperature must not exceed 105 °C.
- Rated voltage pulse slope:
 - If the pulse voltage is lower than the rated voltage, the values of the specific reference data can be multiplied by 420 V (DC) and divided by the applied voltage.

Interference suppression film capacitors

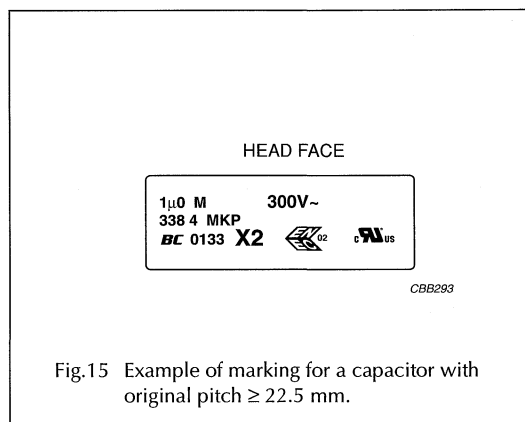
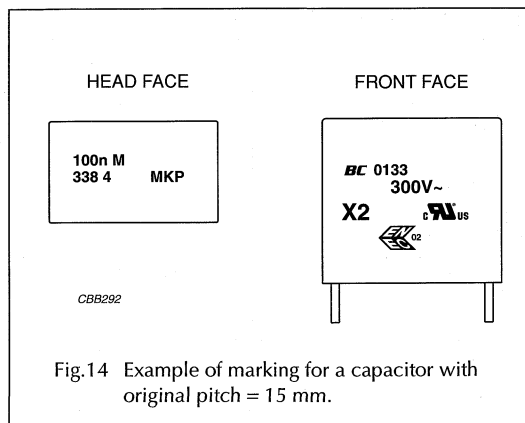
MKP 338 4 X2

MARKING

Product marking

The capacitors are marked (see Figs 14 to 15) with the following information:

1. Rated capacitance code in accordance with "IEC 60062"
2. Tolerance on rated capacitance; M = $\pm 20\%$; K = $\pm 10\%$
3. Rated (AC) voltage (e.g. 300 V)
4. Sub-class (e.g. X2)
5. Manufacturer's type designation (e.g. 338 4)
6. Code for dielectric material (MKP)
7. Manufacturer and origin (" " Belgium; "PL" Poland)
8. Year and week of manufacture (e.g. 0133).



Interference suppression film capacitors

MKP 338 4 X2

QUICK REFERENCE TEST REQUIREMENTS

TEST	PROCEDURE (quick reference)	REQUIREMENTS
Robustness of leads		
Tensile strength: "IEC 60068-2-21"	load 10 N; 10 s	no visible damage legible marking $ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 80 \times 10^{-4}$ ($C \leq 1 \mu\text{F}$); note 1 $\Delta \tan \delta \leq 50 \times 10^{-4}$ ($C > 1 \mu\text{F}$); note 1
Bending: "IEC 60068-2-21"	load 5 N; $4 \times 90^\circ$	
Resistance to soldering heat: "IEC 60068-2-20"	solder bath: 260 °C; 10 s	
Component solvent resistance	isopropyl alcohol; 23 °C; 5 minutes	
Robustness of component (fixed leads only)		
Rapid change of temperature: "IEC 60068-2-14"	5 cycles 1 cycle = 30 minutes at -55°C and 30 minutes at 105°C	$ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 80 \times 10^{-4}$ ($C \leq 1 \mu\text{F}$); note 1 $\Delta \tan \delta \leq 50 \times 10^{-4}$ ($C > 1 \mu\text{F}$); note 1
Vibration: "IEC 60068-2-6"	10 to 55 Hz; amplitude 0.75 mm; 6 hours	
Shock: "IEC 60068-2-27"	half sinewave; 490 m/s ² ; 11 ms	
Climatic sequence		
Dry heat: "IEC 60068-2-2"	16 hours; 105°C	$ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 80 \times 10^{-4}$ ($C \leq 1 \mu\text{F}$); note 1 $\Delta \tan \delta \leq 50 \times 10^{-4}$ ($C > 1 \mu\text{F}$); note 1 Rins $\geq 50\%$ of specified value
Damp heat, cyclic, test Db, first cycle: "IEC 60068-2-30"		
Cold: "IEC 60068-2-1"	2 hours; -55°C	
Damp heat, cyclic, test Db, remaining cycles: "IEC 60068-2-30"		
Voltage proof: "IEC 60384-14"	$V_p = 1290 \text{ V (DC)}$; 1 minute	
Other applicable tests		
Damp heat, steady state: "IEC 60068-2-3"	56 days; 40°C ; 90 to 95% RH no load $V_p = 1290 \text{ V (DC)}$; 1 minute	$ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 80 \times 10^{-4}$ ($C \leq 1 \mu\text{F}$); note 1 $\Delta \tan \delta \leq 50 \times 10^{-4}$ ($C > 1 \mu\text{F}$); note 1 Rins $\geq 50\%$ of specified value
Endurance (AC): "IEC 60384-14"	$3 \times 2.5 \text{ kV}$ pulse voltage for X2; 1000 hours; $1.25 \times U_{\text{Rac}}$ at 105°C ; once per hour; 0.1 s; 1000 V (RMS) via resistor of 47 Ω ; $V_p = 1290 \text{ V (DC)}$; 1 minute	

Interference suppression film capacitors**MKP 338 4 X2**

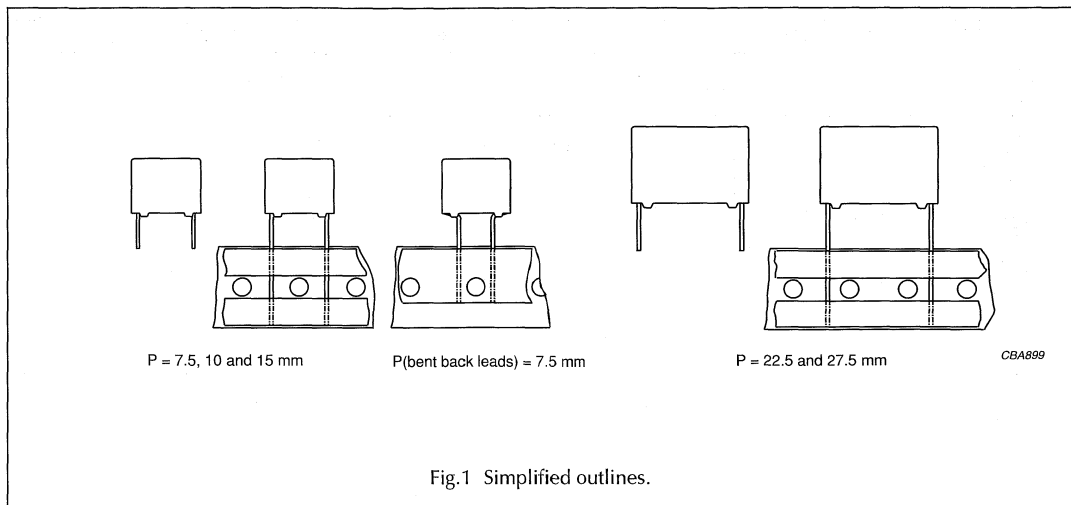
TEST	PROCEDURE (quick reference)	REQUIREMENTS
Charge and discharge: "IEC 60384-14"	10000 cycles; 5 ms; 1.5 × dV/dt	$ \Delta C/C \leq 10\%$ $\Delta \tan \delta \leq 80 \times 10^{-4}$ ($C \leq 1 \mu\text{F}$); note 1 $\Delta \tan \delta \leq 50 \times 10^{-4}$ ($C > 1 \mu\text{F}$); note 1 Rins $\geq 50\%$ of specified value
Passive flammability: "IEC 60384-14"	class B	no burning
Active flammability: "IEC 60384-14"	20 × 2.5 kV discharge	no burning
Heat storage: "IEC 60384-14"	1 000 hours; 105 °C	$ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 80 \times 10^{-4}$ ($C \leq 1 \mu\text{F}$); note 1 $\Delta \tan \delta \leq 50 \times 10^{-4}$ ($C > 1 \mu\text{F}$); note 1
Resistance to soldering heat with preheating: "IEC 60384-14"	preheating: 105 °C; solder bath: 260 °C; 10 s	$ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 80 \times 10^{-4}$ ($C \leq 1 \mu\text{F}$); note 1 $\Delta \tan \delta \leq 50 \times 10^{-4}$ ($C > 1 \mu\text{F}$); note 1
Active flammability test	voltage proof up to 2 × peak impulse voltage of 4.13 or until breakdown (100 V/sec, current limited 2mA) failed capacitors connected to a 300 V (AC) power supply during 5 minutes.	no burning

Note

1. Measuring frequency 10 kHz for $C \leq 1 \mu\text{F}$ and 1 kHz for $C > 1 \mu\text{F}$.

Interference suppression film capacitors MKP 338 2 X2

MKP RADIAL POTTED TYPE

 PITCH 7.5/10/15/22.5/27.5 mm
 PITCH 7.5 mm (bent back leads)


FEATURES

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

APPLICATIONS

- For X2 electromagnetic interference suppression
- Specially designed to meet the requirements of the "IEC 60384-14 2nd edition and EN 132400", requiring for X2 a 2.5 kV peak pulse voltage test and both UL1414 and CSA-C22.2 No 1 specifications.







DETAIL SPECIFICATION

For more detailed data and test requirements see "Type detail specification HQN-384-14/111".

QUICK REFERENCE DATA

DESCRIPTION	VALUE
Capacitance range (E12 series)	0.001 to 3.3 μ F
Capacitance tolerance	\pm 20%; \pm 10%; \pm 5%
Rated (AC) voltage, 50 to 60 Hz	275 V
Rated (DC) voltage	630 V
Climatic category	55/105/56/B
Rated temperature	105 $^{\circ}$ C
Maximum application temperature	105 $^{\circ}$ C
Reference specifications	IEC 60384-14 2 nd edition and EN 132400
Safety approvals:	
250 V	CSA-C22.2 No 1; UL1414
275 V	CSA-C22.2 No 8; CCEE
275 V	SEV; VDE; FI; N; D; S; IMQ; ÖVE
305 V	UL1283
Materials	qualified in accordance with UL94V-O
Safety class	X2; across the line

Interference suppression film capacitors**MKP 338 2 X2****SAFETY APPROVALS AND SAFETY TEST REPORT****Approvals**









SAFETY APPROVALS (X2)		VOLTAGE	VALUE	FILE NUMBERS
	UL1414	250 V (AC)	1 nF to 1 µF	E112471
	UL1283	305 V (AC)	1 nF to 3.3 µF	E109565
	CSA-C22.2 No.1	250 V (AC)	1 nF to 1 µF	1087424 (LR94054-15)
	CSA-C22.2 No.8	275 V (AC)	1 nF to 3.3 µF	1078568
	CCEE	275 V (AC)	1 nF to 3.3 µF	CH0038043-99
	EN132400	275 V (AC)	1 nF to 3.3 µF	ENEC/B05/2001

Safety test report

SAFETY TEST REPORT	VOLTAGE	VALUE	FILE NUMBERS
CB TEST CERTIFICATE	275 V (AC)	1 nF to 3.3 µF: 55/100/56/B	FI 1095A2 and FI 1709

The EneC-approval together with the CB-Certificate replace all national approval marks of the following countries (they have already signed the ENEC-Agreement): Austria; Belgium; Czech. Republic; Denmark; Finland; France; Germany; Greece; Hungary; Ireland; Italy; Luxembourg; Netherlands; Norway; Portugal; Slovenian; Spain; Sweden; Switzerland and United Kingdom.

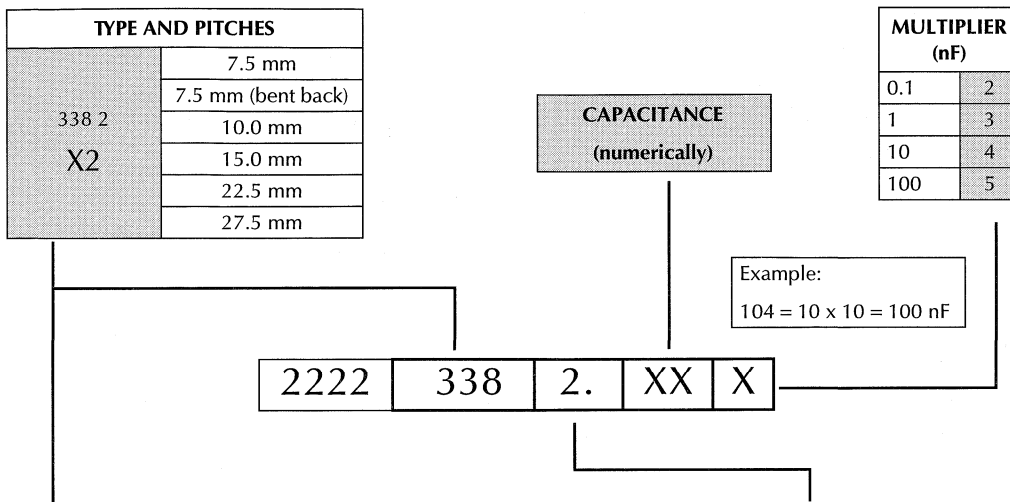
Safety approvals to be replaced by ENEC during 2001

SAFETY APPROVALS (X2)	VOLTAGE	VALUE	FILE NUMBERS	
	SEV (EN132400)	275 V (AC)	1 nF to 3.3 µF	99,6 60107,02
	VDE (EN132400)	275 V (AC)	1 nF to 3.3 µF	115223
	FI (EN132400)	275 V (AC)	1 nF to 3.3 µF	FI 11681A1
	NEMKO (EN132400)	275 V (AC)	1 nF to 3.3 µF	P00101845
	DEMKO (EN132400)	275 V (AC)	1 nF to 3.3 µF	308077-02
	SEMKO (EN132400)	275 V (AC)	1 nF to 3.3 µF	9839136/02
	IMQ (EN132400)	275 V (AC)	1 nF to 3.3 µF	V4693
	ÖVE (EN132400)	275 V (AC)	1 nF to 3.3 µF	E260-009

Interference suppression film capacitors

MKP 338 2 X2

COMPOSITION OF CATALOGUE NUMBER



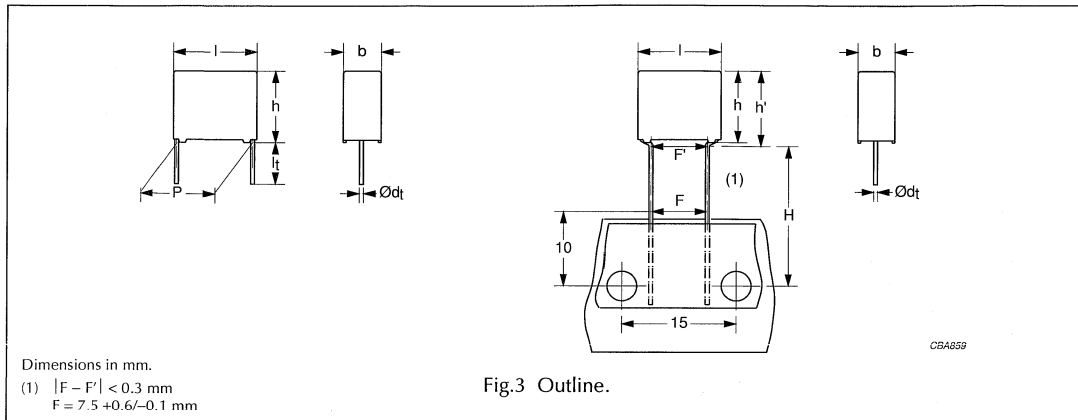
TYPE	PACKAGING	STANDARD DIMENSIONS	C-TOL	PREFERRED TYPES
338 2 X2	loose in box	lead length 3.5 mm	±20%	20
		lead length 5.0 mm		22
		lead length 25.0 mm		24
	taped	pitch 7.5 mm or bent back to 7.5 mm		26
		ALTERNATIVE LARGER PITCH SIZES		ON REQUEST
338 2 X2	loose in box	lead length 3.5 mm	±20%	21
		lead length 5.0 mm		23
		lead length 25.0 mm		25
		ALTERNATIVE TAPED VERSION		ON REQUEST
338 2 X2	taped		±20%	27
		ALTERNATIVE C-TOL		ON REQUEST
338 2 X2	loose in box	lead length 3.5 mm	±10%	2....
			±5%	2....
		lead length 5.0 mm	±10%	2....
			±5%	2....
		lead length 25.0 mm	±10%	2....
			±5%	2....
	taped	pitch 7.5 mm or bent back to 7.5 mm	±10%	2....
			±5%	2....

Interference suppression film capacitors

MKP 338 2 X2

MKP 338 2 GENERAL DATA

PITCH 7.5/10 mm; PITCH 7.5 mm (bent back leads)



Specific reference data for the 275 V AC (X2) capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle: $C \leq 100 \text{ nF}$	$\leq 10 \times 10^{-4}$	$\leq 20 \times 10^{-4}$	$\leq 100 \times 10^{-4}$
Rated voltage pulse slope (dU/dt)R at 385 V (DC)	100 V/ μs		
R between leads, for $C \leq 0.33 \mu\text{F}$ at 100 V; 1 minute	$>15000 \text{ M}\Omega$		
R between leads and case; 100 V; 1 minute	$>30000 \text{ M}\Omega$		
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	2200 V; 1 minute		
Withstanding (AC) voltage between leads and case	2050 V; 1 minute		

Available 275 V AC (X2) versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 3.5 +1/-0.5 \text{ mm}$	$\pm 20\%$	2222 338 20...	preferred
		$\pm 20\%$	2222 338 21...; note 1	on request
		$\pm 10\%$	2222 338 2...; note 2	on request
	$l_t = 5.0 \pm 1.0 \text{ mm}$	$\pm 5\%$	2222 338 2...; note 2	on request
		$\pm 20\%$	2222 338 22...	preferred
		$\pm 20\%$	2222 338 23...; note 1	on request
		$\pm 10\%$	2222 338 2...; note 2	on request
		$\pm 5\%$	2222 338 2...; note 2	on request
		$l_t = 25.0 \pm 2.0 \text{ mm}$	$\pm 20\%$	2222 338 24...
$\pm 20\%$	2222 338 25...; note 1		on request	
$\pm 10\%$	2222 338 2...; note 2		on request	
Taped on reel; bent back	$H = 16.0 \text{ mm}$; for $P_0 = 15.0 \text{ mm}$	$\pm 5\%$	2222 338 2...; note 2	on request
		$\pm 20\%$	2222 338 26...	preferred
		$\pm 10\%$	2222 338 2...; note 2	on request
Taped	$H = 18.5 \text{ mm}$; for $P_0 = 12.7 \text{ mm}$	$\pm 5\%$	2222 338 2...; note 2	on request
		$\pm 20\%$	2222 338 27...	on request
		$\pm 10\%$	2222 338 2...; note 2	on request
		$\pm 5\%$	2222 338 2...; note 2	on request

Notes

1. Alternative larger pitch sizes.
2. Other dimensions for $\pm 10\%$ and $\pm 5\%$ tolerance values.

Interference suppression film capacitors

MKP 338 2 X2

 $U_{Rac} = 275 \text{ V (X2)}; U_{Rdc} = 630 \text{ V}$

C (μF)	DIMENSIONS ⁽¹⁾ $b \times h (h') \times l$ (mm)	MASS (g)	CATALOGUE NUMBER			
			LOOSE IN BOX			TAPED
			short leads		long leads	
			$l_1 = 3.5+1/-0.5 \text{ mm}$	$l_1 = 5.0 \pm 1.0 \text{ mm}$	$l_1 = 25.0 \pm 2.0 \text{ mm}$	H = 16.0 mm; P ₀ = 15.0 mm
			C-tol = $\pm 20\%$			C-tol = $\pm 20\%$
			catalogue number	last 5 digits		last 5 digits
Pitch = $7.5 \pm 0.4 \text{ mm}$; $d_t = 0.50 \pm 0.05 \text{ mm}$					ammopack; pitch = 7.5 mm	
0.001	4.0 × 9.0 × 10.0	0.5	2222 338 20102	.. 22102	.. 24102	.. 26102
0.0015			2222 338 20152	.. 22152	.. 24152	.. 26152
0.0022			2222 338 20222	.. 22222	.. 24222	.. 26222
0.0033			2222 338 20332	.. 22332	.. 24332	.. 26332
0.0047			2222 338 20472	.. 22472	.. 24472	.. 26472
0.0068			2222 338 20682	.. 22682	.. 24682	.. 26682
0.01			2222 338 20103	.. 22103	.. 24103	.. 26103
0.015			2222 338 20153	.. 22153	.. 24153	.. 26153
0.022			2222 338 20223	.. 22223	.. 24223	.. 26223
0.033			5.0 × 10.5 × 10.0	0.9	2222 338 20333	.. 22333
0.047	6.0 × 11.5 × 10.0	1.0	2222 338 20473	.. 22473	.. 24473	.. 26473
Pitch = $10.0 \pm 0.4 \text{ mm}$; $d_t = 0.60 \pm 0.06 \text{ mm}$					reel; pitch = 7.5 mm (bent back)	
0.068	6.0 × 12.0 (14.0) × 12.5	1.3	2222 338 20683	.. 22683	.. 24683	.. 26683
0.1			2222 338 20104	.. 22104	.. 24104	.. 26104

Note

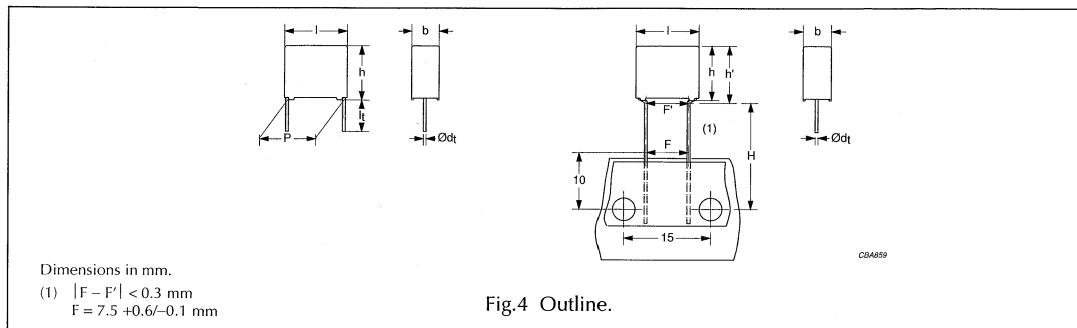
1. Dimensions in brackets for bent back leads.

Interference suppression film capacitors

MKP 338 2 X2

MKP 338 2 GENERAL DATA

PITCH 15/22.5/27.5 mm; PITCH 7.5 mm (bent back leads)



Specific reference data for the 275 V AC (X2) capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle: $C \leq 470 \text{ nF}$ $470 \text{ nF} < C \leq 1 \mu\text{F}$ $C > 1 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 20 \times 10^{-4}$	$\leq 100 \times 10^{-4}$
Rated voltage pulse slope (dU/dt)R at 385 V (DC)	$\leq 20 \times 10^{-4}$	$\leq 70 \times 10^{-4}$	—
R between leads, for $C \leq 0.33 \mu\text{F}$ at 100 V; 1 minute	$\leq 30 \times 10^{-4}$	—	—
RC between leads, for $C > 0.33 \mu\text{F}$ at 100 V; 1 minute	100 V/ μs		
R between leads and case; 100 V; 1 minute	>15000 M Ω		
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s: $C \leq 1 \mu\text{F}$ $C > 1 \mu\text{F}$	>5000 s		
Withstanding (AC) voltage between leads and case	>30000 M Ω		
	2200 V; 1 minute		
	1800 V; 1 minute		
	2050 V; 1 minute		

Available 275 V AC (X2) versions

PACKAGING ⁽¹⁾	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 3.5 \pm 0.3 \text{ mm}$	$\pm 20\%$	2222 338 20...	preferred
		$\pm 20\%$	2222 338 21...; note 2	on request
		$\pm 10\%$	2222 338 2...; note 3	on request
	$l_t = 5.0 \pm 1.0 \text{ mm}$	$\pm 5\%$	2222 338 2...; note 3	on request
		$\pm 20\%$	2222 338 22...	preferred
		$\pm 20\%$	2222 338 23...; note 2	on request
		$\pm 10\%$	2222 338 2...; note 3	on request
		$\pm 5\%$	2222 338 2...; note 3	on request
		$\pm 20\%$	2222 338 24...	preferred
Taped on reel; bent back	$H = 16.0 \text{ mm}$; for $P_0 = 15.0 \text{ mm}$	$\pm 20\%$	2222 338 25...; note 2	on request
		$\pm 10\%$	2222 338 2...; note 3	on request
		$\pm 5\%$	2222 338 2...; note 3	on request
		$\pm 20\%$	2222 338 27...	on request
Taped	$H = 18.5 \text{ mm}$; for $P_0 = 12.7 \text{ mm}$	$\pm 10\%$	2222 338 2...; note 3	on request
		$\pm 5\%$	2222 338 2...; note 3	on request
		$\pm 5\%$	2222 338 2...; note 3	on request

Notes

1. Taped on reel pitch = 27.5 mm is not available.
2. Alternative larger pitch sizes.
3. Other dimensions for ± 10 and $\pm 5\%$ tolerance values.

Interference suppression film capacitors

MKP 338 2 X2

 $U_{Rac} = 275 \text{ V (X2)}$; $U_{Rdc} = 630 \text{ V}$

C (μF)	DIMENSIONS ⁽¹⁾ $b \times h (h') \times l$ (mm)	MASS (g)	CATALOGUE NUMBER				
			LOOSE IN BOX			REEL	
			short leads		long leads		
			$l_1 = 3.5 \pm 0.3 \text{ mm}$	$l_1 = 5.0 \pm 1.0 \text{ mm}$	$l_1 = 25.0 \pm 2.0 \text{ mm}$		$H = 16.0 \text{ mm};$ $P_0 = 15.0 \text{ mm}$
			C-tol = $\pm 20\%$				C-tol = $\pm 20\%$
catalogue number		last 5 digits			last 5 digits		
Pitch = $15.0 \pm 0.4 \text{ mm}$; $d_1 = 0.80 \pm 0.08 \text{ mm}$						pitch = 7.5 mm (bent back)	
0.15	$7.0 \times 13.5 (15.5) \times 17.5$	1.9	2222 338 20154	.. 22154	.. 24154	.. 26154	
0.22	$8.5 \times 15.0 (17.0) \times 17.5$	2.6	2222 338 20224	.. 22224	.. 24224	.. 26224	
0.33	$10.0 \times 16.5 (18.5) \times 17.5$	3.1	2222 338 20334	.. 22334	.. 24334	.. 26334	
Pitch = $22.5 \pm 0.4 \text{ mm}$; $d_1 = 0.80 \pm 0.08 \text{ mm}$						pitch = 7.5 mm (bent back)	
0.47	$8.5 \times 18.0 \times 26.0$	4.4	2222 338 20474	.. 22474	.. 24474	not available	
0.68	$10.0 \times 19.5 \times 26.0$	5.5	2222 338 20684	.. 22684	.. 24684		
1	$12.0 \times 22.0 \times 26.0$	7.8	2222 338 20105	.. 22105	.. 24105		
Pitch = $27.5 \pm 0.4 \text{ mm}$; $d_1 = 0.80 \pm 0.08 \text{ mm}$						pitch = 7.5 mm (bent back)	
1.5	$15.0 \times 25.0 \times 31.0$	12.8	2222 338 20155	.. 22155	.. 24155	not available	
2.2	$18.0 \times 28.0 \times 31.0$	17.2	2222 338 20225	.. 22225	.. 24225		
3.3	$21.0 \times 31.0 \times 31.0$	20.4	2222 338 20335	.. 22335	.. 24335		

Note

1. Dimensions in brackets for bent back leads.

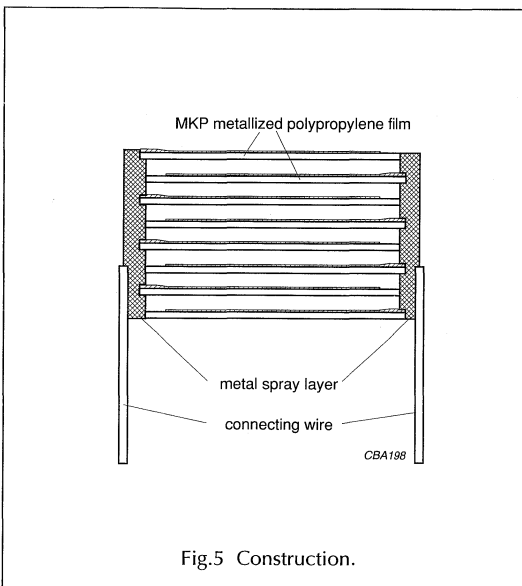
Interference suppression film capacitors

MKP 338 2 X2

CONSTRUCTION

Description

- Low-inductive wound cell of metallized polypropylene (PP) film, potted with epoxy resin in a flame-retardant 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 tape specifications refer to this handbook, chapter "Packaging information".

SPECIFIC METHOD OF MOUNTING TO WITHSTAND VIBRATION AND SHOCK

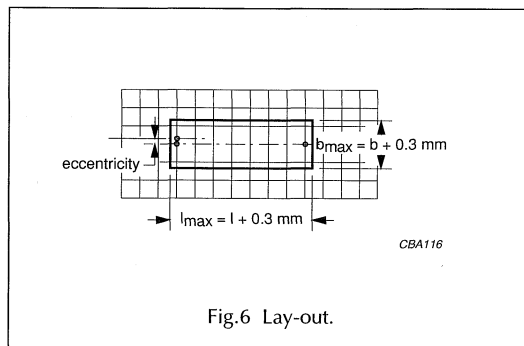
In order to withstand vibration and shock tests, it must be ensured that the stand-off pips are in good contact with the printed-circuit board:

- For pitches ≤ 15 mm 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 Fig.6:

- Eccentricity as in Fig.6. 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 60717" as reference: $h_{\max} \leq h + 0.3$ mm or $h_{\max} \leq h' + 0.3$ mm.



Storage temperature

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

RATINGS AND CHARACTERISTICS REFERENCE CONDITIONS

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 $50 \pm 2\%$.

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

Interference suppression film capacitors

MKP 338 2 X2

CHARACTERISTICS

Capacitance

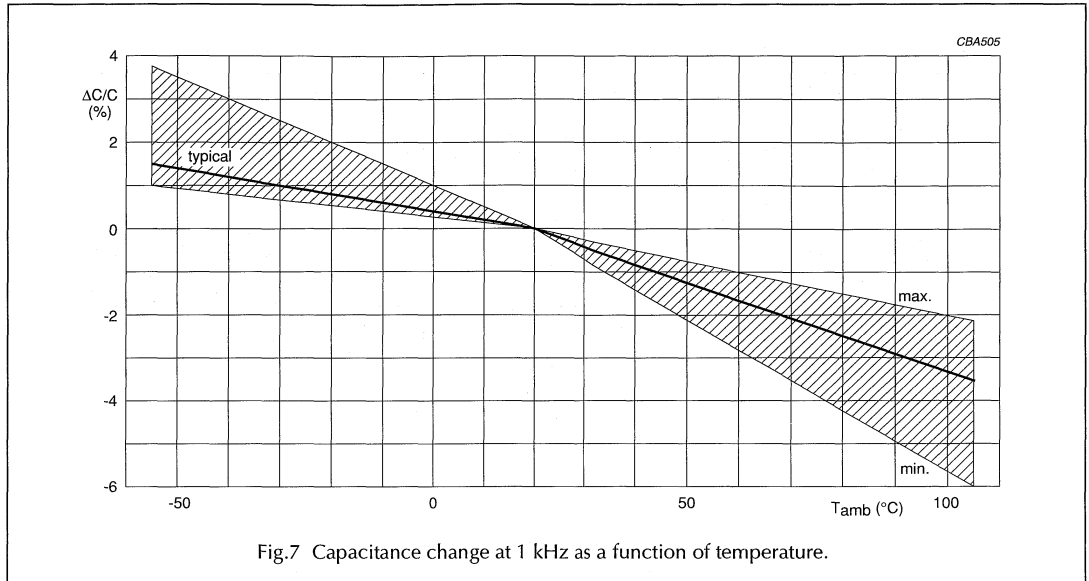


Fig.7 Capacitance change at 1 kHz as a function of temperature.

Tangent of loss angle

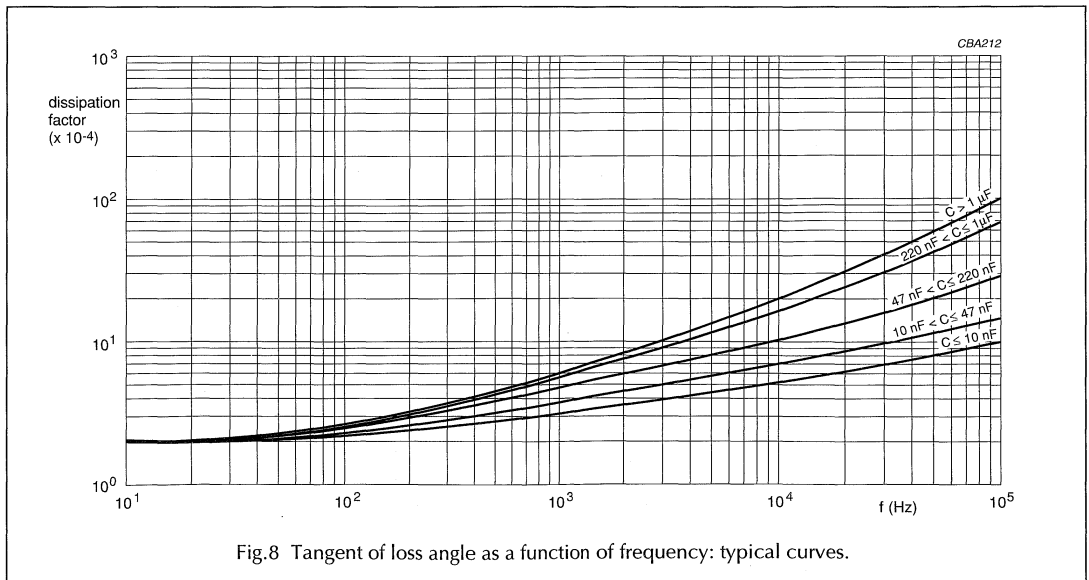
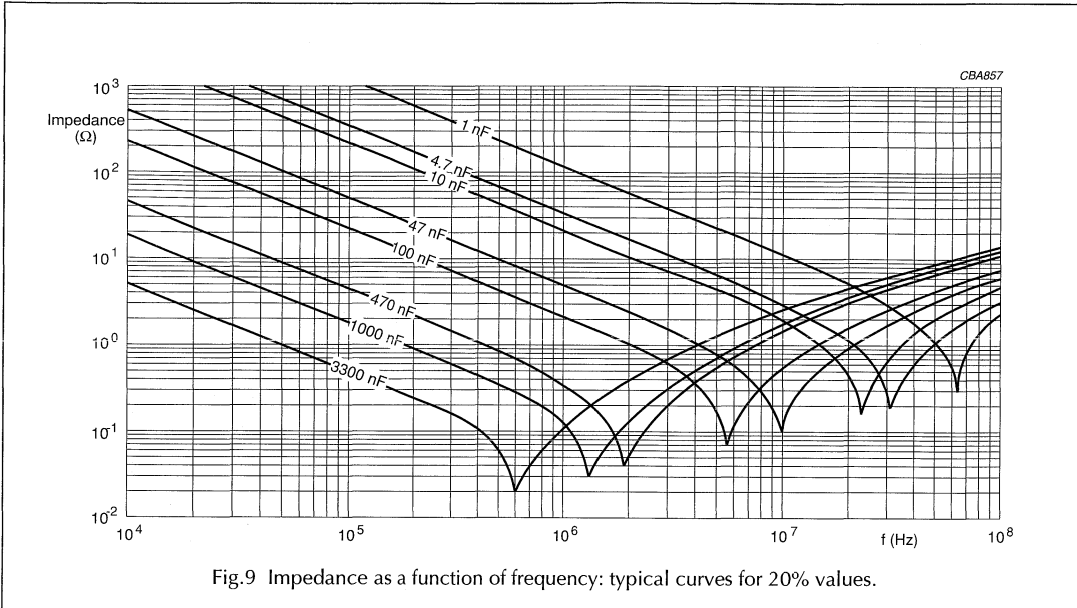


Fig.8 Tangent of loss angle as a function of frequency: typical curves.

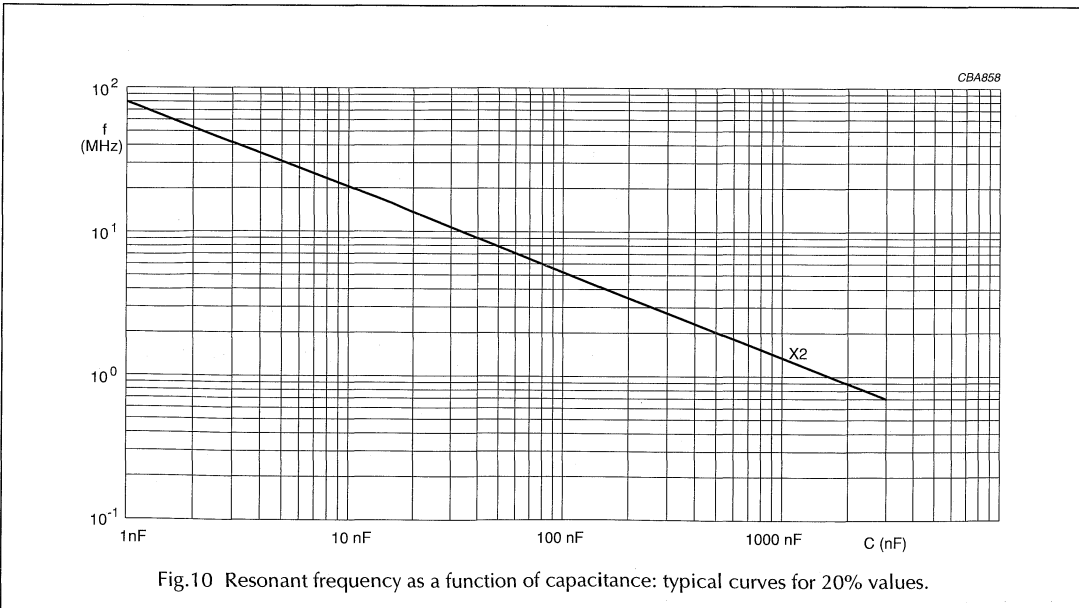
Interference suppression film capacitors

MKP 338 2 X2

Impedance

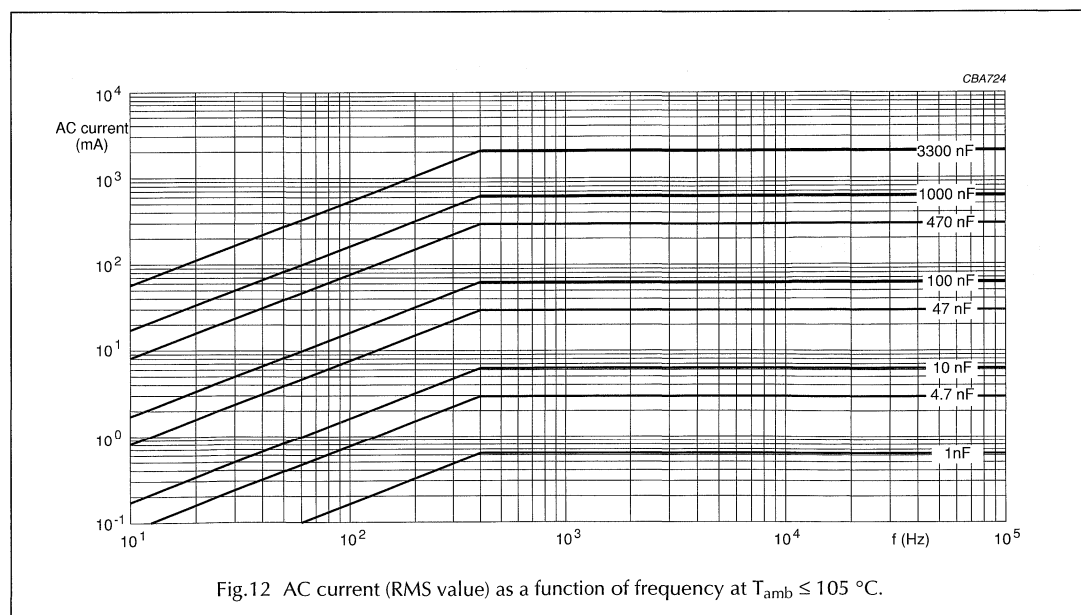
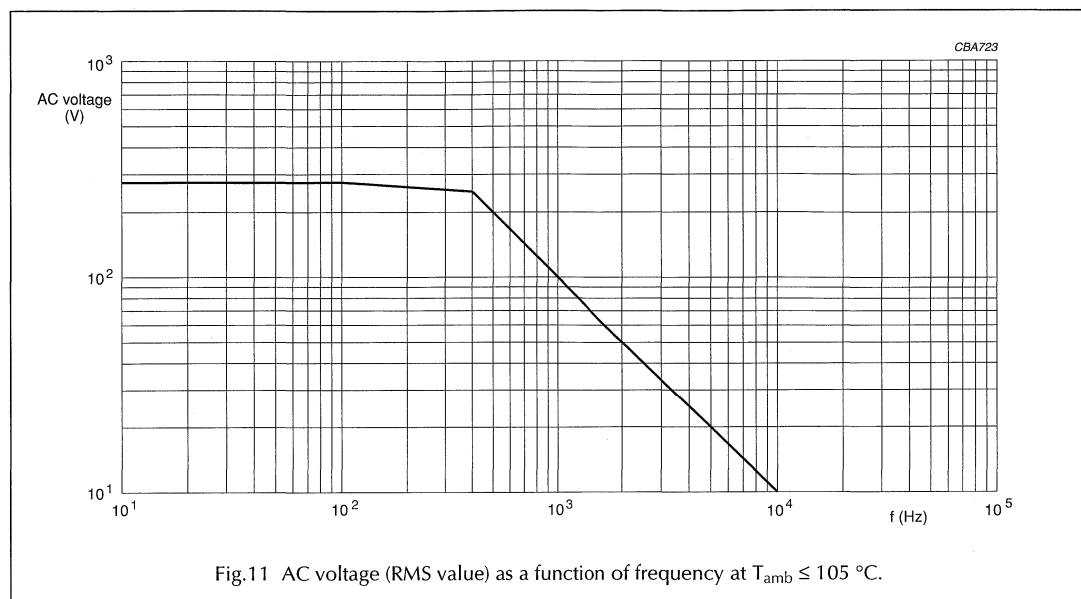


Resonant frequency



Interference suppression film capacitors

MKP 338 2 X2

Maximum RMS voltage and AC current (sinewave) as a function of frequency for $T_{amb} \leq 105\text{ }^{\circ}\text{C}$ 

Interference suppression film capacitors

MKP 338 2 X2

Insulation resistance

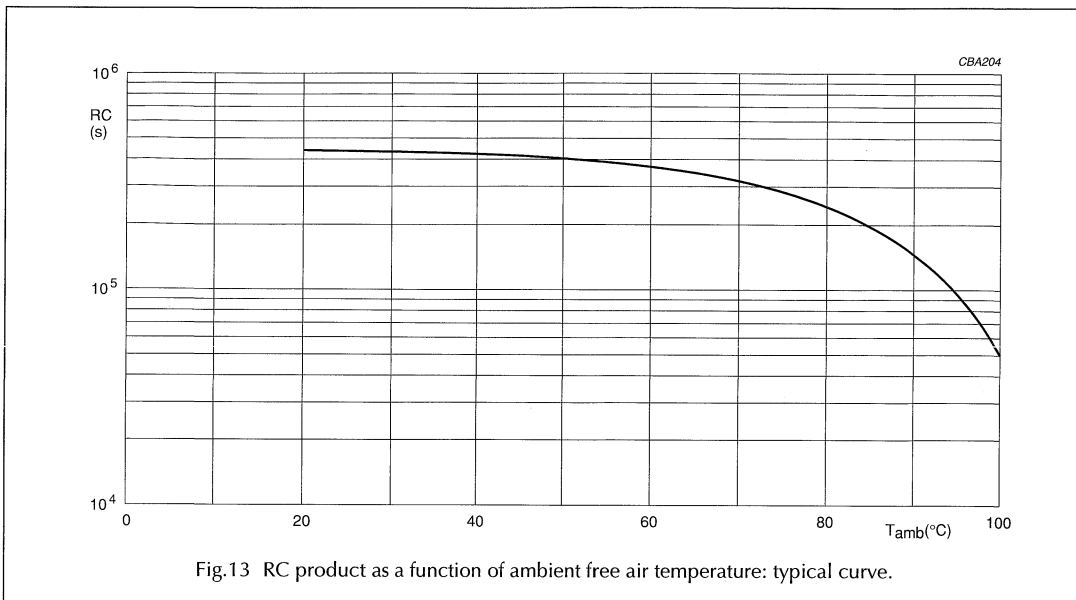


Fig.13 RC product as a function of ambient free air temperature: typical curve.

APPLICATION NOTES

- For X2 electromagnetic interference suppression in across the line applications (50/60 Hz) with a maximum mains voltage of 275 V (AC) $\pm 10\%$ instability.
- These capacitors are not intended for continuous pulse applications. For these situations, capacitors of the AC and pulse program must be used, such as: 2222 375; 2222 383 or 2222 479
- The maximum ambient temperature must not exceed 105 °C.
- Rated voltage pulse slope:
 - If the pulse voltage is lower than the rated voltage, the values of the specific reference data can be multiplied by 385 V (DC) and divided by the applied voltage.

Interference suppression film capacitors

MKP 338 2 X2

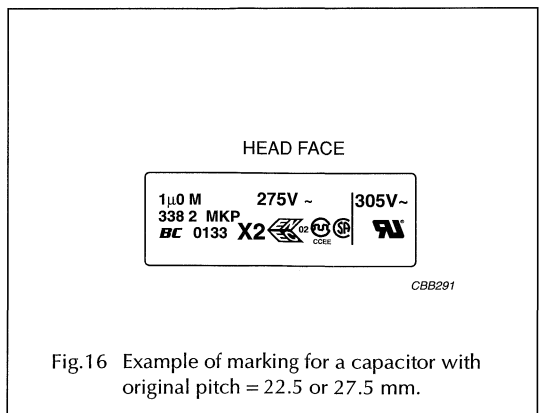
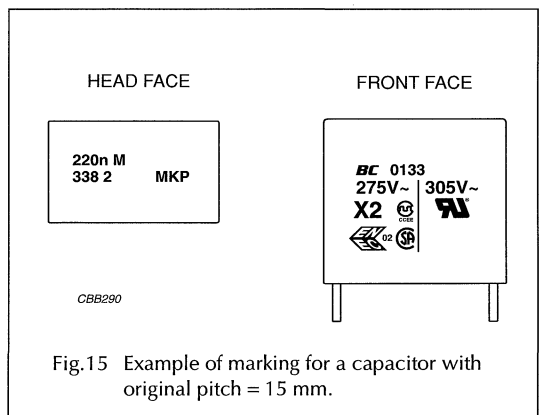
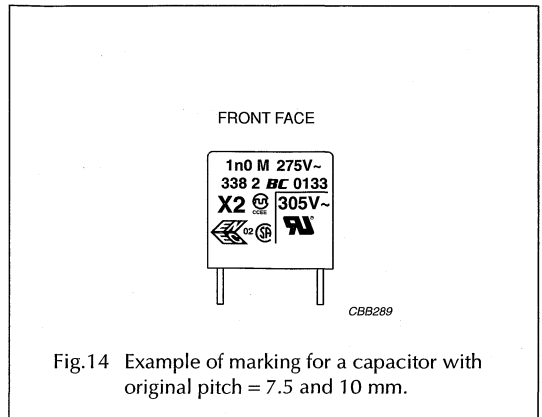
MARKING

Product marking

NEW MARKING (INTRODUCED DURING 2001)

The capacitors are marked (see Figs 14 to 16) with the following information:

1. Rated capacitance code in accordance with "IEC 60062"
2. Tolerance on rated capacitance; M = ±20%; K = ±10%; J = ±5%
3. Rated (AC) voltage (e.g. 275 V)
4. Sub-class (e.g. X2)
5. Manufacturer's type designation (e.g. 338 2)
6. Code for dielectric material (MKP) for capacitors with original pitch = 15, 22.5 and 27.5 mm
7. Manufacturer (BC)
8. Year and week of manufacture (e.g. 0133).



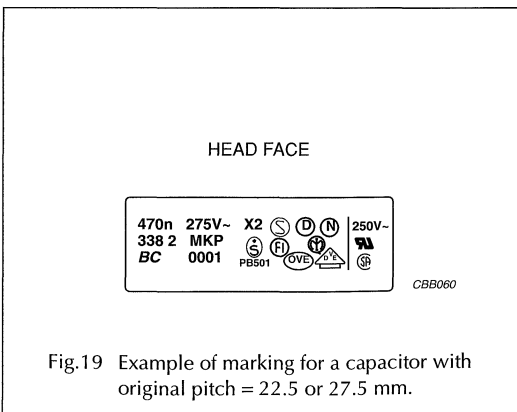
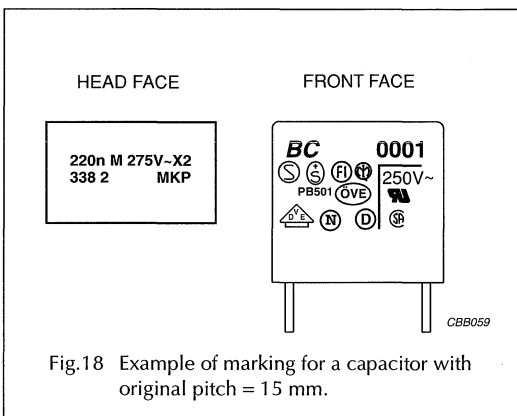
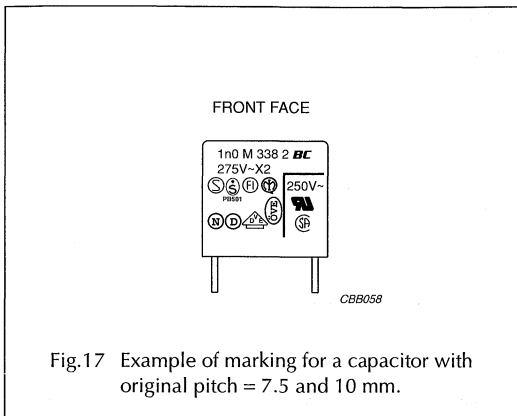
Interference suppression film capacitors

MKP 338 2 X2

PRESENT MARKING

The capacitors are marked (see Figs 17 to 19) with the following information:

1. Rated capacitance code in accordance with "IEC 60062"
2. Tolerance on rated capacitance; M = ±20%; K = ±10%; J = ±5%
3. Rated (AC) voltage (e.g. 275 V)
4. Sub-class (e.g. X2)
5. Manufacturer's type designation (e.g. 338 2)
6. Code for dielectric material (MKP) for capacitors with original pitch = 15, 22.5 and 27.5 mm
7. Manufacturer (BC)
8. Year and week of manufacture (e.g. 0001) for capacitors with original pitch = 15, 22.5 and 27.5 mm.



Interference suppression film capacitors**MKP 338 2 X2****QUICK REFERENCE TEST REQUIREMENTS**

TEST	PROCEDURE (quick reference)	REQUIREMENTS
Robustness of leads		
Tensile strength: "IEC 60068-2-21"	load 10 N; 10 s	no visible damage legible marking $ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 80 \times 10^{-4}$ ($C \leq 1 \mu\text{F}$); note 1 $\Delta \tan \delta \leq 50 \times 10^{-4}$ ($C > 1 \mu\text{F}$); note 1
Bending: "IEC 60068-2-21"	load 5 N; $4 \times 90^\circ$	
Resistance to soldering heat: "IEC 60068-2-20"	solder bath: 260 °C; 10 s	
Component solvent resistance	isopropyl alcohol; 23 °C; 5 minutes	
Robustness of component		
Rapid change of temperature: "IEC 60068-2-14"	5 cycles 1 cycle = 30 minutes at -55 °C and 30 minutes at 105 °C	$ \Delta C/C \leq 5\%$
Vibration: "IEC 60068-2-6"	10 to 55 Hz; amplitude 0.75 mm; 6 hours	$\Delta \tan \delta \leq 80 \times 10^{-4}$ ($C \leq 1 \mu\text{F}$); note 1 $\Delta \tan \delta \leq 50 \times 10^{-4}$ ($C > 1 \mu\text{F}$); note 1
Shock: "IEC 60068-2-27"	half sinewave; 490 m/s ² ; 11 ms	
Climatic sequence		
Dry heat: "IEC 60068-2-2"	16 hours; 105 °C	$ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 80 \times 10^{-4}$ ($C \leq 1 \mu\text{F}$); note 1 $\Delta \tan \delta \leq 50 \times 10^{-4}$ ($C > 1 \mu\text{F}$); note 1 $R_{\text{ins}} \geq 50\%$ of specified value
Damp heat, cyclic, test Db, first cycle: "IEC 60068-2-30"		
Cold: "IEC 60068-2-1"	2 hours; -55 °C	
Damp heat, cyclic, test Db, remaining cycles: "IEC 60068-2-30"		
Voltage proof: "IEC 60384-14"	$V_p = 1200 \text{ V (DC)}$; 1 minute	
Other applicable tests		
Damp heat, steady state: "IEC 60068-2-3"	56 days; 40 °C; 90 to 95% RH no load $V_p = 1200 \text{ V (DC)}$; 1 minute	$ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 80 \times 10^{-4}$ ($C \leq 1 \mu\text{F}$); note 1 $\Delta \tan \delta \leq 50 \times 10^{-4}$ ($C > 1 \mu\text{F}$); note 1 $R_{\text{ins}} \geq 50\%$ of specified value
Endurance (AC): "IEC 60384-14"	$3 \times 2.5 \text{ kV}$ pulse voltage for X2; 1000 hours; $1.25 \times U_{\text{Rac}}$ at 105 °C; once per hour; 0.1 s; 1000 V (RMS) via resistor of 47 Ω ; $V_p = 1200 \text{ V (DC)}$; 1 minute	$ \Delta C/C \leq 10\%$ $\Delta \tan \delta \leq 80 \times 10^{-4}$ ($C \leq 1 \mu\text{F}$); note 1 $\Delta \tan \delta \leq 50 \times 10^{-4}$ ($C > 1 \mu\text{F}$); note 1 $R_{\text{ins}} \geq 50\%$ of specified value

Interference suppression film capacitors**MKP 338 2 X2**

TEST	PROCEDURE (quick reference)	REQUIREMENTS
Charge and discharge: "IEC 60384-14"	10 000 cycles; 5 ms; $1.5 \times dV/dt$	$ \Delta C/C \leq 10\%$ $\Delta \tan \delta \leq 80 \times 10^{-4}$ ($C \leq 1 \mu\text{F}$); note 1 $\Delta \tan \delta \leq 50 \times 10^{-4}$ ($C > 1 \mu\text{F}$); note 1 $R_{\text{ins}} \geq 50\%$ of specified value
Passive flammability: "IEC 60384-14"	class B	no burning
Active flammability: "IEC 60384-14"	20×2.5 kV discharge	no burning
Heat storage: "IEC 60384-14"	1 000 hours; 105 °C	$ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 80 \times 10^{-4}$ ($C \leq 1 \mu\text{F}$); note 1 $\Delta \tan \delta \leq 50 \times 10^{-4}$ ($C > 1 \mu\text{F}$); note 1
Resistance to soldering heat with preheating: "IEC 60384-14"	preheating: 105 °C; solder bath: 260 °C; 10 s	$ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 80 \times 10^{-4}$ ($C \leq 1 \mu\text{F}$); note 1 $\Delta \tan \delta \leq 50 \times 10^{-4}$ ($C > 1 \mu\text{F}$); note 1
Active flammability test	voltage proof up to $2 \times$ peak impulse voltage of 4.13 or until breakdown (100 V/sec, current limited 2mA) failed capacitors connected to a 250 V (AC) power supply during 5 minutes.	no burning

Note

1. Measuring frequency 10 kHz for $C \leq 1 \mu\text{F}$ and 1 kHz for $C > 1 \mu\text{F}$.

Interference suppression film capacitors MKP 336 2 X2

MKP RADIAL POTTED TYPE

PITCH 10/15/22.5/27.5 mm

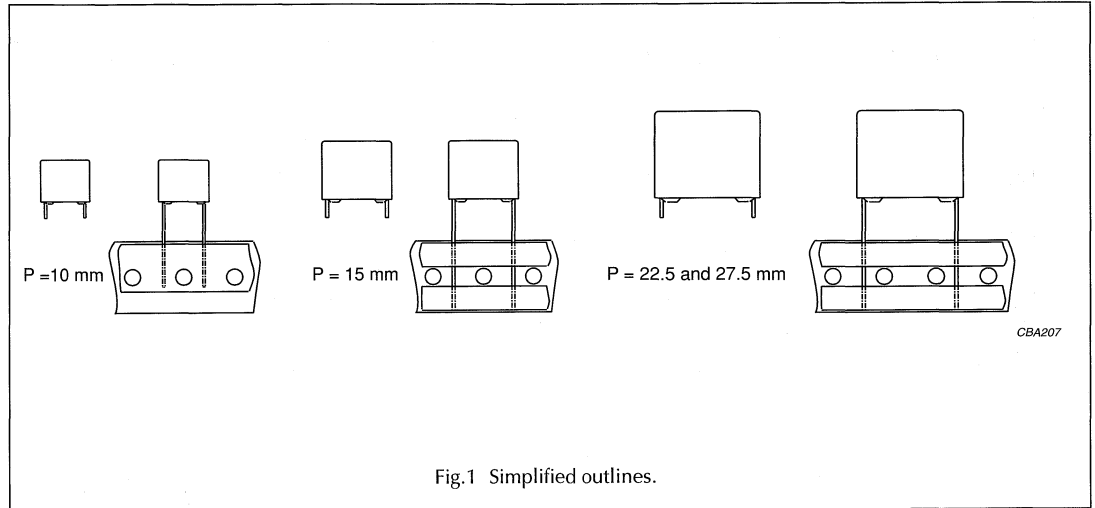


Fig.1 Simplified outlines.

FEATURES

- 10 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-retardant case.

APPLICATIONS

- For X2 electromagnetic interference suppression
- Specially designed to meet the requirements of the "IEC 60384-14 2nd edition and EN 132400", requiring a 2.5 kV peak pulse voltage test and UL1414 and CSA-C22.2 No. 1 specifications.






QUICK REFERENCE DATA

DESCRIPTION	VALUE
Capacitance range (E12 series)	0.001 to 2.2 μ F
Capacitance tolerance	\pm 20%; \pm 10%; \pm 5%
Rated (AC) voltage, 50 to 60 Hz	275 V
Rated (DC) voltage	630 V
Climatic category	55/100/21/B
Rated temperature	100 °C
Maximum application temperature	100 °C
Reference specifications	IEC 60384-14 2 nd edition and EN 132400
Safety approvals:	
250 V	UL1414; CSA-C22.2 No 1
275 V	UL1283
275 V	SEV; VDE; FI; N; D; S; IMQ; ÖVE
Materials	qualified in accordance with UL94V-O
Safety class	X2; across the line

DETAIL SPECIFICATION

For more detailed data and test requirements see "Type detail specification HQN-384-14/108".

Interference suppression film capacitors**MKP 336 2 X2****SAFETY APPROVALS AND SAFETY TEST REPORT****Approvals**









SAFETY APPROVALS (X2)		VOLTAGE	VALUE	FILE NUMBERS
	UL1414	250 V (AC)	1 nF to 1 µF	E 112471
	UL1283	275 V (AC)	1 nF to 2.2 µF	E 109565
	CSA-C22.2 No.1	250 V (AC)	1 nF to 1 µF	1087424 (LR 94054-15)
	CCEE	275 V (AC)	1 nF to 2.2 µF	CH0038042-99
	EN132400	275 V (AC)	1 nF to 2.2 µF	ENEC/B02/2001

Safety test report

SAFETY TEST REPORT	VOLTAGE	VALUE	FILE NUMBERS
CB TEST CERTIFICATE	275 V (AC)	1 nF to 2.2 µF: 55/100/21/B	DE-1-7474 and DE-1-8228

The Enec-approval together with the CB-Certificate replace all national approval marks of the following countries (they have already signed the ENEC-Agreement): Austria; Belgium; Czech. Republic; Denmark; Finland; France; Germany; Greece; Hungary; Ireland; Italy; Luxembourg; Netherlands; Norway, Portugal; Slovenian; Spain; Sweden; Switzerland and United Kingdom.

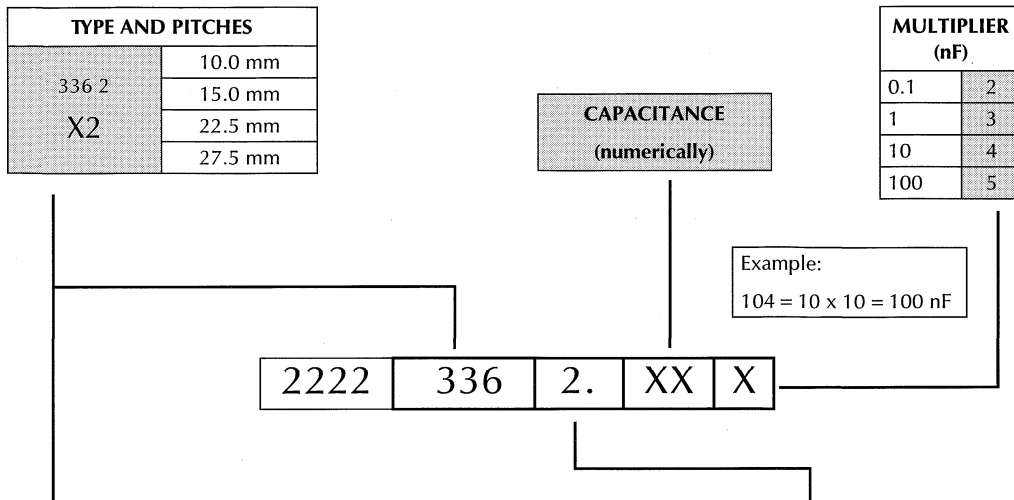
Safety approvals to be replaced by ENEC during 2001

SAFETY APPROVALS (X2)	VOLTAGE	VALUE	FILE NUMBERS	
	SEV (EN132400)	275 V (AC)	1 nF to 2.2 µF	99.7 70447.01
	VDE (EN132400)	275 V (AC)	1 nF to 2.2 µF	83618
	FI (EN132400)	275 V (AC)	1 nF to 2.2 µF	176515
	NEMKO (EN132400)	275 V (AC)	1 nF to 2.2 µF	P99101827
	DEMKO (EN132400)	275 V (AC)	1 nF to 2.2 µF	99-03137
	SEMKO (EN132400)	275 V (AC)	1 nF to 2.2 µF	9439096
	IMQ (EN132400)	275 V (AC)	1 nF to 2.2 µF	V 3732
	ÖVE (EN132400)	275 V (AC)	1 nF to 2.2 µF	E 260-000

Interference suppression film capacitors

MKP 336 2 X2

COMPOSITION OF CATALOGUE NUMBER



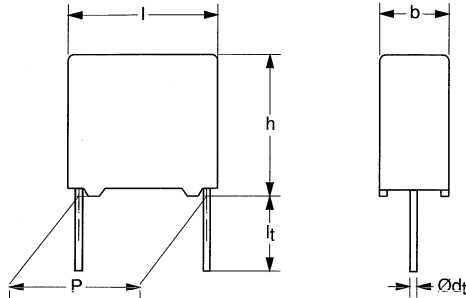
TYPE	PACKAGING	LEAD CONFIGURATION	C-TOL	PREFERRED TYPES
336 2 X2	loose in box	lead length 3.5 mm	±20%	20
		lead length 25.0 mm		26
				ON REQUEST
336 2 X2	loose in box	lead length 3.5 mm	±10%	21
		lead length 25.0 mm		27
	taped on reel		±20%	23
			±10%	24

Interference suppression film capacitors

MKP 336 2 X2

MKP 336 2 GENERAL DATA

PITCH 10/15 mm



CBA196

Fig.3 Outline.

Specific reference data for the 275 V AC (X2) capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: $C \leq 100 \text{ nF}$ $100 \text{ nF} < C \leq 220 \text{ nF}$	$\leq 10 \times 10^{-4}$ $\leq 20 \times 10^{-4}$	$\leq 50 \times 10^{-4}$ $\leq 100 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 385 V (DC)	100 V/ μs	
R between leads, for $C \leq 0.33 \mu\text{F}$ at 100 V; 1 minute	$>15000 \text{ M}\Omega$	
R between leads and case; 100 V; 1 minute	$>30000 \text{ M}\Omega$	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	2200 V; 1 minute	
Withstanding (AC) voltage between leads and case	2050 V; 1 minute	

Available 275 V AC (X2) versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 3.5 +1/-0.5 + \text{ mm}; \text{ note 1}$	$\pm 20\%$	2222 336 20...	preferred
		$\pm 10\%$	2222 336 21...; note 2	on request
	$l_t = 25.0 \pm 2.0 \text{ mm}$	$\pm 20\%$	2222 336 26...	preferred
		$\pm 10\%$	2222 336 27...; note 2	on request
Taped on reel	$H = 18.5 \text{ mm}; P_0 = 12.7 \text{ mm}$	$\pm 20\%$	2222 336 23...	on request
		$\pm 10\%$	2222 336 24...; note 2	on request

Notes

- $l_t = 3.5 \pm 0.3 \text{ mm}$ for pitch = 15 mm.
- Other dimensions for $\pm 10\%$ tolerance values.

Interference suppression film capacitors

MKP 336 2 X2

 $U_{Rac} = 275 \text{ V (X2)}; U_{Rdc} = 630 \text{ V}$

C (μF)	DIMENSIONS ⁽¹⁾ $b \times h \times l$ (mm)	MASS (g)	CATALOGUE NUMBER	
			LOOSE IN BOX	
			$l_t = 3.5 +1/-0.5 \text{ mm}^{(2)}$	$l_t = 25.0 \pm 2.0 \text{ mm}$
			C-tol = $\pm 20\%$	
		catalogue number		last 5 digits
Pitch = $10.0 \pm 0.4 \text{ mm}; d_t = 0.60 \pm 0.06 \text{ mm}$				
0.001	4.0 × 10.0 × 12.5	0.6	2222 336 20102	.. 26102
0.0015			2222 336 20152	.. 26152
0.0022			2222 336 20222	.. 26222
0.0033	5.0 × 11.0 × 12.5	0.9	2222 336 20332	.. 26332
0.0047			2222 336 20472	.. 26472
0.0068			2222 336 20682	.. 26682
0.01			2222 336 20103	.. 26103
0.015			2222 336 20153	.. 26153
0.022			2222 336 20223	.. 26223
0.033	6.0 × 12.0 × 12.5	1.0	2222 336 20333	.. 26333
Pitch = $15.0 \pm 0.4 \text{ mm}; d_t = 0.80 \pm 0.08 \text{ mm}$				
0.01	5.0 × 11.0 × 17.5	1.2	2222 336 29001	.. 29097
0.015			2222 336 29011	.. 29071
0.022			2222 336 29021	.. 29076
0.033			2222 336 29031	.. 29082
0.047			2222 336 20473	.. 26473
0.068			2222 336 20683	.. 26683
0.1	6.0 × 12.0 × 17.5	1.4	2222 336 20104	.. 26104
0.15	8.5 × 15.0 × 17.5	2.6	2222 336 20154	.. 26154
0.22	10.0 × 16.5 × 17.5	3.1	2222 336 20224	.. 26224

Notes

- Specified dimensions only valid for $\pm 20\%$ tolerance values.
- $l_t = 3.5 \pm 0.3 \text{ mm}$ for pitch = 15 mm.

Interference suppression film capacitors

MKP 336 2 X2

MKP 336 2 GENERAL DATA

PITCH 22.5/27.5 mm

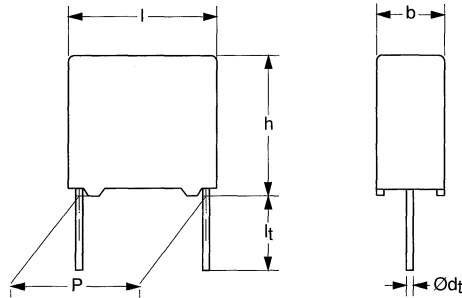


Fig.4 Outline.

Specific reference data for the 275 V AC (X2) capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: 150 nF < C ≤ 470 nF C > 470 nF	≤ 20 × 10 ⁻⁴ ≤ 70 × 10 ⁻⁴	≤ 100 × 10 ⁻⁴ -
Rated voltage pulse slope (dU/dt) _R at 385 V (DC)	100 V/μs	
R between leads, for C ≤ 0.33 μF at 100 V; 1 minute	> 15000 MΩ	
RC between leads, for C > 0.33 μF at 100 V; 1 minute	> 5000 s	
R between leads and case; 100 V; 1 minute	> 30000 MΩ	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s: C ≤ 1 μF C > 1 μF	2200 V; 1 minute 1800 V; 1 minute	
Withstanding (AC) voltage between leads and case	2050 V; 1 minute	

Available 275 V AC (X2) versions

PACKAGING ⁽¹⁾	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	l _t = 3.5 ± 0.3 mm	±20%	2222 336 20...	preferred
		±10%	2222 336 21...; note 2	on request
	l _t = 25.0 ± 2.0 mm	±20%	2222 336 26...	preferred
		±10%	2222 336 27...; note 2	on request
Taped on reel	H = 18.5 mm; P ₀ = 12.7 mm	±20%	2222 336 23...	on request
		±10%	2222 336 24...; note 2	on request

Notes

1. Taped on reel pitch = 27.5 mm is not available.
2. Other dimensions for ±10% tolerance values.

Interference suppression film capacitors

MKP 336 2 X2

 $U_{\text{Rac}} = 275 \text{ V (X2)}$; $U_{\text{Rdc}} = 630 \text{ V}$

C (μF)	DIMENSIONS ⁽¹⁾ b × h × l (mm)	MASS (g)	CATALOGUE NUMBER	
			LOOSE IN BOX	
			$l_t = 3.5 \pm 0.3 \text{ mm}$	$l_t = 25.0 \pm 2.0 \text{ mm}$
			C-tol = $\pm 20\%$	
			catalogue number	last 5 digits
Pitch = $22.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$				
0.15	6.0 × 15.5 × 26.0	2.9	2222 336 29041	.. 29087
0.22	7.0 × 16.5 × 26.0	3.2	2222 336 29051	.. 29093
0.33	8.5 × 18.0 × 26.0	4.4	2222 336 20334	.. 26334
0.47	10.0 × 19.5 × 26.0	5.5	2222 336 20474	.. 26474
Pitch = $27.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$				
0.47	9.0 × 19.0 × 31.0	5.5	2222 336 29055	.. 29095
0.68	11.0 × 21.0 × 31.0	7.8	2222 336 20684	.. 26684
1	13.0 × 23.0 × 31.0	10.4	2222 336 20105	.. 26105
1.5	18.0 × 28.0 × 31.0	17.2	2222 336 20155	.. 26155
2.2	21.0 × 31.0 × 31.0	20.4	2222 336 20225	.. 26225

Note

1. Specified dimensions only valid for $\pm 20\%$ tolerance values.

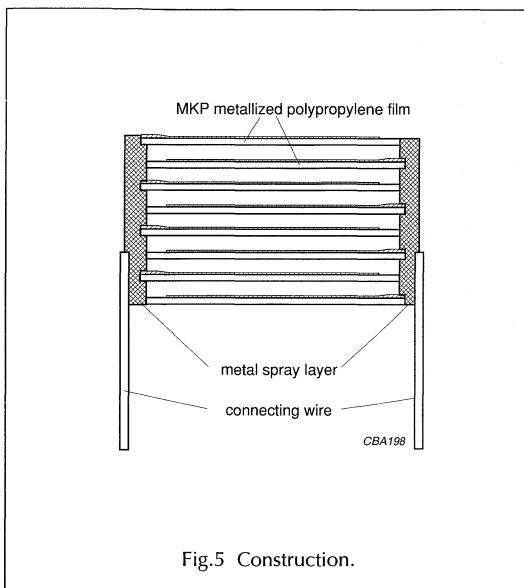
Interference suppression film capacitors

MKP 336 2 X2

CONSTRUCTION

Description

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



SPECIFIC METHOD OF MOUNTING TO WITHSTAND VIBRATION AND SHOCK

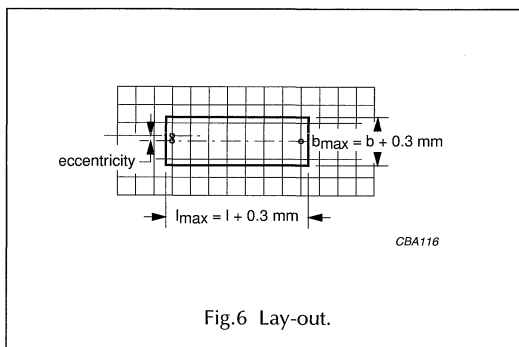
In order to withstand vibration and shock tests, it must be ensured that the stand-off pips are in good contact with the printed-circuit board:

- For pitches ≤ 15 mm 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 Fig.6:

- Eccentricity as in Fig.6. 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 60717" as reference: $h_{\max} \leq h + 0.3$ mm.



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 tape specifications refer to this handbook, chapter "Packaging information".

Storage temperature

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

RATINGS AND CHARACTERISTICS REFERENCE CONDITIONS

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 $50 \pm 2\%$.

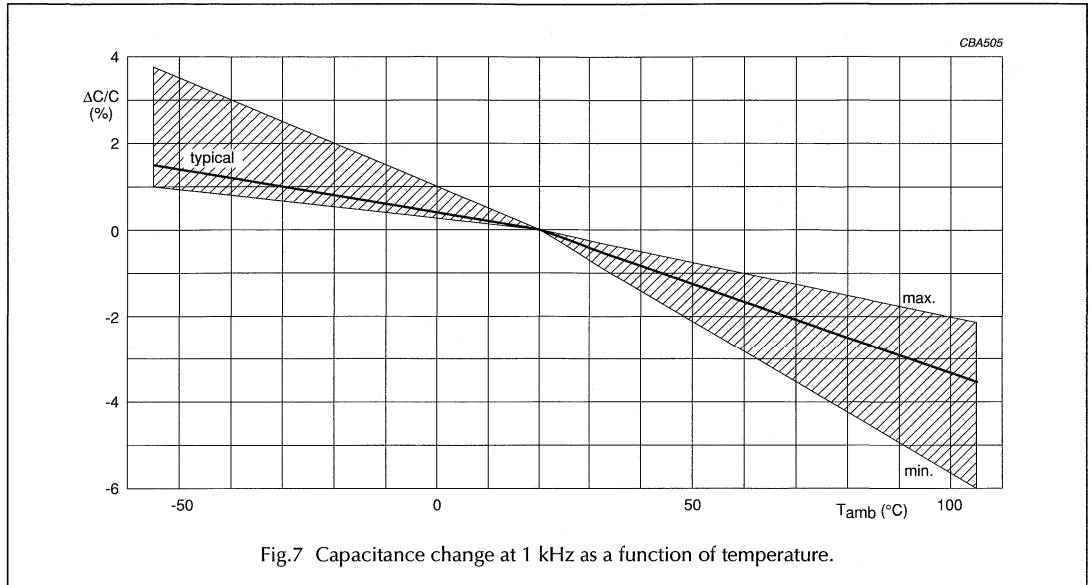
For reference testing, a conditioning period shall be applied over 96 ± 4 hours by heating the products in a circulating air oven at the rated temperature and a relative humidity not exceeding 20%.

Interference suppression film capacitors

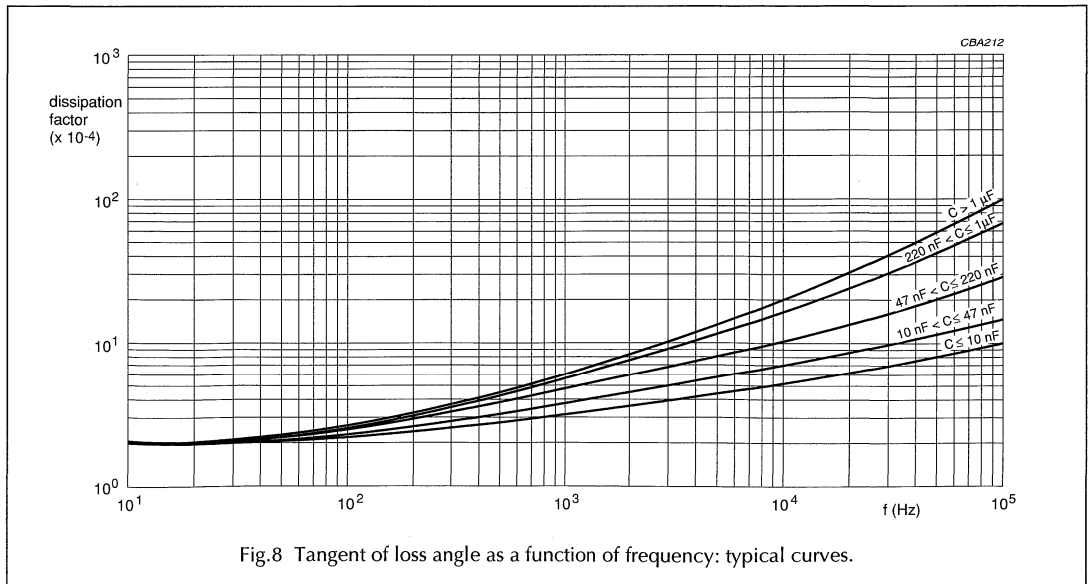
MKP 336 2 X2

CHARACTERISTICS

Capacitance



Tangent of loss angle



Interference suppression film capacitors

MKP 336 2 X2

Impedance

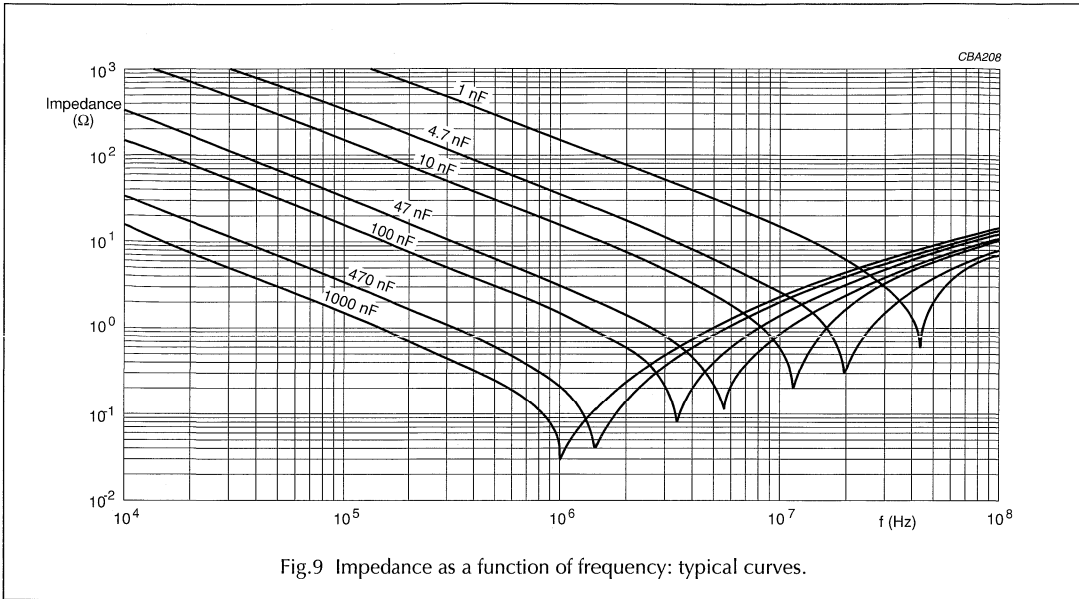


Fig.9 Impedance as a function of frequency: typical curves.

Resonant frequency

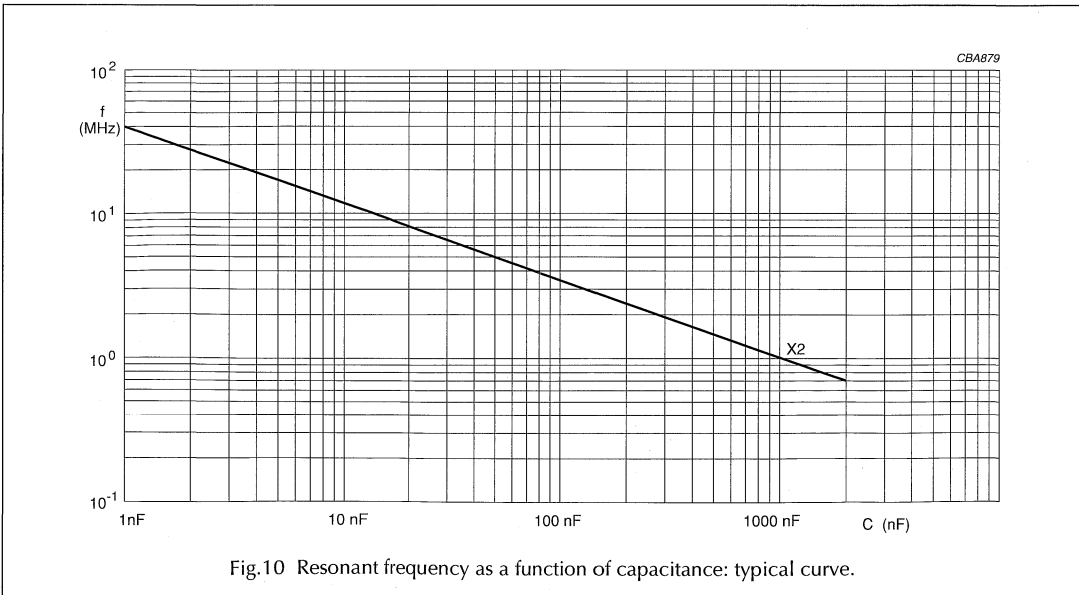
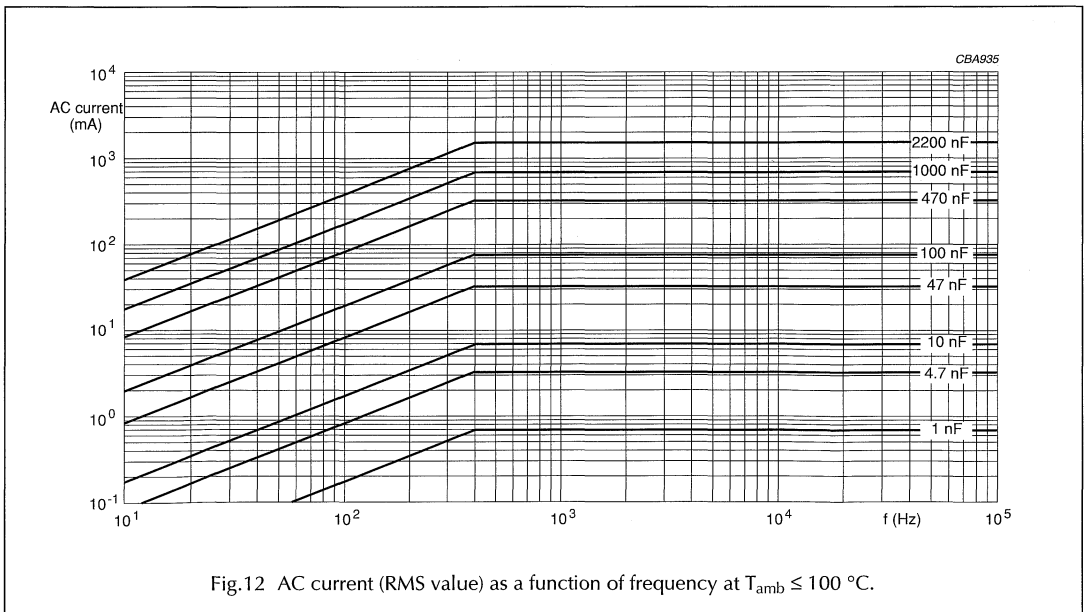
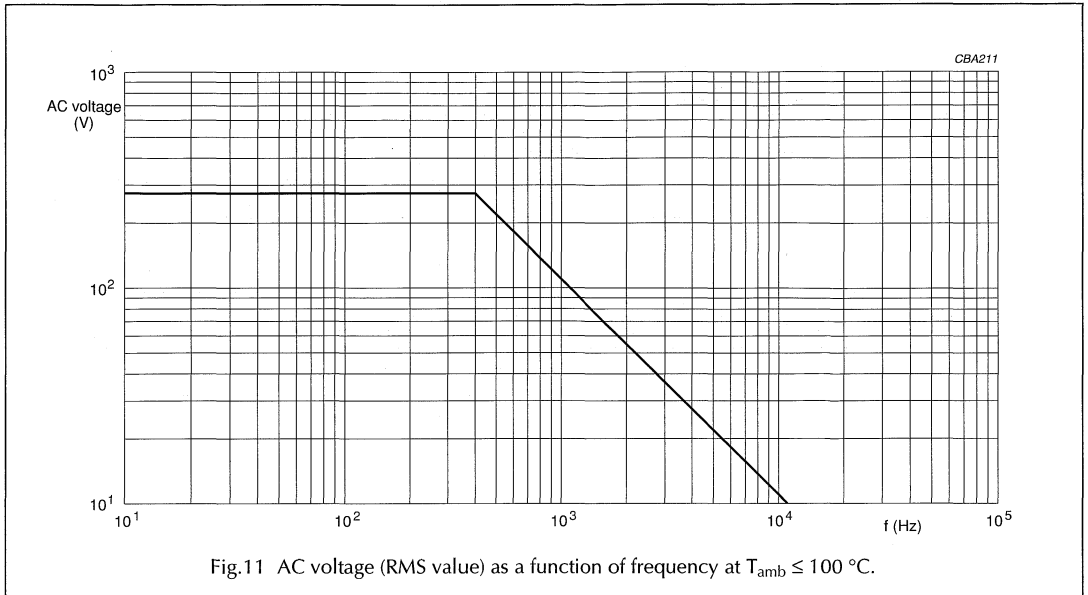


Fig.10 Resonant frequency as a function of capacitance: typical curve.

Interference suppression film capacitors

MKP 336 2 X2

Maximum RMS voltage and AC current (sinewave) as a function of frequency for $T_{amb} \leq 100\text{ }^{\circ}\text{C}$



Interference suppression film capacitors

MKP 336 2 X2

Insulation resistance

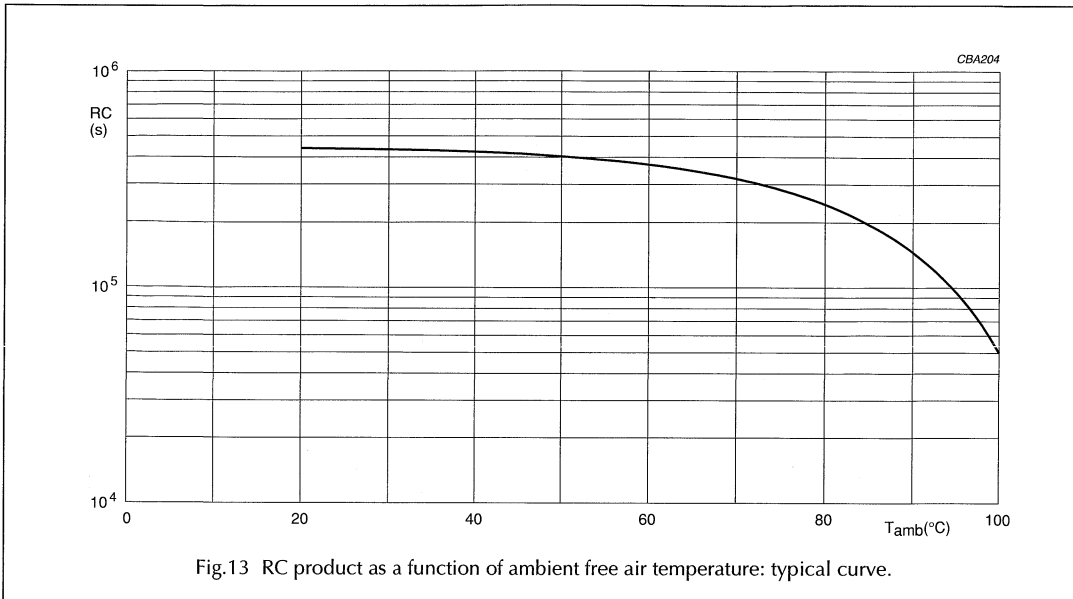


Fig.13 RC product as a function of ambient free air temperature: typical curve.

APPLICATION NOTES

- For X2 electromagnetic interference suppression in across the line applications (50/60 Hz) with a maximum mains voltage of 275 V (AC) $\pm 10\%$ instability.
- These capacitors are not intended for continuous pulse applications. For these situations, capacitors of the AC and pulse program must be used, such as: 2222 375; 2222 383 or 2222 479
- The maximum ambient temperature must not exceed 100 °C.
- Rated voltage pulse slope:
 - If the pulse voltage is lower than the rated voltage, the values of the specific reference data can be multiplied by 385 V (DC) and divided by the applied voltage.

Interference suppression film capacitors

MKP 336 2 X2

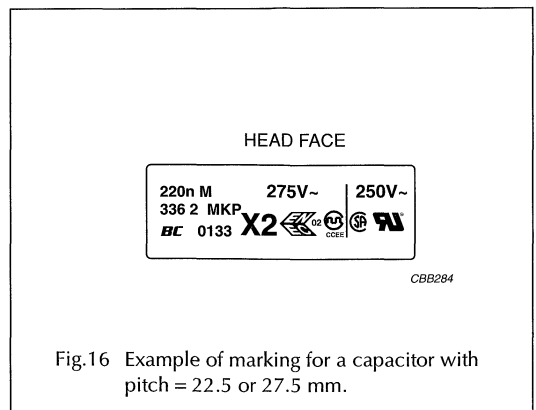
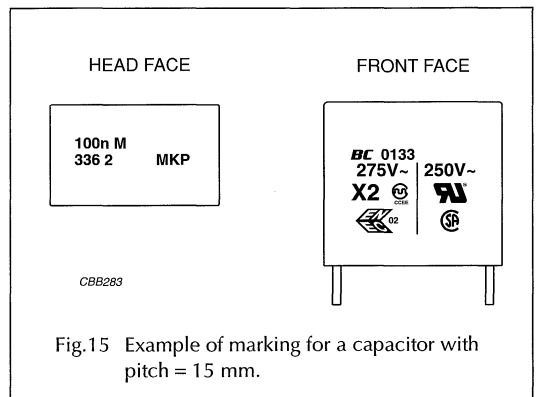
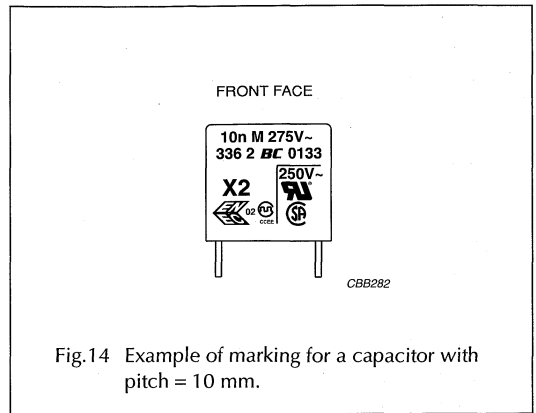
MARKING

Product marking

NEW MARKING (INTRODUCED DURING 2001)

The capacitors are marked on the top for pitch ≥ 22.5 mm (see Fig.16), on the top and one side for pitch = 15 mm (see Fig.15) or on one side for pitch = 10 mm (see Fig.14) with the following information:

1. Rated capacitance code in accordance with "IEC 60062"
2. Tolerance on rated capacitance; M = $\pm 20\%$; K = $\pm 10\%$; J = $\pm 5\%$
3. Rated (AC) voltage (275 V)
4. Sub-class (e.g. X2)
5. Manufacturer's type designation (e.g. 336 2)
6. Code for dielectric material (MKP) for pitch ≥ 15 mm
7. Manufacturer (BC)
8. Year and week of manufacture (e.g. 0133).



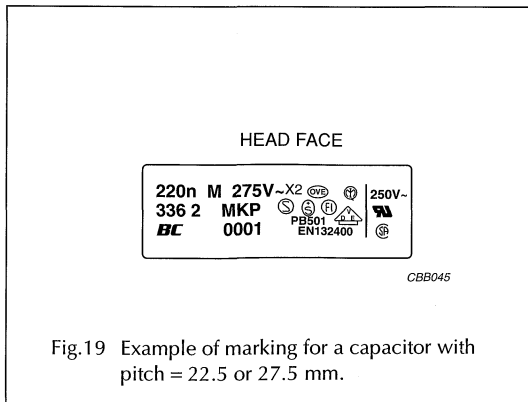
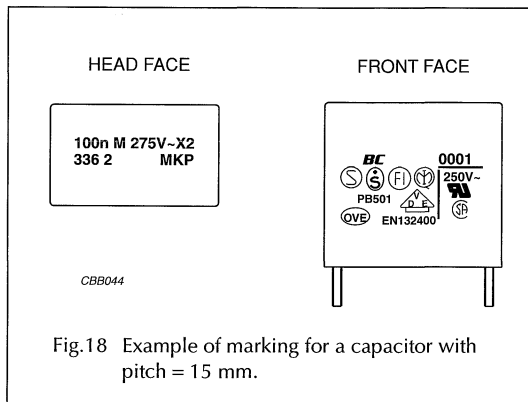
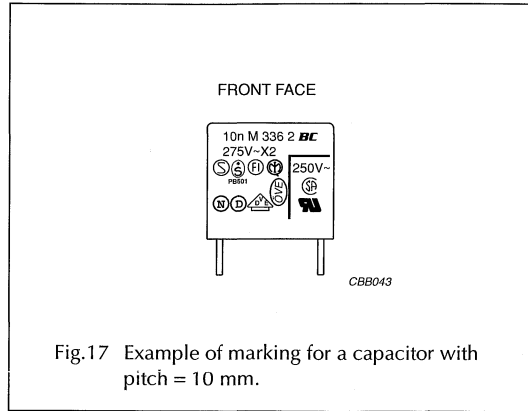
Interference suppression film capacitors

MKP 336 2 X2

PRESENT MARKING

The capacitors are marked on the top for pitch ≥ 22.5 mm (see Fig.19), on the top and one side for pitch = 15 mm (see Fig.18) or on one side for pitch = 10 mm (see Fig.17) with the following information:

1. Rated capacitance code in accordance with "IEC 60062"
2. Tolerance on rated capacitance; M = $\pm 20\%$; K = $\pm 10\%$; J = $\pm 5\%$
3. Rated (AC) voltage (275 V)
4. Sub-class (e.g. X2)
5. Manufacturer's type designation (e.g. 336 2)
6. Code for dielectric material (MKP) for pitch ≥ 15 mm
7. Manufacturer (BC)
8. Year and week of manufacture (e.g. 0001) for pitch ≥ 15 mm.



Interference suppression film capacitors

MKP 336 2 X2

QUICK REFERENCE TEST REQUIREMENTS

TEST	PROCEDURE (quick reference)	REQUIREMENTS
Robustness of leads		
Tensile strength: "IEC 60068-2-21"	load 10 N; 10 s	no visible damage
Bending: "IEC 60068-2-21"	load 5 N; 4 × 90 °	legible marking $ \Delta C/C \leq 5\%$
Resistance to soldering heat: "IEC 60068-2-20"	solder bath: 260 °C; 10 s	$\Delta \tan \delta \leq 100 \times 10^{-4}$ (C ≤ 100 nF); note 1 $\Delta \tan \delta \leq 200 \times 10^{-4}$ (100 nF < C ≤ 470 nF); note 1
Component solvent resistance	isopropyl alcohol; 23 °C; 5 minutes	$\Delta \tan \delta \leq 70 \times 10^{-4}$ (C > 470 nF); note 1
Robustness of component		
Rapid change of temperature: "IEC 60068-2-14"	5 cycles 1 cycle = 30 minutes at -55 °C and 30 minutes at 100 °C	$ \Delta C/C \leq 5\%$
Vibration: "IEC 60068-2-6"	10 to 55 Hz; amplitude 0.75 mm; 6 hours	$\Delta \tan \delta \leq 100 \times 10^{-4}$ (C ≤ 100 nF); note 1 $\Delta \tan \delta \leq 200 \times 10^{-4}$ (100 nF < C ≤ 470 nF); note 1 $\Delta \tan \delta \leq 70 \times 10^{-4}$ (C > 470 nF); note 1
Shock: "IEC 60068-2-27"	half sinewave; 490 m/s ² ; 11 ms	
Climatic sequence		
Dry heat: "IEC 60068-2-2"	16 hours; 100 °C	$ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 100 \times 10^{-4}$ (C ≤ 100 nF); note 1 $\Delta \tan \delta \leq 200 \times 10^{-4}$ (100 nF < C ≤ 470 nF); note 1 $\Delta \tan \delta \leq 70 \times 10^{-4}$ (C > 470 nF); note 1 $R_{ins} \geq 50\%$ of specified value
Damp heat, cyclic, test Db, first cycle: "IEC 60068-2-30"		
Cold: "IEC 60068-2-1"	2 hours; -55 °C	
Damp heat, cyclic, test Db, remaining cycles: "IEC 60068-2-30"		
Voltage proof: "IEC 60384-14"	$V_p = 1200$ V (DC); 1 minute	
Other applicable tests		
Damp heat, steady state: "IEC 60068-2-3"	21 days; 40 °C; 90 to 95% RH no load $V_p = 1200$ V (DC); 1 minute	$ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 70 \times 10^{-4}$ $R_{ins} \geq 50\%$ of specified value
Endurance (AC): "IEC 60384-14"	3 × 2.5 kV pulse voltage 1000 hours; 1.25 × U_{Rac} at 100 °C; once per hour; 0.1 s; 1000 V (RMS) via resistor of 47 Ω; $V_p = 1200$ V (DC); 1 minute	$ \Delta C/C \leq 10\%$ $\Delta \tan \delta \leq 100 \times 10^{-4}$ (C ≤ 100 nF); note 1 $\Delta \tan \delta \leq 200 \times 10^{-4}$ (100 nF < C ≤ 470 nF); note 1 $\Delta \tan \delta \leq 70 \times 10^{-4}$ (C > 470 nF); note 1 $R_{ins} \geq 50\%$ of specified value

Interference suppression film capacitors

MKP 336 2 X2

TEST	PROCEDURE (quick reference)	REQUIREMENTS
Charge and discharge: "IEC 60384-14"	10 000 cycles; 5 ms; $1.5 \times dV/dt$	$ \Delta C/C \leq 10\%$ $\Delta \tan \delta \leq 100 \times 10^{-4}$ ($C \leq 100$ nF); note 1 $\Delta \tan \delta \leq 200 \times 10^{-4}$ (100 nF $< C \leq 470$ nF); note 1 $\Delta \tan \delta \leq 70 \times 10^{-4}$ ($C > 470$ nF); note 1 $R_{ins} \geq 50\%$ of specified value
Passive flammability: "IEC 60384-14"	class B	no burning
Active flammability: "IEC 60384-14"	20×2.5 kV discharge	no burning
Heat storage: "IEC 60384-14"	1 000 hours; 100 °C	$ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 100 \times 10^{-4}$ ($C \leq 100$ nF); note 1 $\Delta \tan \delta \leq 200 \times 10^{-4}$ (100 nF $< C \leq 470$ nF); note 1 $\Delta \tan \delta \leq 70 \times 10^{-4}$ ($C > 470$ nF); note 1
Resistance to soldering heat with preheating: "IEC 60384-14"	preheating: 100 °C; solder bath: 260 °C; 10 s	$ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 100 \times 10^{-4}$ ($C \leq 100$ nF); note 1 $\Delta \tan \delta \leq 200 \times 10^{-4}$ (100 nF $< C \leq 470$ nF); note 1 $\Delta \tan \delta \leq 70 \times 10^{-4}$ ($C > 470$ nF); note 1
Active flammability test	voltage proof up to $2 \times$ peak impulse voltage of 4.13 or until breakdown (100 V/sec, current limited 2mA) failed capacitors connected to a 250 V (DC) power supply during 5 minutes	no burning

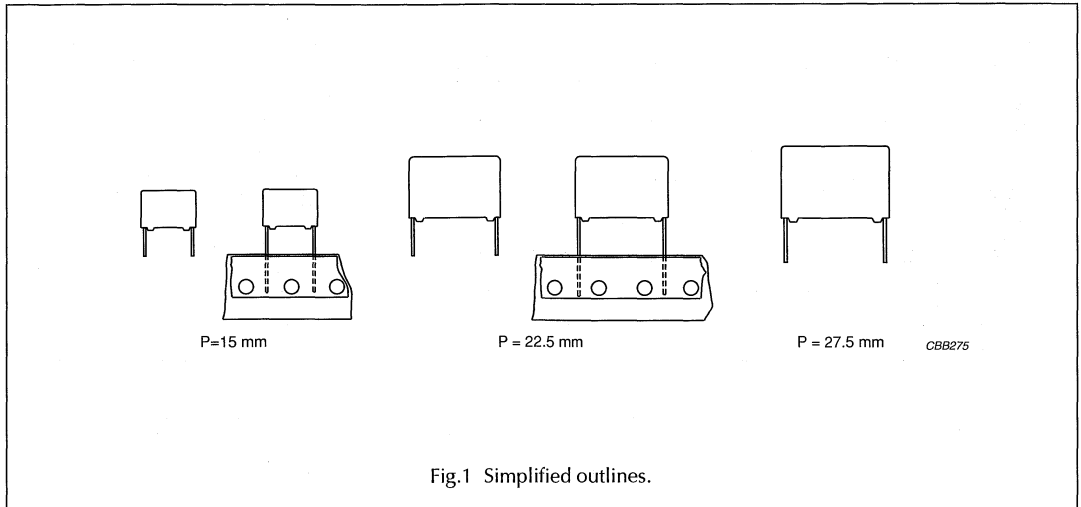
Note

1. Measuring frequency 100 kHz for $C \leq 470$ nF and 10 kHz for $C > 470$ nF.

Interference suppression film capacitors MKP 335 5 X2

MKP RADIAL POTTED TYPE

PITCH 15/22.5/27.5 mm



FEATURES

- 15 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-retardant case.

APPLICATIONS

- For X2 electromagnetic interference suppression
- Specially designed to meet the requirements of the "IEC 60384-14 2nd edition and EN 132400", requiring a 2.5 kV peak pulse voltage test and both UL1414 and CSA-C22.2 No. 1 specifications.





DETAIL SPECIFICATION

For more detailed data and test requirements see "Type detail specification HQN-384-14/112".

QUICK REFERENCE DATA

DESCRIPTION	VALUE
Capacitance range (E12 series)	0.01 to 1.5 μ F
Capacitance tolerance	\pm 20%; \pm 10%; \pm 5%
Rated (AC) voltage, 50 to 60 Hz	275 V
Rated (DC) voltage	630 V
Climatic category	55/100/56/B
Rated temperature	100 °C
Maximum application temperature	100 °C
Reference specifications	IEC 60384-14 2 nd edition and EN 132400
Safety approvals:	
250 V	UL1414; CSA-C22.2 No 1;
275 V	CCEE
275 V	SEV; VDE; FI; N; D; S; IMQ; ÖVE
Materials	qualified in accordance with UL94V-O
Safety class	X2; across the line

Interference suppression film capacitors**MKP 335 5 X2****SAFETY APPROVALS AND SAFETY TEST REPORT****Approvals**









SAFETY APPROVALS (X2)		VOLTAGE	VALUE	FILE NUMBERS
	UL1414	250 V (AC)	10 nF to 1.0 µF	E 112471
	CSA-C22.2 No.1	250 V (AC)	10 nF to 1.0 µF	1104861 (LR94054-16)
	CCEE	275 V (AC)	10 nF to 1.5 µF	CH0038055-99 (Roeselare factory) CH0033610-99 (Shanghai factory)
	EN132400	275 V (AC)	10 nF to 1.5 µF	ENEC/B06/2001

Safety test report

SAFETY TEST REPORT	VOLTAGE	VALUE	FILE NUMBERS
CB TEST CERTIFICATE	275 V (AC)	10 nF to 1.5 µF: 55/100/56/B	FI 1185 A2

The Enec-approval together with the CB-Certificate replace all national approval marks of the following countries (they have already signed the ENEC-Agreement): Austria; Belgium; Czech. Republic; Denmark; Finland; France; Germany; Greece; Hungary; Ireland; Italy; Luxembourg; Netherlands; Norway, Portugal; Slovenian; Spain; Sweden; Switzerland and United Kingdom.

Safety approvals to be replaced by ENEC during 2001

SAFETY APPROVALS (X2)		VOLTAGE	VALUE	FILE NUMBERS
	SEV (EN132400)	275 V (AC)	10 nF to 1.5 µF	99,5 51205,05
	VDE (EN132400)	275 V (AC)	10 nF to 1.5 µF	117321 (Roeselare factory) 118878 (Shanghai factory)
	FI (EN132400)	275 V (AC)	10 nF to 1.5 µF	FI 12134
	NEMKO (EN132400)	275 V (AC)	10 nF to 1.5 µF	P99102663
	DEMKO (EN132400)	275 V (AC)	10 nF to 1.5 µF	99-04550
	SEMKO (EN132400)	275 V (AC)	10 nF to 1.5 µF	9851035/01
	IMQ (EN132400)	275 V (AC)	10 nF to 1.5 µF	V4696
	ÖVE (EN132400)	275 V (AC)	10 nF to 1.5 µF	E260-010-01

Interference suppression film capacitors

MKP 335 5 X2

COMPOSITION OF CATALOGUE NUMBER

TYPE AND PITCHES	
335 5	15.0 mm
X2	22.5 mm
	27.5 mm

MULTIPLIER (nF)	
1	3
10	4

CAPACITANCE (numerically)

Example:
104 = 10 x 10 = 100 nF

2222 335 5. XX X

TYPE	PACKAGING	LEAD CONFIGURATION	C-TOL	PREFERRED TYPES
335 5 X2	loose in box	lead length 3.5 mm	±20%	50...
		lead length 25.0 mm		54...
				ON REQUEST
335 5 X2	loose in box	lead length 3.5 mm	±10%	51...
		lead length 5.0 mm	±20%	56...
			±10%	57...
		lead length 25.0 mm	±10%	55...

Interference suppression film capacitors

MKP 335 5 X2

MKP 335 5 GENERAL DATA

PITCH 15/22.5/27.5 mm

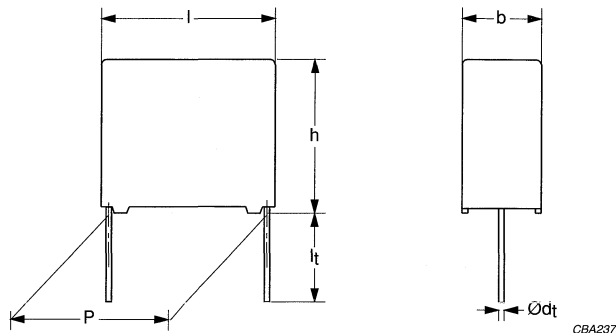


Fig.3 Outline.

Specific reference data for the 275 V (AC) X2 capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle:			
$C \leq 100 \text{ nF}$	$\leq 7 \times 10^{-4}$	$\leq 10 \times 10^{-4}$	$\leq 30 \times 10^{-4}$
$100 \text{ nF} < C \leq 470 \text{ nF}$	$\leq 10 \times 10^{-4}$	$\leq 20 \times 10^{-4}$	$\leq 70 \times 10^{-4}$
$C > 470 \text{ nF}$	$\leq 20 \times 10^{-4}$	$\leq 70 \times 10^{-4}$	–
Rated voltage pulse slope (dU/dt) _R at 385 V (DC)	100 V/ μ s		
R between leads, for $C \leq 0.33 \mu\text{F}$ at 100 V; 1 minute	>15000 M Ω		
RC between leads, for $C > 0.33 \mu\text{F}$ at 100 V; 1 minute	>5000 s		
R between leads and case; 100 V; 1 minute	>30000 M Ω		
Withstanding voltage DC (cut off current 10 mA); rise time 100 V/s			
$C \leq 1 \mu\text{F}$	2200 V; 1 minute		
$C > 1 \mu\text{F}$	1800 V; 1 minute		
Withstanding voltage AC between leads and case	2050 V; 1 minute		

Available 275 V (AC) X2 versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 3.5 \pm 0.5 \text{ mm}$	$\pm 20\%$	2222 335 50...	preferred
		$\pm 10\%$	2222 335 51...; note 1	on request
	$l_t = 5.0 \pm 1.0 \text{ mm}$	$\pm 20\%$	2222 335 56...	on request
		$\pm 10\%$	2222 335 57...; note 1	on request
	$l_t = 25.0 \pm 2.0 \text{ mm}$	$\pm 20\%$	2222 335 54...	preferred
		$\pm 10\%$	2222 335 55...; note 1	on request

Note

1. Other dimensions for $\pm 10\%$ tolerance values.

Interference suppression film capacitors

MKP 335 5 X2

 $U_{Rac} = 275 \text{ V (X2)}$; $U_{Rdc} = 630 \text{ V}$

C (μF)	DIMENSIONS ⁽¹⁾ b × h × l (mm)	MASS (g)	CATALOGUE NUMBER	
			LOOSE IN BOX	
			short leads	long leads
			$l_t = 3.5 \pm 0.5 \text{ mm}$	$l_t = 25.0 \pm 2.0 \text{ mm}$
			C-tol = $\pm 20\%$	
		catalogue number	last 5 digits	
Pitch = $15.0 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$				
0.01	5.0 × 11.0 × 17.5	1.2	2222 335 50103	.. 54103
0.015			2222 335 50153	.. 54153
0.022			2222 335 50223	.. 54223
0.033			2222 335 50333	.. 54333
0.047	6.0 × 12.0 × 17.5	1.4	2222 335 50473	.. 54473
0.068	7.0 × 13.5 × 17.5	1.9	2222 335 50683	.. 54683
0.1	8.5 × 15.0 × 17.5	2.6	2222 335 50104	.. 54104
0.15	10.0 × 16.5 × 17.5	3.1	2222 335 50154	.. 54154
Pitch = $22.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$				
0.22	8.5 × 18.0 × 26.0	4.4	2222 335 50224	.. 54224
0.33	10.0 × 19.5 × 26.0	5.5	2222 335 50334	.. 54334
0.47	12.0 × 22.0 × 26.0	7.8	2222 335 50474	.. 54474
Pitch = $27.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$				
0.68	15.0 × 25.0 × 31.0	12.8	2222 335 50684	.. 54684
1	18.0 × 28.0 × 31.0	17.2	2222 335 50105	.. 54105
1.5	21.0 × 31.0 × 31.0	20.4	2222 335 50155	.. 54155

Note

- Specified dimensions only valid for $\pm 20\%$ tolerance values.

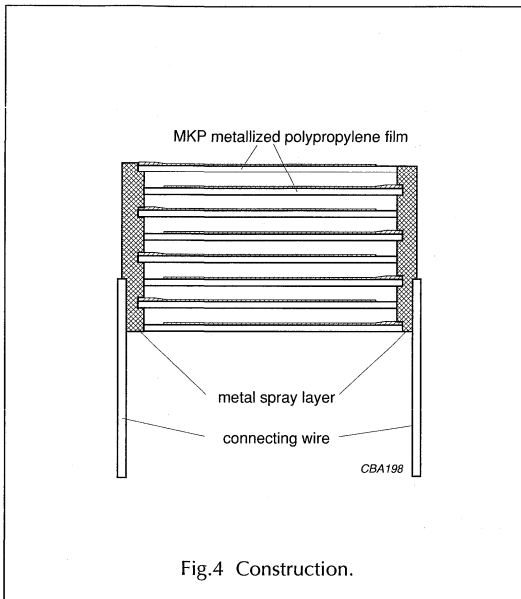
Interference suppression film capacitors

MKP 335 5 X2

CONSTRUCTION

Description

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



SPECIFIC METHOD OF MOUNTING TO WITHSTAND VIBRATION AND SHOCK

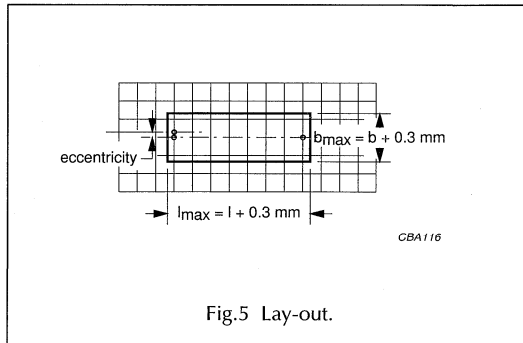
In order to withstand vibration and shock tests, it must be ensured that the stand-off pips are in good contact with the printed-circuit board:

- For pitches ≤ 15 mm 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 Fig.5:

- Eccentricity as in Fig.5. 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 60717" as reference: $h_{\max} \leq h + 0.3$ mm.



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 tape specifications refer to this handbook, chapter "Packaging information".

Storage temperature

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

RATINGS AND CHARACTERISTICS REFERENCE CONDITIONS

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 $50 \pm 2\%$.

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

Interference suppression film capacitors

MKP 335 5 X2

CHARACTERISTICS

Capacitance

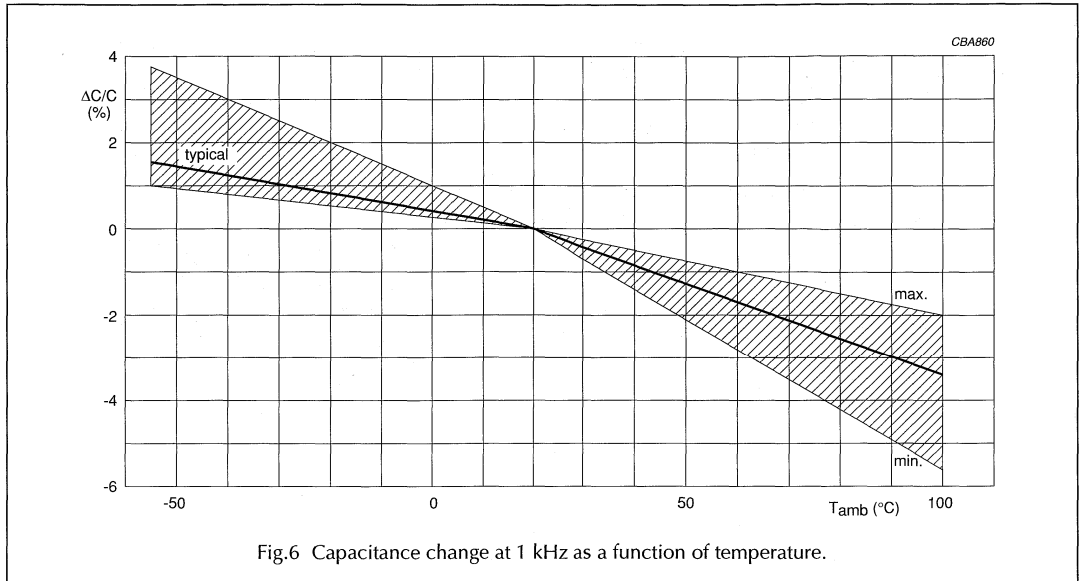


Fig.6 Capacitance change at 1 kHz as a function of temperature.

Tangent of loss angle

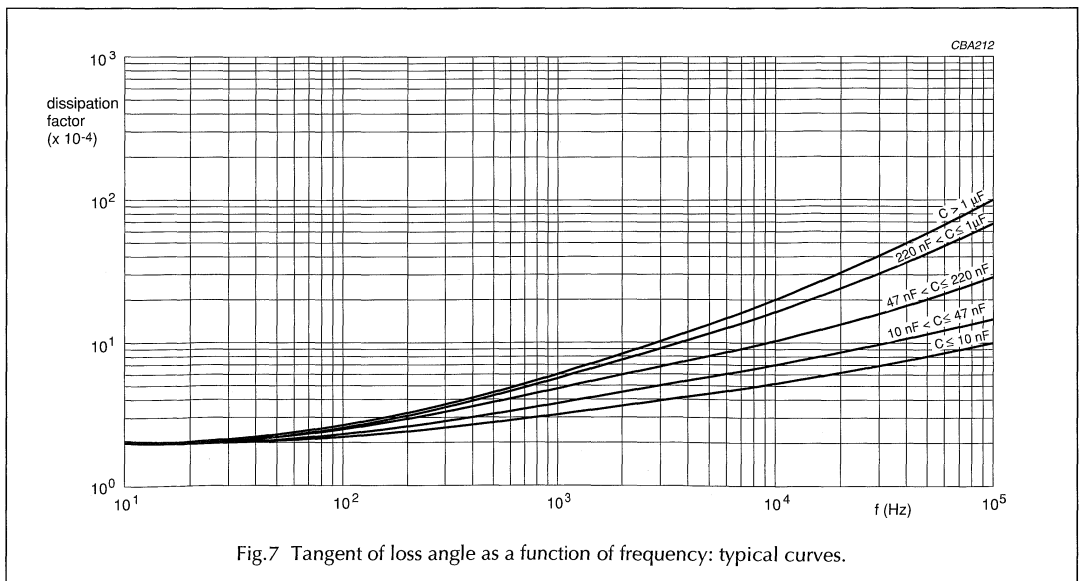
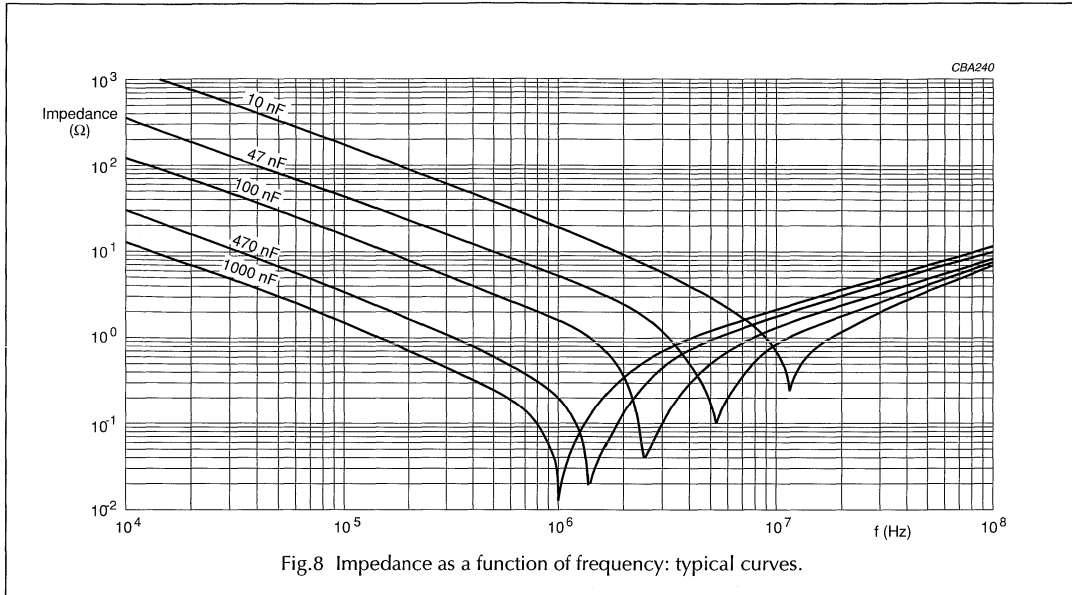


Fig.7 Tangent of loss angle as a function of frequency: typical curves.

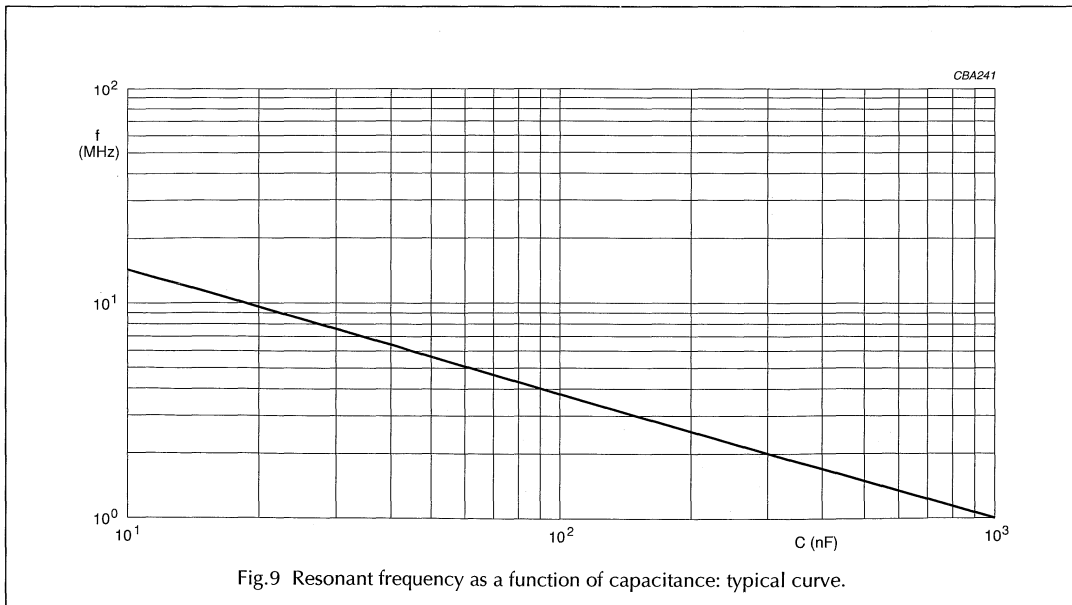
Interference suppression film capacitors

MKP 335 5 X2

Impedance



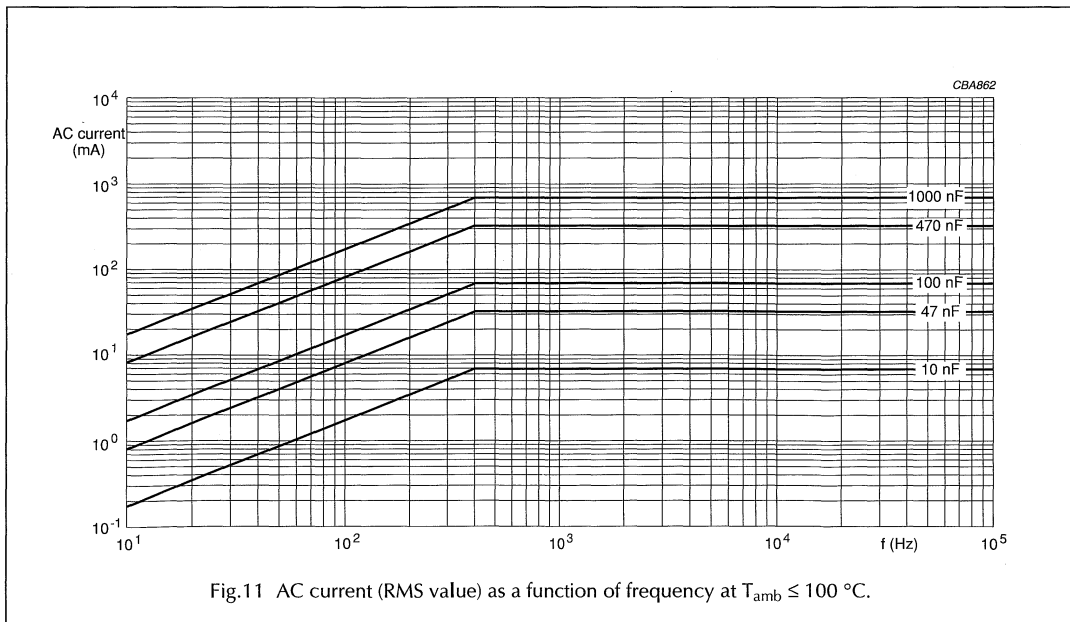
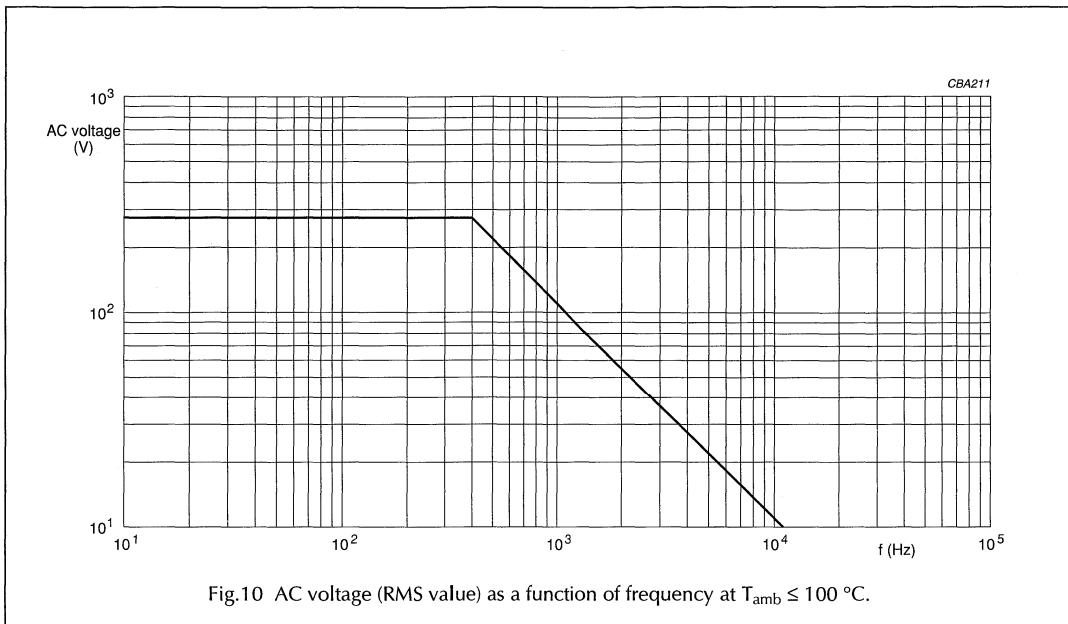
Resonant frequency



Interference suppression film capacitors

MKP 335 5 X2

Maximum RMS voltage and AC current (sinewave) as a function of frequency for $T_{amb} \leq 100\text{ }^{\circ}\text{C}$



Interference suppression film capacitors

MKP 335 5 X2

Insulation resistance

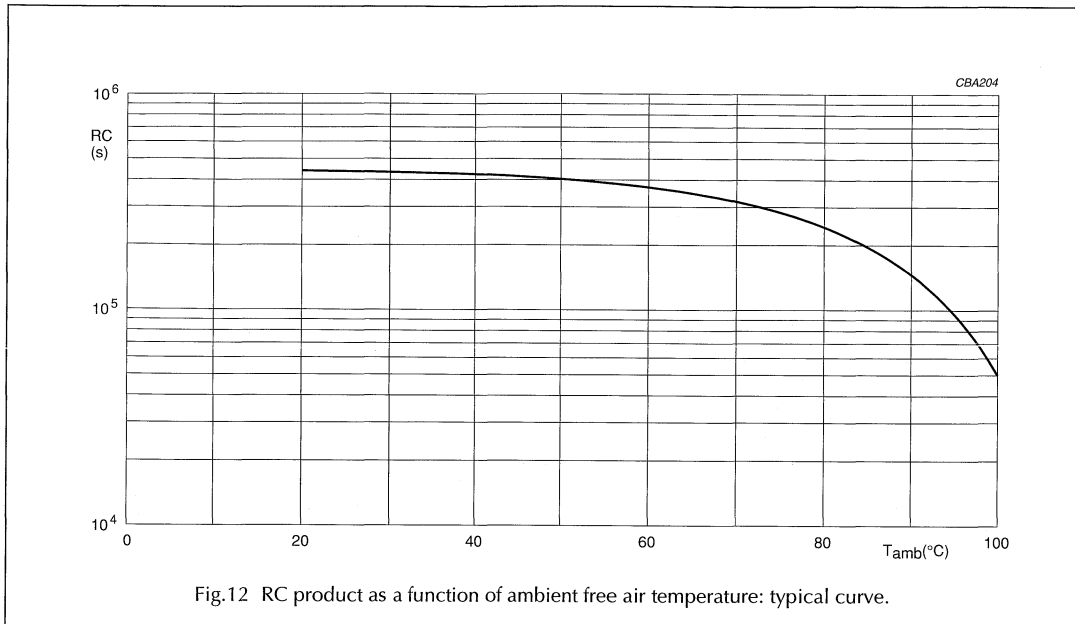


Fig.12 RC product as a function of ambient free air temperature: typical curve.

APPLICATION NOTES

- For X2 electromagnetic interference suppression in across the line applications (50/60 Hz) with a maximum mains voltage of 275 V (AC) $\pm 10\%$ instability.
- These capacitors are not intended for continuous pulse applications. For these situations, capacitors of the AC and pulse program must be used, such as: 2222 375; 2222 383 or 2222 479
- The maximum ambient temperature must not exceed 100 °C.
- Rated voltage pulse slope:
 - If the pulse voltage is lower than the rated voltage, the values of the specific reference data can be multiplied by 385 V (DC) and divided by the applied voltage.

Interference suppression film capacitors

MKP 335 5 X2

MARKING

Product marking

The capacitors are marked on the top for pitch ≥ 22.5 mm (see Fig.14 or 16) or on the top and one side for pitch ≤ 15 mm (see Fig.13 or 15) with the following information:

1. Rated capacitance code in accordance with "IEC 60062"
2. Tolerance on rated capacitance; M = $\pm 20\%$; K = $\pm 10\%$; J = $\pm 5\%$
3. Rated (AC) voltage (275 V)
4. Sub-class (e.g. X2)
5. Manufacturer's type designation (e.g. 335 5)
6. Code for dielectric material (MKP)
7. Manufacturer location
 - a) " " : Roeselare
 - b) "07": Shanghai
8. Manufacturer (BC)
9. Year and week of manufacture (e.g. 0133).

NEW MARKING (INTRODUCED DURING 2001)

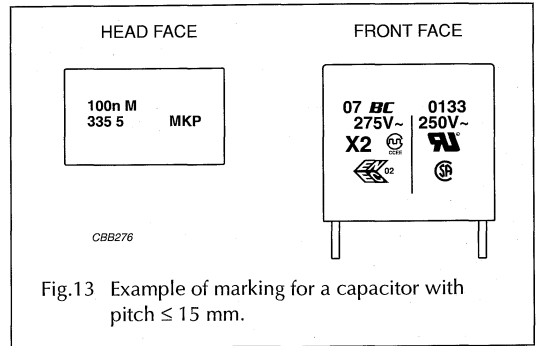


Fig.13 Example of marking for a capacitor with pitch ≤ 15 mm.

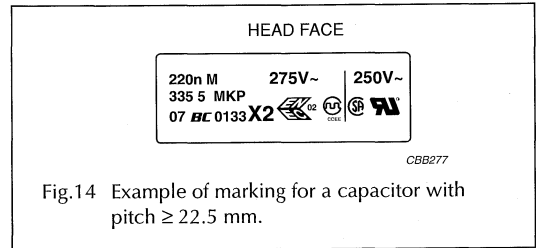


Fig.14 Example of marking for a capacitor with pitch ≥ 22.5 mm.

PRESENT MARKING

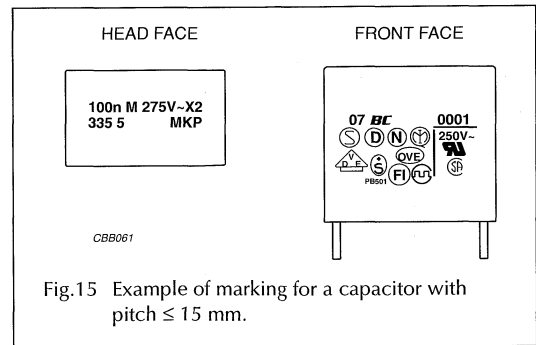


Fig.15 Example of marking for a capacitor with pitch ≤ 15 mm.

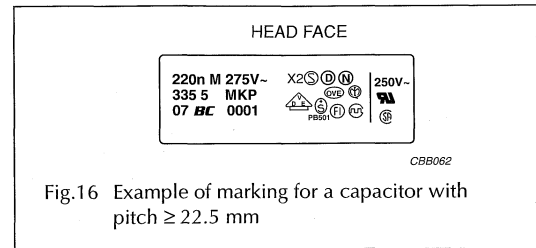


Fig.16 Example of marking for a capacitor with pitch ≥ 22.5 mm

Interference suppression film capacitors

MKP 335 5 X2

QUICK REFERENCE TEST REQUIREMENTS

TEST	PROCEDURE (quick reference)	REQUIREMENTS
Robustness of leads		
Tensile strength: "IEC 60068-2-21"	load 10 N; 10 s	no visible damage legible marking $ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 80 \times 10^{-4}$ ($C \leq 1 \mu\text{F}$); note 1 $\Delta \tan \delta \leq 50 \times 10^{-4}$ ($C > 1 \mu\text{F}$); note 1
Bending: "IEC 60068-2-21"	load 5 N; $4 \times 90^\circ$	
Resistance to soldering heat: "IEC 60068-2-20"	solder bath: 260 °C; 10 s	
Component solvent resistance	isopropyl alcohol; 23 °C; 5 minutes	
Robustness of component		
Rapid change of temperature: "IEC 60068-2-14"	5 cycles 1 cycle = 30 minutes at -55 °C and 30 minutes at 100 °C	$ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 80 \times 10^{-4}$ ($C \leq 1 \mu\text{F}$); note 1 $\Delta \tan \delta \leq 50 \times 10^{-4}$ ($C > 1 \mu\text{F}$); note 1
Vibration: "IEC 60068-2-6"	10 to 55 Hz; amplitude 0.75 mm; 6 hours	
Shock: "IEC 60068-2-27"	half sinewave; 490 m/s ² ; 11 ms	
Climatic sequence		
Dry heat: "IEC 60068-2-2"	16 hours; 100 °C	$ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 80 \times 10^{-4}$ ($C \leq 1 \mu\text{F}$); note 1 $\Delta \tan \delta \leq 50 \times 10^{-4}$ ($C > 1 \mu\text{F}$); note 1 $R_{\text{ins}} \geq 50\%$ of specified value
Damp heat, cyclic, test Db, first cycle: "IEC 60068-2-30"		
Cold: "IEC 60068-2-1"	2 hours; -55 °C	
Damp heat, cyclic, test Db, remaining cycles: "IEC 60068-2-30"		
Voltage proof: "IEC 60384-14"	$V_p = 1\,200 \text{ V (DC)}$; 1 minute	
Other applicable tests		
Damp heat, steady state: "IEC 60068-2-3"	56 days; 40 °C; 90 to 95% RH $V_p = 1\,200 \text{ V (DC)}$; 1 minute	$ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 80 \times 10^{-4}$ ($C \leq 1 \mu\text{F}$); note 1 $\Delta \tan \delta \leq 50 \times 10^{-4}$ ($C > 1 \mu\text{F}$); note 1 $R_{\text{ins}} \geq 50\%$ of specified value
Endurance (AC): "IEC 60384-14"	$3 \times 2.5 \text{ kV}$ pulse voltage for X2 1 000 hours; $1.25 \times U_{\text{Rac}}$ at 100 °C; once per hour; 0.1 s; 1 000 V (RMS) via resistor of 47 Ω ; $V_p = 1\,200 \text{ V (DC)}$; 1 minute	

Interference suppression film capacitors**MKP 335 5 X2**

TEST	PROCEDURE (quick reference)	REQUIREMENTS
Charge and discharge: "IEC 60384-14"	10000 cycles; 5 ms; 1.5 × dV/dt	$ \Delta C/C \leq 10\%$ $\Delta \tan \delta \leq 80 \times 10^{-4}$ ($C \leq 1 \mu\text{F}$); note 1 $\Delta \tan \delta \leq 50 \times 10^{-4}$ ($C > 1 \mu\text{F}$); note 1 $R_{\text{ins}} \geq 50\%$ of specified value
Passive flammability: "IEC 60384-14"	class B	no burning
Active flammability: "IEC 60384-14"	20 × 2.5 kV discharge for X2	no burning
Heat storage: "IEC 60384-14"	1000 hours; 100 °C	$ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 80 \times 10^{-4}$ ($C \leq 1 \mu\text{F}$); note 1 $\Delta \tan \delta \leq 50 \times 10^{-4}$ ($C > 1 \mu\text{F}$); note 1
Resistance to soldering heat with preheating: "IEC 60384-14"	preheating: 100 °C; solder bath: 260 °C; 10 s	$ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 80 \times 10^{-4}$ ($C \leq 1 \mu\text{F}$); note 1 $\Delta \tan \delta \leq 50 \times 10^{-4}$ ($C > 1 \mu\text{F}$); note 1
Active flammability test	voltage proof up to 2 × peak impulse voltage of 4.13 or until breakdown (100 V/sec, current limited 2mA) failed capacitors connected to a 250 Vac power supply during 5 minutes.	no burning

Note

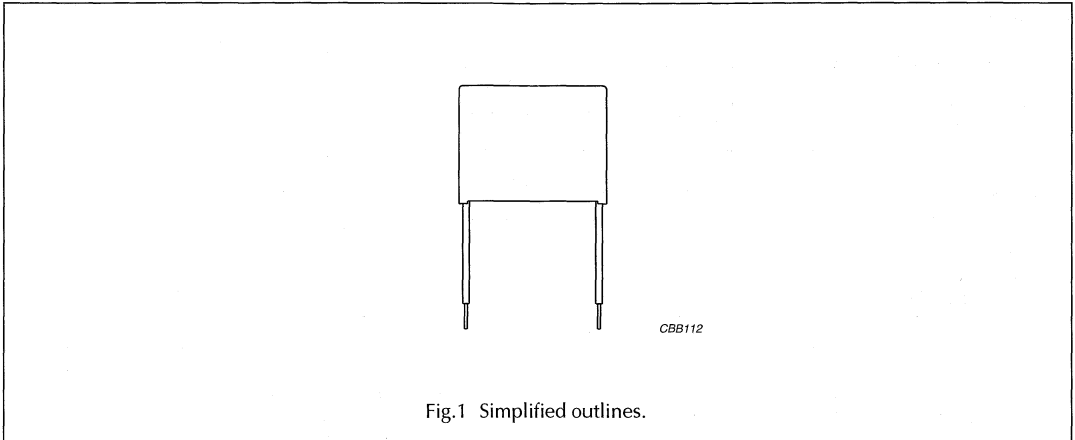
1. Measuring frequency 10 kHz for $C \leq 1 \mu\text{F}$ and 1 kHz for $C > 1 \mu\text{F}$.

Interference suppression film capacitors, insulated leads

MKP 435 X2

MKP RADIAL POTTED TYPE

PITCH 15/22.5/27.5 mm



FEATURES

- 15 to 27.5 mm lead pitch
- Insulated leads
- Supplied loose in box
- Consists of a low-inductive wound cell of metallized polypropylene film, potted in a flame-retardant case.

APPLICATIONS

- For X2 electromagnetic interference suppression
- Specially designed to meet the requirements of the "IEC 60384-14 2nd edition and EN 132400", requiring for X2 a 2.5 kV peak pulse voltage test and both UL1414 and CSA-C22.2 No 1 specifications.

DETAIL SPECIFICATION

For more detailed data and test requirements see "Type detail specification HQN-384-14/117".

QUICK REFERENCE DATA

DESCRIPTION	VALUE
Capacitance range (E12 series)	0.01 to 1.0 μ F
Capacitance tolerance	$\pm 20\%$, $\pm 10\%$
Rated (AC) voltage , 50 to 60 Hz	275 V
Rated (DC) voltage	630 V
Climatic category	40/100/56/C (15 nF to 1.0 μ F) 40/085/56/C (10 nF)
Rated temperature	100 °C
Maximum application temperature	100 °C
Reference specifications	IEC 60384-14 2nd edition and EN 132400
Safety approvals: 250 V 275 V	UL1414 and CSA-C22.2.1; note 1 VDE
Safety class	X2; across the line

Note



1. Pending.

Interference suppression film capacitors, insulated leads

MKP 435 X2

SAFETY APPROVALS AND SAFETY TEST REPORT

Approvals


SAFETY APPROVALS (X2)		VOLTAGE	VALUE	FILE NUMBERS
	UL1414 and CSA-C22.2.1	250 V (AC)	10 nF to 1.0 μ F	pending
	EN132400	275 V (AC)	15 nF to 1.0 μ F: 40/100/56/C	ENEC/B07/2001

Safety test report

SAFETY TEST REPORT	VOLTAGE	VALUE	FILE NUMBERS
CB TEST CERTIFICATE	275 V (AC)	10 nF to 1.0 μ F: 40/085/21/C	DE-1-5671

The EneC-approval together with the CB-Certificate replace all national approval marks of the following countries (they have already signed the ENEC-Agreement): Austria; Belgium; Czech. Republic; Denmark; Finland; France; Germany; Greece; Hungary; Ireland; Italy; Luxembourg; Netherlands; Norway, Portugal; Slovenian; Spain; Sweden; Switzerland and United Kingdom.

Safety approvals to be replaced by ENEC during 2001

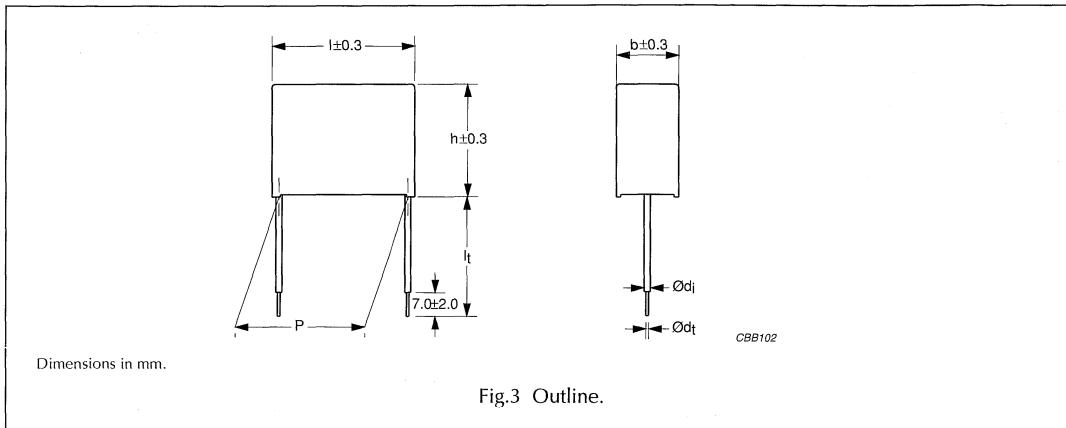
SAFETY APPROVALS (X2)		VOLTAGE	VALUE	FILE NUMBERS
	VDE (EN132400)	275 V (AC)	15 nF to 1.0 μ F: 40/100/56/C	128645

Interference suppression film capacitors, insulated leads

MKP 435 X2

MKP 435 GENERAL DATA

PITCH 15/22.5/27.5 mm



Specific reference data for the 275 V AC (X2) capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle: 100 nF < C ≤ 470 nF	≤ 10 × 10 ⁻⁴	≤ 20 × 10 ⁻⁴	≤ 100 × 10 ⁻⁴
470 nF < C ≤ 1 µF	≤ 20 × 10 ⁻⁴	≤ 70 × 10 ⁻⁴	–
Rated voltage pulse slope (dU/dt) _R at 385 V (DC)	100 V/µs		
R between leads, for C ≤ 0.33 µF at 100 V; 1 minute	> 30000 MΩ		
RC between leads, for C > 0.33 µF at 100 V; 1 minute	> 10000 s		
R between leads and case; 100 V; 1 minute	> 30000 MΩ		
Withstanding (DC)voltage (cut off current 10 mA); rise time 100 V/s	1 200 V; 1 minute		
Withstanding (AC) voltage between leads and case	2 050 V; 1 minute		

Available 275 V AC (X2) versions

PACKAGING	STANDARD DIMENSIONS ⁽¹⁾⁽²⁾	LEAD CONFIGURATION	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
loose in box	lead length 35.0 mm	Solid Cu wire 0.8 mm	±20%	2222 435 20...	preferred
			±10%	2222 435 30...	on request
			±20%	2222 435 21...	on request
			±10%	2222 435 31...	on request
			±20%	2222 435 22...	on request
			±10%	2222 435 32...	on request
	lead length 40.0 mm	Stranded Cu wire 0.5 mm ²	±20%	2222 435 23...	preferred
			±10%	2222 435 33...	on request
			±20%	2222 435 24...	on request
			±10%	2222 435 34...	on request
			±20%	2222 435 25...	on request
			±10%	2222 435 35...	on request

Notes

- Lead length: $l_t = \pm 5$ mm.
- The parts without insulation are tinned.

Interference suppression film capacitors, insulated leads

MKP 435 X2

 $U_{Rac} = 275 \text{ V (X2)}; U_{Rdc} = 630 \text{ V}$

C (μF)	DIMENSIONS $b \times h \times l$ (mm)	MASS (g)	CATALOGUE NUMBER	
			LOOSE IN BOX	
			$l_t = 35 \pm 5 \text{ mm}$	
			lead configuration = solid Cu wire = 0.8 mm ⁽¹⁾	lead configuration = stranded Cu wire = 0.5 mm ⁽²⁾
			C-tol = $\pm 20\%$	C-tol = $\pm 20\%$
			catalogue number	last 5 digits
Reference pitch: P = 15 mm				
0.01	5.5 × 10.5 × 18.0	1.5	2222 435 20103	.. 23103
0.015			2222 435 20153	.. 23153
0.022			2222 435 20223	.. 23223
0.033			2222 435 20333	.. 23333
0.047	6.5 × 12.5 × 18.0	2.0	2222 435 20473	.. 23473
0.068	7.5 × 13.5 × 18.0	2.5	2222 435 20683	.. 23683
0.10	8.5 × 14.5 × 18.0	3.0	2222 435 20104	.. 23104
Reference pitch: P = 22.5 mm				
0.15	7.5 × 15.5 × 26.5	4.0	2222 435 20154	.. 23154
0.22	8.5 × 16.5 × 26.5	5.0	2222 435 20224	.. 23224
0.33	10.5 × 18.5 × 26.5	6.5	2222 435 20334	.. 23334
Reference pitch: P = 27.5 mm				
0.47	11.5 × 20.5 × 31.5	10.0	2222 435 20474	.. 23474
0.68	13.5 × 23.5 × 31.5	13.0	2222 435 20684	.. 23684
1	15.0 × 24.5 × 31.5	15.0	2222 435 20105	.. 23105

Notes

1. \varnothing di isolation = 2.4 mm for P = 15 mm and 2.8 mm for P > 15 mm.
2. \varnothing di isolation = 2.4 mm.

Interference suppression film capacitors, insulated leads

MKP 435 X2

CONSTRUCTION

Description

- Low-inductive wound cell of metallized polypropylene (PP) film, potted with epoxy resin in a flame-retardant case
- Radial insulated leads:
 - Solid wire 0.8 mm with PVC insulation
 - Stranded tinned wire 0.5 mm² with PVC insulation.

Mounting

NORMAL USE

The capacitors are designed for snap-in mounting and soldering.

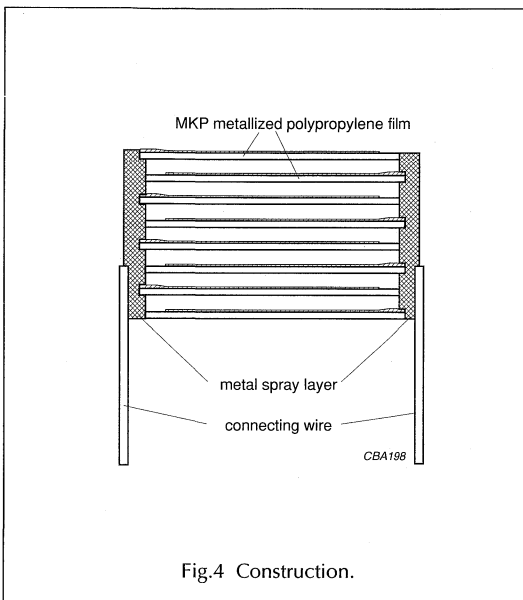
Storage temperature

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

RATINGS AND CHARACTERISTICS REFERENCE CONDITIONS

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 over 96 ±4 hours by heating the products in a circulating air oven at the rated temperature and a relative humidity not exceeding 20%.

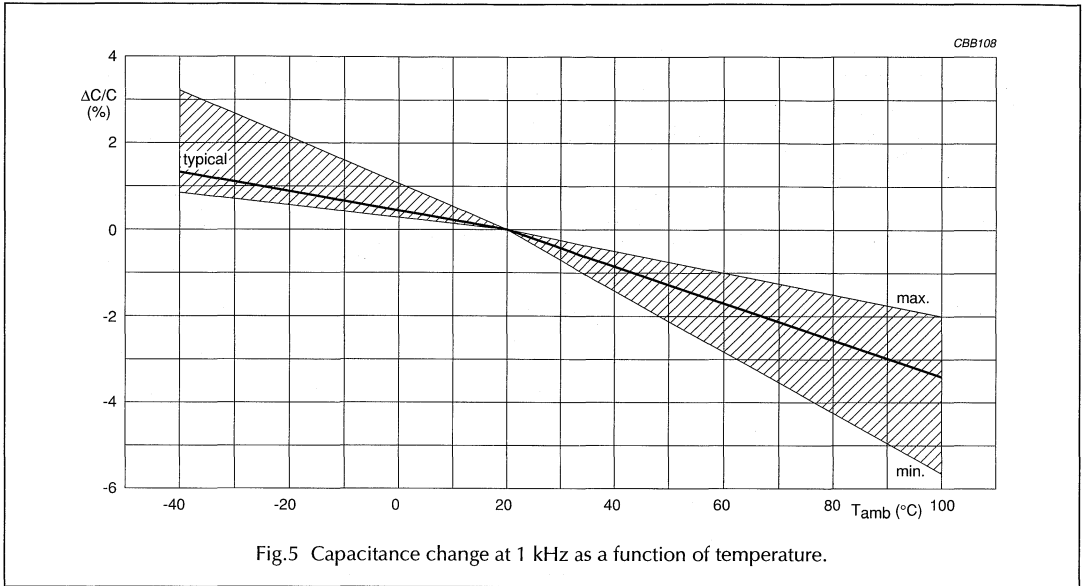


**Interference suppression film capacitors,
insulated leads**

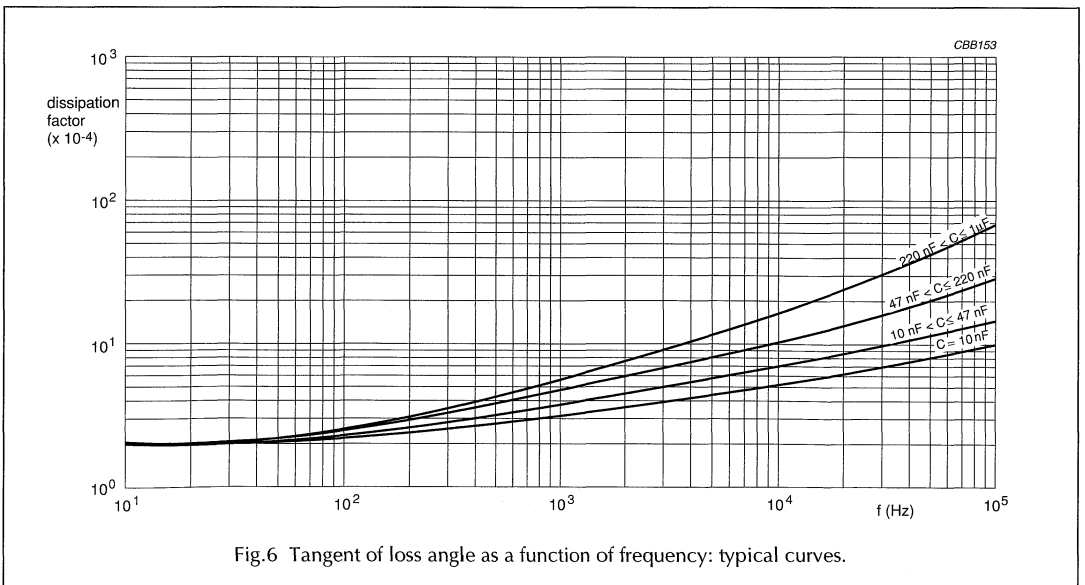
MKP 435 X2

CHARACTERISTICS

Capacitance



Tangent of loss angle



**Interference suppression film capacitors,
insulated leads**

MKP 435 X2

Impedance

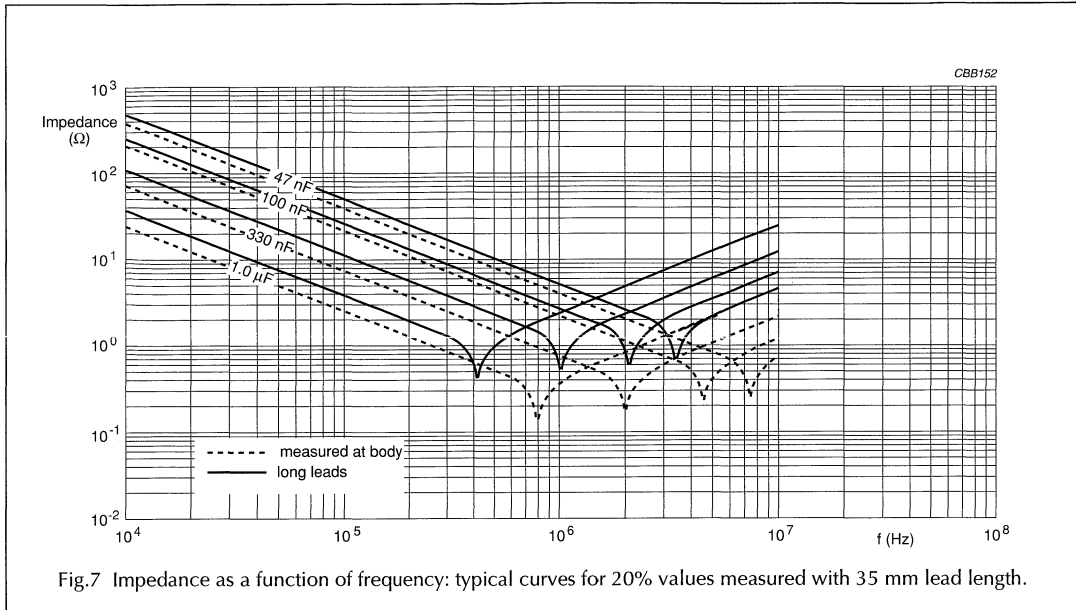


Fig.7 Impedance as a function of frequency: typical curves for 20% values measured with 35 mm lead length.

Resonant frequency

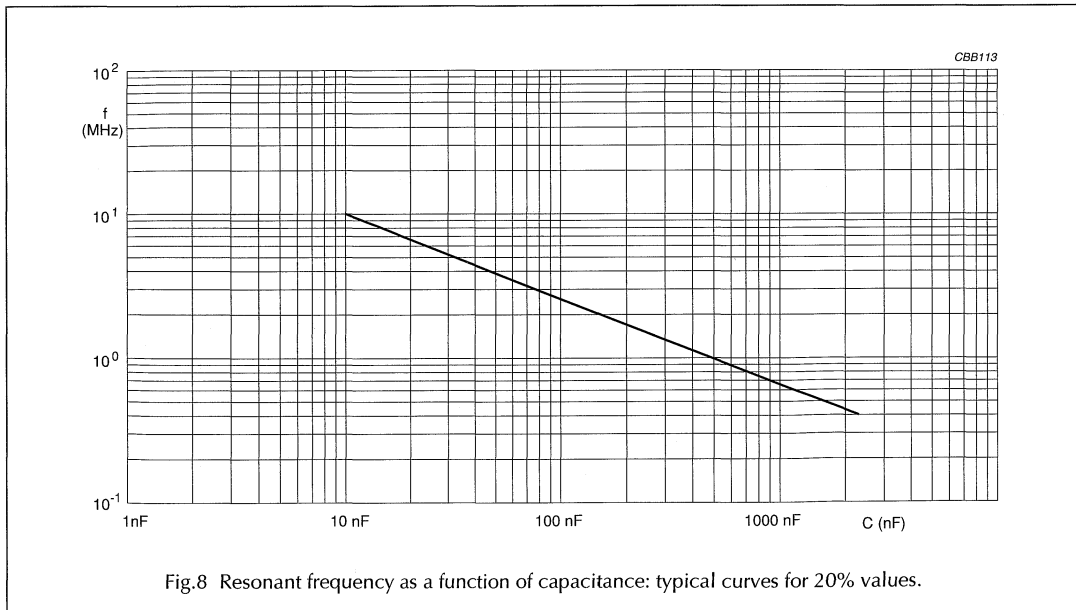
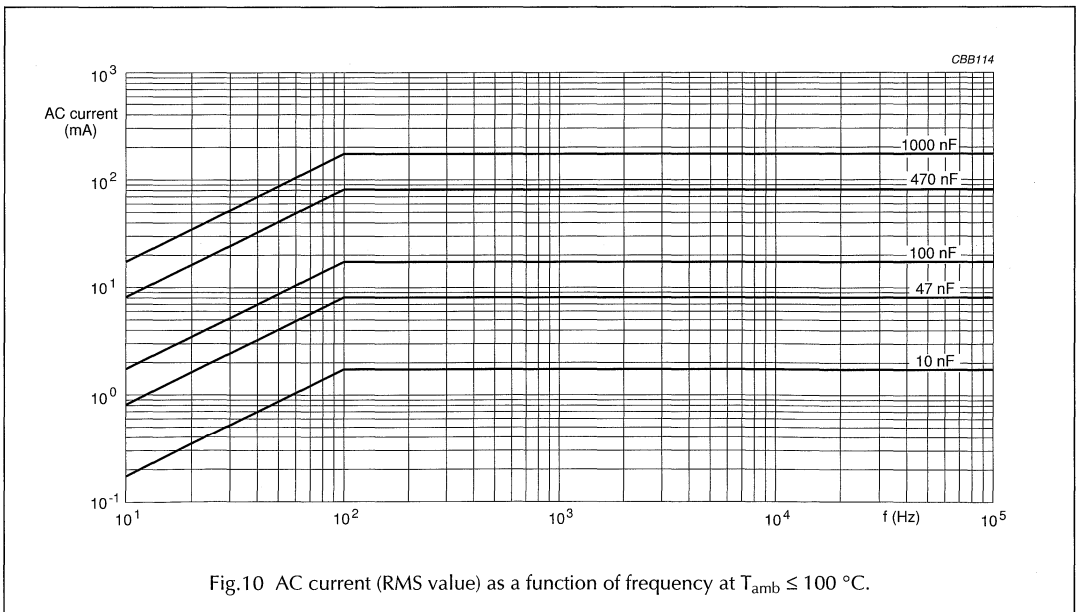
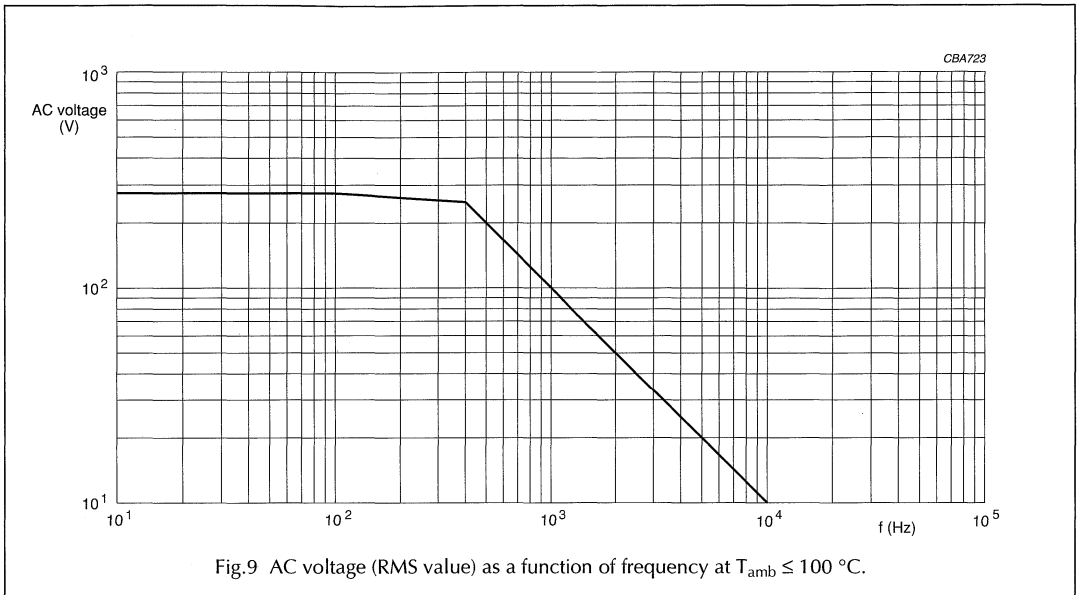


Fig.8 Resonant frequency as a function of capacitance: typical curves for 20% values.

Interference suppression film capacitors, insulated leads

MKP 435 X2

Maximum RMS voltage and AC current (sinewave) as a function of frequency for $T_{amb} \leq 100\text{ }^{\circ}\text{C}$



Interference suppression film capacitors, insulated leads

MKP 435 X2

Insulation resistance

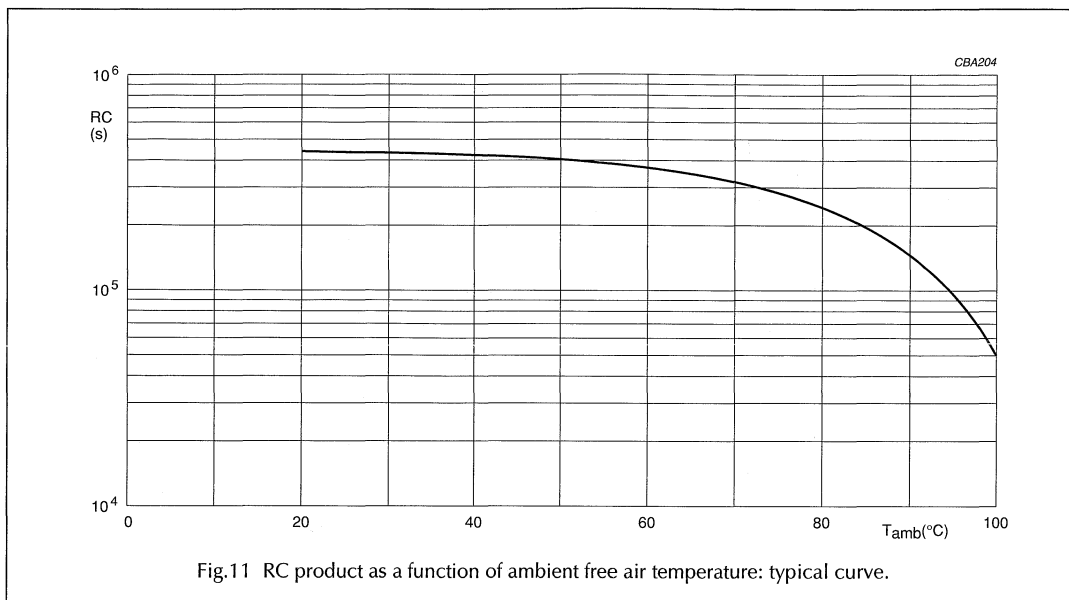


Fig.11 RC product as a function of ambient free air temperature: typical curve.

APPLICATION NOTES

- For X2 electromagnetic interference suppression in across the line applications (50/60 Hz) with a maximum mains voltage of 275 V (AC) $\pm 10\%$ instability.
- These capacitors are not intended for continuous pulse applications. For these situations, capacitors of the AC and pulse program must be used, such as: 2222 375; 2222 383 or 2222 479
- The maximum ambient temperature must not exceed 100 °C.
- Rated voltage pulse slope:
 - If the pulse voltage is lower than the rated voltage, the values of the specific reference data can be multiplied by 385 V (DC) and divided by the applied voltage.

Interference suppression film capacitors, insulated leads

MKP 435 X2

MARKING

Product marking

The capacitors are marked (see Fig.12) with the following information:

1. Rated capacitance code in accordance with "IEC 60062"
2. Tolerance on rated capacitance; M = $\pm 20\%$; K = $\pm 10\%$
3. Rated (AC) voltage (e.g. 275 V)
4. Sub-class (e.g. X2)
5. Manufacturer's type designation (e.g. 435)
6. Code for dielectric material (MKP) for capacitors with original pitch = 15, 22.5 and 27.5 mm
7. Manufacturer (BC) and manufacturer place
8. Year and week of manufacture (e.g. 0133) for capacitors with original pitch = 15, 22.5 and 27.5 mm.

NEW MARKING (INTRODUCED DURING 2001)

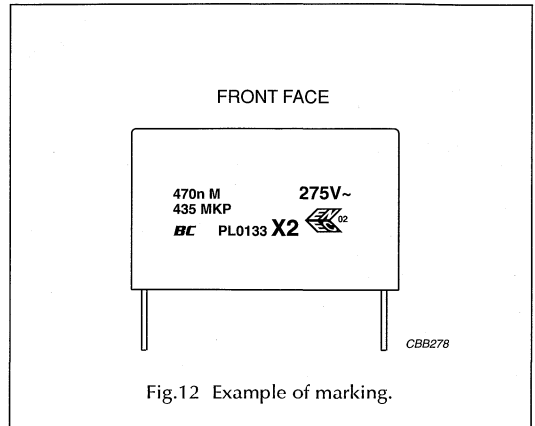


Fig.12 Example of marking.

PRESENT MARKING

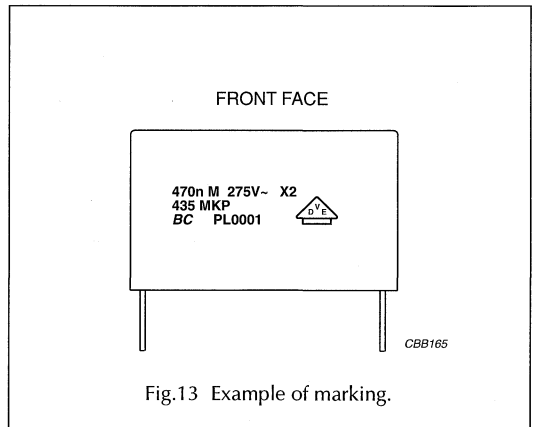


Fig.13 Example of marking.

Interference suppression film capacitors, insulated leads

MKP 435 X2

QUICK REFERENCE TEST REQUIREMENTS

TEST	PROCEDURE (quick reference)	REQUIREMENTS
Robustness of leads		
Tensile strength: "IEC 60068-2-21"	load 10 N; 10 s	no visible damage legible marking
Bending: "IEC 60068-2-21"	load 5 N; 4 × 90 °	
Component solvent resistance	isopropyl alcohol; 23 °C; 5 minutes	$ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 80 \times 10^{-4}$ ($C \leq 1 \mu\text{F}$); note 1
Robustness of component		
Rapid change of temperature: "IEC 60068-2-14"	5 cycles 1 cycle = 30 minutes at -40 °C and 30 minutes at 100 °C	$ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 80 \times 10^{-4}$ ($C \leq 1 \mu\text{F}$); note 1
Vibration: "IEC 60068-2-6"	10 to 55 Hz; amplitude 0.75 mm; 6 hours	
Shock: "IEC 60068-2-27"	half sinewave; 490 m/s ² ; 11 ms	
Climatic sequence		
Dry heat: "IEC 60068-2-2"	16 hours; 100 °C	$ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 80 \times 10^{-4}$ ($C \leq 1 \mu\text{F}$); note 1 $R_{\text{ins}} \geq 50\%$ of specified value
Damp heat, cyclic, test Db, first cycle: "IEC 60068-2-30"		
Cold: "IEC 60068-2-1"	2 hours; -40 °C	
Damp heat, cyclic, test Db, remaining cycles: "IEC 60068-2-30"		
Voltage proof: "IEC 60384-14"	$V_p = 1\,200 \text{ V (DC)}$; 1 minute	
Other applicable tests		
Damp heat, steady state: "IEC 60068-2-3"	56 days; 40 °C; 90 to 95% RH no load $V_p = 1\,200 \text{ V (DC)}$; 1 minute	$ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 80 \times 10^{-4}$ ($C \leq 1 \mu\text{F}$); note 1 $R_{\text{ins}} \geq 50\%$ of specified value
Endurance (AC): "IEC 60384-14"	3 × 2.5 kV pulse voltage for X2; 1000 hours; $1.25 \times U_{\text{RAC}}$ at 100 °C; once per hour; 0.1 s; 1000 V (RMS) via resistor of 47 Ω; $V_p = 1\,200 \text{ V (DC)}$; 1 minute	$ \Delta C/C \leq 10\%$ $\Delta \tan \delta \leq 80 \times 10^{-4}$ ($C \leq 1 \mu\text{F}$); note 1 $R_{\text{ins}} \geq 50\%$ of specified value
Charge and discharge: "IEC 60384-14"	10000 cycles; 5 ms; $1.5 \times dV/dt$	$ \Delta C/C \leq 10\%$ $\Delta \tan \delta \leq 80 \times 10^{-4}$ ($C \leq 1 \mu\text{F}$); note 1 $R_{\text{ins}} \geq 50\%$ of specified value
Passive flammability: "IEC 60384-14"	class C	no burning

Interference suppression film capacitors, insulated leads

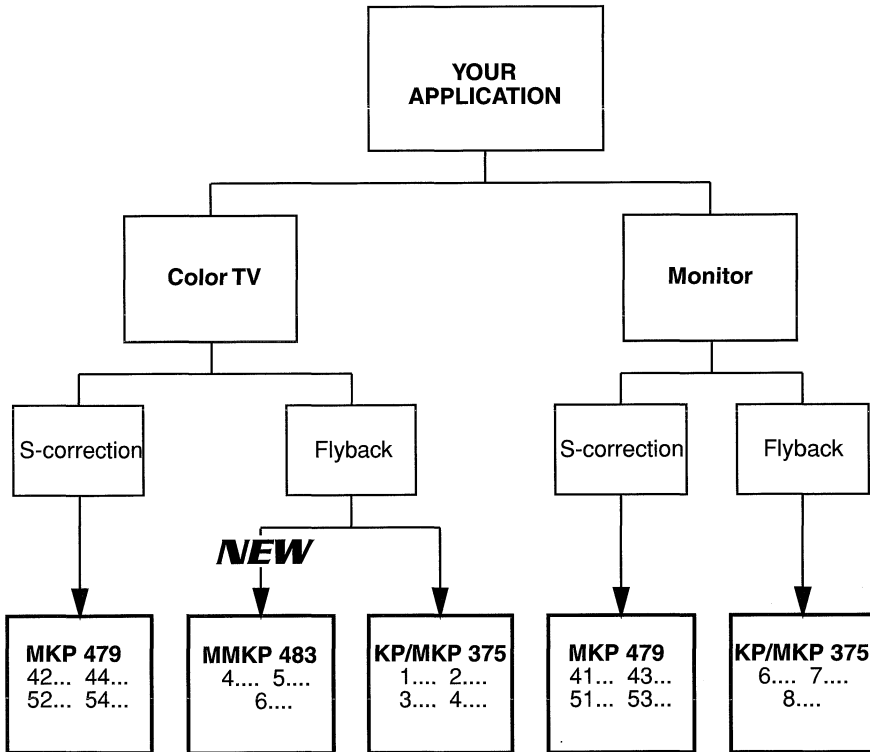
MKP 435 X2

TEST	PROCEDURE (quick reference)	REQUIREMENTS
Active flammability: "IEC 60384-14"	20 × 2.5 kV discharge	no burning
Heat storage: "IEC 60384-14"	1 000 hours; 100 °C	$ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 80 \times 10^{-4}$ ($C \leq 1 \mu\text{F}$); note 1
Active flammability test	voltage proof up to 2 × peak impulse voltage of 4.13 or until breakdown (100 V/sec, current limited 2mA) failed capacitors connected to a 250 V (AC) power supply during 5 minutes	no burning

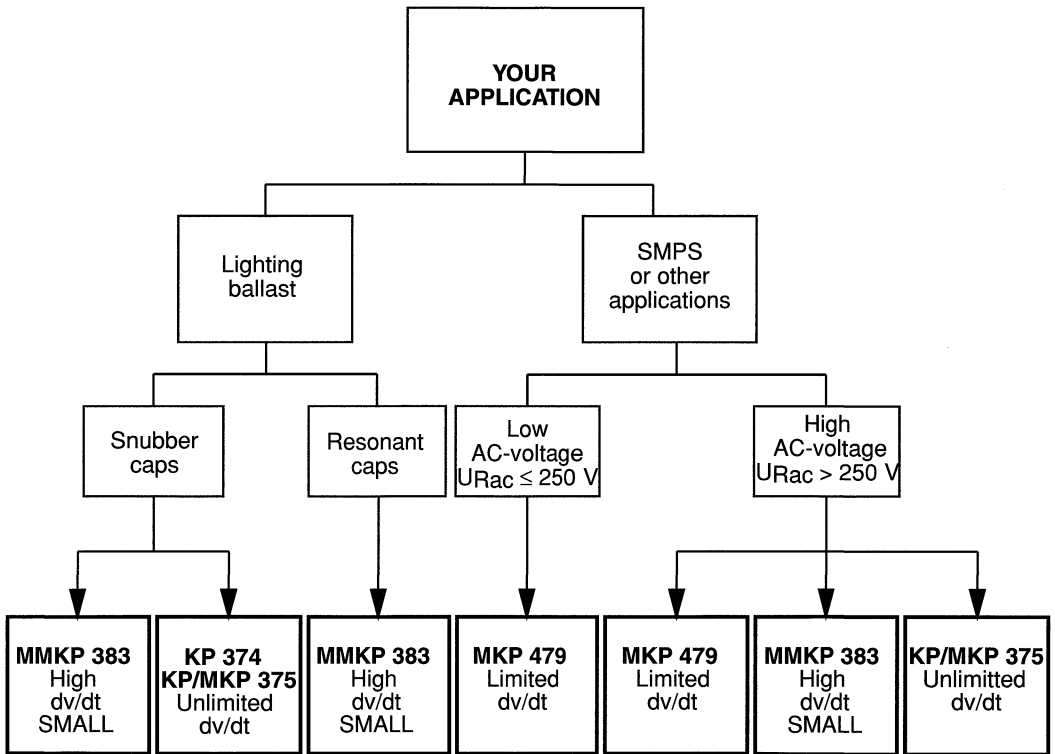
Note

1. Measuring frequency 10 kHz for $C \leq 1 \mu\text{F}$.

AC AND PULSE CAPACITORS



CBB329



CBB330

AC and pulse metallized polypropylene film capacitors

MKP 479

MKP RADIAL EPOXY LACQUERED TYPE

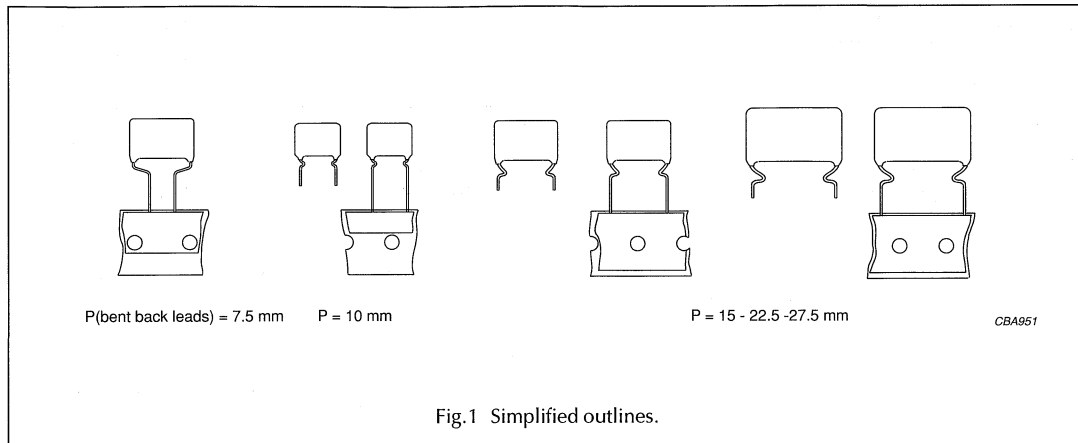
PITCH 10/15/22.5/27.5 mm
PITCH 7.5 mm (bent back leads)

Fig.1 Simplified outlines.

FEATURES

- 7.5 mm bent back pitch
- 10 to 27.5 mm lead pitch
- Low contact resistance
- Low loss dielectric
- Supplied loose in box (including lock lead versions) and taped on reel.

APPLICATIONS

- 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
- Typical for S-correction in TV-sets and monitor
- Their small dimensions make them suitable for circuits with high packaging density.

DETAIL SPECIFICATION

For more detailed data and test requirements see "Type detail specification HQN-384-17/105".

QUICK REFERENCE DATA

DESCRIPTION	VALUE
Capacitance range (E24 series)	0.01 to 3.9 μ F
Capacitance tolerance	\pm 5%
Rated (DC) voltage	160 V; 250 V; 400 V; 630 V
Rated (AC) voltage	100 V; 160 V; 200 V; 200 V
Rated peak-to-peak voltage	280 V; 450 V; 560 V; 560 V
Climatic category	55/105/56
Rated temperature (DC)	85 °C
Rated temperature (AC)	85 °C
Maximum application temperature	105 °C
Reference specification	IEC 60384-17
Performance grade	grade 1 (long life)
Stability grade	grade 2
Materials	qualified in accordance with UL94 V-0

AC and pulse metallized polypropylene film capacitors

MKP 479

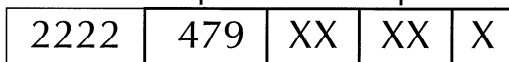
COMPOSITION OF CATALOGUE NUMBER

TYPE AND PITCHES	
479	15.0/7.5 mm
	10.0 mm
	15.0 mm
	22.5 mm
	27.5 mm

CAPACITANCE
(numerically; but not for lock lead)

MULTIPLIER (nF)	
0.1	2
1	3
10	4
100	5

Example:
104 = 10 x 10 = 100 nF



TYPE	PACKAGING	LEAD CONFIGURATION	PREFERRED TYPES						
			C-TOL	160 V	250 V	250 V	400 V	400 V	630 V
						monitor type		monitor type	
479	loose in box	lead length 5.0 mm	±5%	32	42	41	52	51	62
		lock lead 4.0 mm		90	90	90	90	90	90
	taped on reel	bent back leads		36	46	49	56	59	66
			ON REQUEST						
479	loose in box	lead length 3.5 mm	±5%	34	44	43	54	53	64
	taped on reel			35	45	47	55	57	65

AC and pulse metallized polypropylene film capacitors

MKP 479

MKP 479 GENERAL DATA

**PITCH 10/15 mm
PITCH 7.5 mm (bent back leads)**

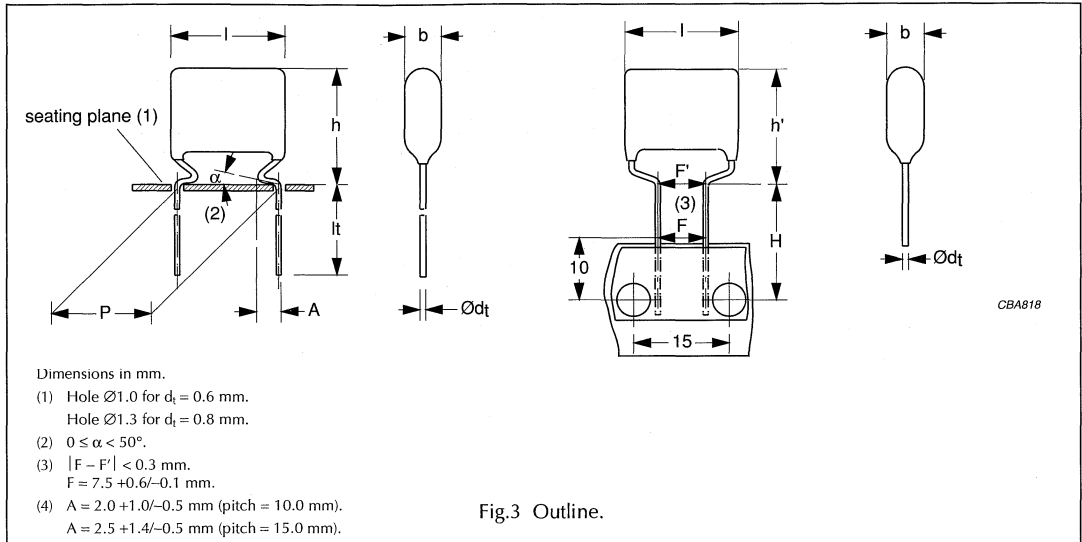


Fig.3 Outline.

Specific reference data for the 160 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
$C = 0.075 \mu\text{F}$	$\leq 5 \times 10^{-4}$	$\leq 20 \times 10^{-4}$
$0.075 \mu\text{F} < C \leq 0.11 \mu\text{F}$	$\leq 5 \times 10^{-4}$	$\leq 25 \times 10^{-4}$
$0.11 \mu\text{F} < C \leq 0.18 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 30 \times 10^{-4}$
$0.18 \mu\text{F} < C \leq 0.3 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 35 \times 10^{-4}$
$0.3 \mu\text{F} < C \leq 0.39 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 40 \times 10^{-4}$
$0.39 \mu\text{F} < C \leq 0.56 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 45 \times 10^{-4}$
$0.56 \mu\text{F} < C \leq 0.68 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 50 \times 10^{-4}$
$0.68 \mu\text{F} < C \leq 0.75 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 55 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 160 V (DC):		
$P = 10$ mm	60 V/ μs	
$P = 15$ mm	50 V/ μs	
R between leads, for $C \leq 1.0 \mu\text{F}$ at 100 V; 1 minute	$> 100\,000 \text{ M}\Omega$	
R between leads and case; 100 V; 1 minute	$> 100\,000 \text{ M}\Omega$	
Ionization (AC) voltage (typical value) at 50 pC peak discharge	$> 220 \text{ V}$	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	256 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 160 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 5.0 \pm 1.0$ mm	$\pm 5\%$	2222 479 32...	preferred
	$l_t = 3.5 \pm 0.5$ mm	$\pm 5\%$	2222 479 34...	on request
Taped on reel	$H = 16.0$ mm; $P_0 = 12.7$ mm	$\pm 5\%$	2222 479 35...	on request
Taped on reel (bent back)	$H = 16.0$ mm; $P_0 = 15.0$ mm	$\pm 5\%$	2222 479 36...	preferred

AC and pulse metallized polypropylene film capacitors

MKP 479

 $U_{Rdc} = 160 \text{ V}; U_{Rac} = 100 \text{ V}; U_{p-p} = 280 \text{ V}$

C (μF)	DIMENSIONS ⁽¹⁾ $b_{\text{max}} \times h (h')_{\text{max}} \times l_{\text{max}}$ (mm)	MASS (g)	CATALOGUE NUMBER	
			LOOSE IN BOX	REEL DIAMETER = 500 mm
			$l_t = 5.0 \pm 1.0 \text{ mm}$	H = 16.0 mm; P ₀ = 15.0 mm
			C-tol = $\pm 5\%$	C-tol = $\pm 5\%$
			catalogue number	last 5 digits
Pitch = 10.0 \pm 0.4 mm; $d_t = 0.60 \pm 0.06 \text{ mm}$			pitch = 7.5 mm (bent back)	
0.075	6.0 \times 15.0 \times 12.5	0.9	2222 479 32753	not available
0.082			2222 479 32823	
0.091			2222 479 32913	
0.1			2222 479 32104	
0.11			2222 479 32114	
0.12			2222 479 32124	
0.13			2222 479 32134	
0.15	6.5 \times 15.5 \times 12.5	1.0	2222 479 32154	
0.16			2222 479 32164	
Pitch = 15.0 \pm 0.4 mm; $d_t = 0.80 \pm 0.08 \text{ mm}$			pitch = 7.5 mm (bent back)	
0.18	6.0 \times 15.0 (16.5) \times 18.5	1.2	2222 479 32184	.. 36184
0.20	6.5 \times 15.5 (17.0) \times 18.5	1.3	2222 479 32204	.. 36204
0.22			2222 479 32224	.. 36224
0.24	7.0 \times 16.0 (17.5) \times 18.5	1.4	2222 479 32244	.. 36244
0.27			2222 479 32274	.. 36274
0.30			2222 479 32304	.. 36304
0.33			2222 479 32334	.. 36334
0.36			2222 479 32364	.. 36364
0.39			2222 479 32394	.. 36394
0.43	7.5 \times 16.5 (18.0) \times 18.5	1.5	2222 479 32434	.. 36434
0.47			2222 479 32474	.. 36474
0.51	8.0 \times 17.0 (18.5) \times 18.5	1.6	2222 479 32514	.. 36514
0.56			2222 479 32564	.. 36564
0.62	8.5 \times 17.5 (19.0) \times 18.5	1.7	2222 479 32624	.. 36624
0.68	9.0 \times 18.0 (19.5) \times 18.5	1.8	2222 479 32684	.. 36684
0.75	9.5 \times 18.5 (20.0) \times 18.5	1.9	2222 479 32754	.. 36754

Note

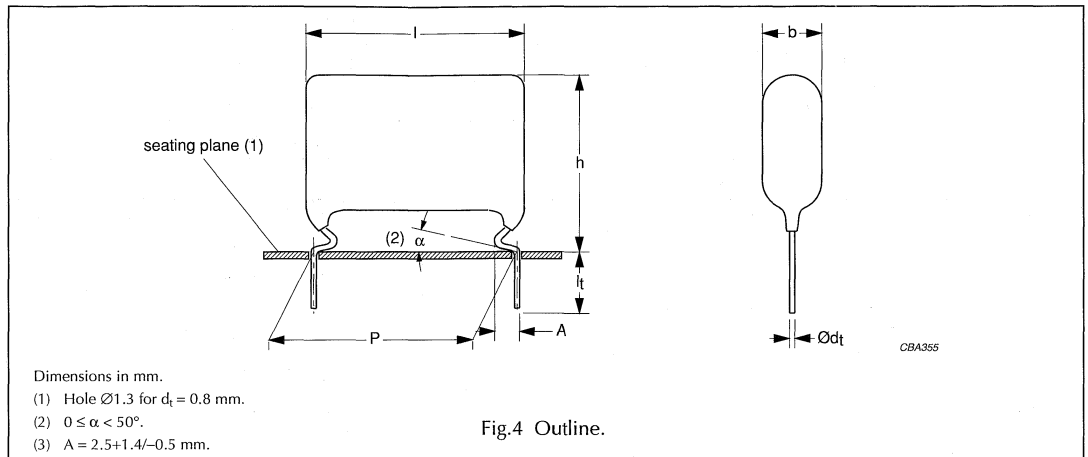
- Dimensions in brackets for bent back leads.

AC and pulse metallized polypropylene film capacitors

MKP 479

MKP 479 GENERAL DATA

PITCH 22.5/27.5 mm



Specific reference data for the 160 V DC capacitors

DESCRIPTION	VALUE		DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz		at 10 kHz	at 100 kHz
Tangent of loss angle: $C = 0.82 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 55 \times 10^{-4}$	Tangent of loss angle: $1.8 \mu\text{F} < C \leq 2.0 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 95 \times 10^{-4}$
$0.82 \mu\text{F} < C \leq 0.91 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 60 \times 10^{-4}$	$2.0 \mu\text{F} < C \leq 2.2 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 100 \times 10^{-4}$
$0.91 \mu\text{F} < C \leq 1.0 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 65 \times 10^{-4}$	$2.2 \mu\text{F} < C \leq 2.4 \mu\text{F}$	$\leq 15 \times 10^{-4}$	$\leq 105 \times 10^{-4}$
$1.0 \mu\text{F} < C \leq 1.2 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 70 \times 10^{-4}$	$2.4 \mu\text{F} < C \leq 2.7 \mu\text{F}$	$\leq 15 \times 10^{-4}$	$\leq 110 \times 10^{-4}$
$1.2 \mu\text{F} < C \leq 1.3 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 75 \times 10^{-4}$	$2.7 \mu\text{F} < C \leq 3.0 \mu\text{F}$	$\leq 15 \times 10^{-4}$	$\leq 115 \times 10^{-4}$
$1.3 \mu\text{F} < C \leq 1.5 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 80 \times 10^{-4}$	$3.0 \mu\text{F} < C \leq 3.3 \mu\text{F}$	$\leq 15 \times 10^{-4}$	$\leq 125 \times 10^{-4}$
$1.5 \mu\text{F} < C \leq 1.6 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 85 \times 10^{-4}$	$3.3 \mu\text{F} < C \leq 3.6 \mu\text{F}$	$\leq 15 \times 10^{-4}$	$\leq 130 \times 10^{-4}$
$1.6 \mu\text{F} < C \leq 1.8 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 90 \times 10^{-4}$	$3.6 \mu\text{F} < C \leq 3.9 \mu\text{F}$	$\leq 15 \times 10^{-4}$	$\leq 135 \times 10^{-4}$
Rated voltage pulse slope (dU/dt) _R at 160 V (DC): P = 22.5 mm	25 V/ μs		Rated voltage pulse slope (dU/dt) _R at 160 V (DC): P = 27.5 mm	15 V/ μs	
R between leads, for $C \leq 1 \mu\text{F}$ at 100 V; 1 minute			>100000 M Ω		
RC between leads, for $C > 1 \mu\text{F}$ at 100 V; 1 minute			>100000 s		
R between leads and case; 100 V; 1 minute			>100000 M Ω		
Ionization (AC) voltage (typical value) at 50 pC peak discharge			>220 V		
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s			256 V; 1 minute		
Withstanding (DC) voltage between leads and case			2840 V; 1 minute		

Available 160 V DC versions

PACKAGING ⁽¹⁾	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 5.0 \pm 1.0$ mm	$\pm 5\%$	2222 479 32...	preferred
	$l_t = 3.5 \pm 0.5$ mm	$\pm 5\%$	2222 479 34...	on request
Taped on reel	H = 16.0 mm; P ₀ = 12.7 mm	$\pm 5\%$	2222 479 35...	on request

Note

1. Taped on reel pitch = 27.5 mm is not available.

AC and pulse metallized polypropylene film capacitors

MKP 479

$U_{Rdc} = 160 \text{ V}$; $U_{Rac} = 100 \text{ V}$; $U_{p-p} = 280 \text{ V}$

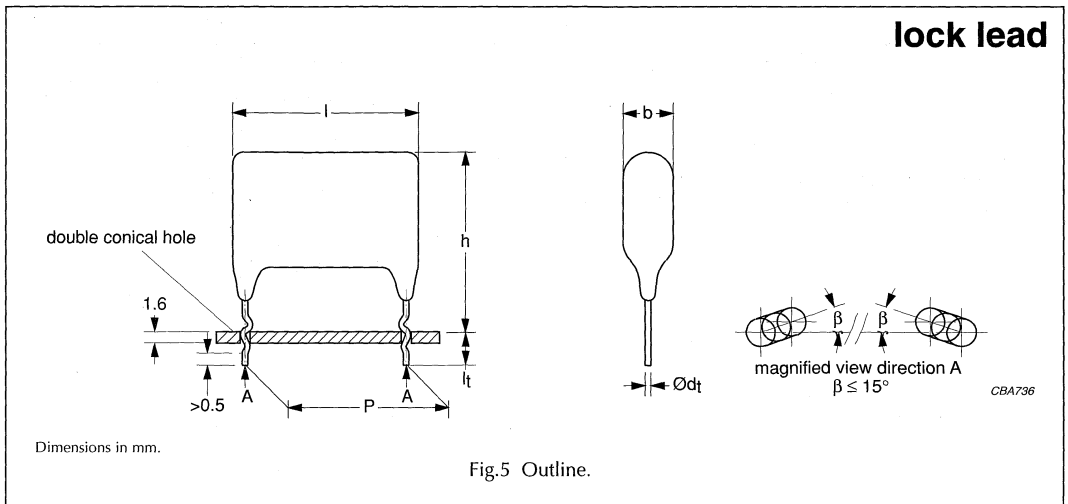
C (μF)	DIMENSIONS $b_{\max} \times h_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 5.0 \pm 1.0 \text{ mm}$
			C-tol = $\pm 5\%$
Pitch = $22.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.82	$7.0 \times 20.0 \times 26.0$	1.8	2222 479 32824
0.91	$7.5 \times 20.5 \times 26.0$	1.9	2222 479 32914
1			2222 479 32105
1.1	$8.0 \times 21.0 \times 26.0$	2.0	2222 479 32115
1.2	$8.5 \times 21.5 \times 26.0$	2.1	2222 479 32125
1.3			2222 479 32135
1.5	$9.5 \times 22.5 \times 26.0$	2.4	2222 479 32155
1.6			2222 479 32165
1.8	$10.0 \times 23.0 \times 26.0$	2.5	2222 479 32185
Pitch = $27.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
2	$10.0 \times 23.0 \times 30.0$	5.0	2222 479 32205
2.2	$10.5 \times 23.5 \times 30.0$	5.0	2222 479 32225
2.4	$11.0 \times 24.0 \times 30.0$	5.5	2222 479 32245
2.7	$11.5 \times 24.5 \times 30.0$	5.5	2222 479 32275
3	$12.0 \times 25.0 \times 30.0$	6.0	2222 479 32305
3.3	$13.0 \times 26.0 \times 30.0$	6.5	2222 479 32335
3.6	$13.5 \times 26.5 \times 30.0$	7.0	2222 479 32365
3.9	$14.0 \times 27.0 \times 30.0$	7.0	2222 479 32395

AC and pulse metallized polypropylene film capacitors

MKP 479

MKP 479 GENERAL DATA

PITCH 10/15 mm (lock lead)



Specific reference data for the 160 V DC capacitors (lock lead)

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
$C = 0.075 \mu\text{F}$	$\leq 5 \times 10^{-4}$	$\leq 20 \times 10^{-4}$
$0.075 \mu\text{F} < C \leq 0.11 \mu\text{F}$	$\leq 5 \times 10^{-4}$	$\leq 25 \times 10^{-4}$
$0.11 \mu\text{F} < C \leq 0.18 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 30 \times 10^{-4}$
$0.18 \mu\text{F} < C \leq 0.3 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 35 \times 10^{-4}$
$0.3 \mu\text{F} < C \leq 0.39 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 40 \times 10^{-4}$
$0.39 \mu\text{F} < C \leq 0.56 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 45 \times 10^{-4}$
$0.56 \mu\text{F} < C \leq 0.68 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 50 \times 10^{-4}$
$0.68 \mu\text{F} < C \leq 0.75 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 55 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 160 V (DC):		
$P = 10 \text{ mm}$	60 V/ μs	
$P = 15 \text{ mm}$	50 V/ μs	
R between leads, for $C \leq 1.0 \mu\text{F}$ at 100 V; 1 minute	$>100\,000 \text{ M}\Omega$	
R between leads and case; 100 V; 1 minute	$>100\,000 \text{ M}\Omega$	
Ionization (AC) voltage (typical value) at 50 pC peak discharge	$>220 \text{ V}$	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	256 V; 1 minute	
Withstanding (DC)voltage between leads and case	2840 V; 1 minute	

Available 160 V DC versions (lock lead)

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 4.0 +1.0/-0.5 \text{ mm}$	$\pm 5\%$	2222 479 90...	preferred

AC and pulse metallized polypropylene film capacitors

MKP 479

$U_{Rdc} = 160 \text{ V}$; $U_{Rac} = 100 \text{ V}$; $U_{p-p} = 280 \text{ V}$ (lock lead)

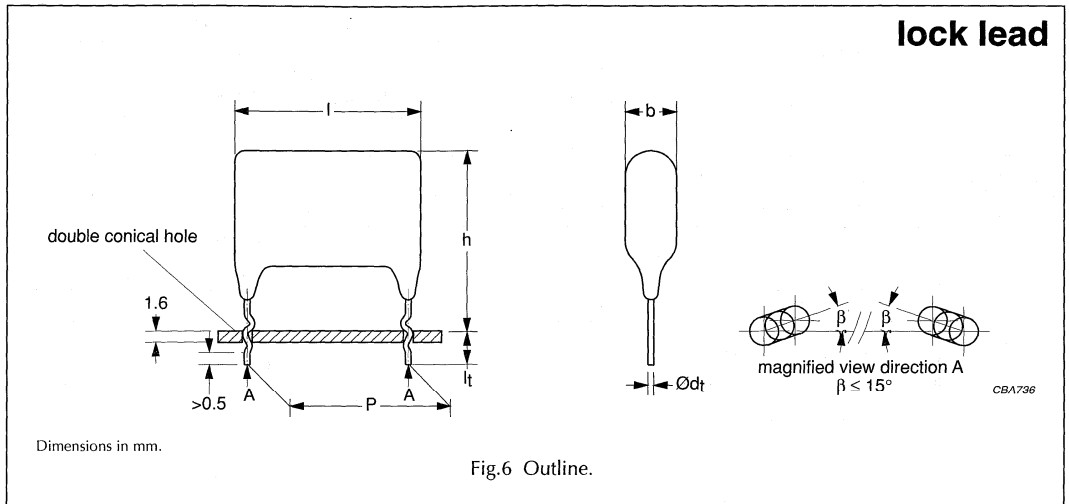
C (μF)	DIMENSIONS $b_{\max} \times h_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 4.0 +1.0/-0.5 \text{ mm}$
			C-tol = $\pm 5\%$
Pitch = 10.0 \pm1.0 mm; $d_t = 0.60 \pm 0.06 \text{ mm}$			
0.075	6.0 \times 18.0 \times 12.5	0.9	2222 479 90089
0.082			2222 479 90091
0.091			2222 479 90092
0.1			2222 479 90093
0.11			2222 479 90094
0.12			2222 479 90095
0.13			2222 479 90096
0.15	6.5 \times 18.5 \times 12.5	1.0	2222 479 90097
0.16			2222 479 90098
Pitch = 15.0 \pm1.0 mm; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.18	6.0 \times 18.0 \times 18.5	1.2	2222 479 90099
0.20	6.5 \times 18.5 \times 18.5	1.3	2222 479 90101
0.22			2222 479 90102
0.24	7.0 \times 19.0 \times 18.5	1.4	2222 479 90103
0.27			2222 479 90104
0.30			2222 479 90105
0.33			2222 479 90106
0.36			2222 479 90107
0.39			2222 479 90108
0.43			7.5 \times 19.5 \times 18.5
0.47	2222 479 90111		
0.51	8.0 \times 20.0 \times 18.5	1.6	2222 479 90112
0.56			2222 479 90113
0.62	8.5 \times 20.5 \times 18.5	1.7	2222 479 90114
0.68	9.0 \times 21.0 \times 18.5	1.8	2222 479 90115
0.75	9.5 \times 21.5 \times 18.5	1.9	2222 479 90116

AC and pulse metallized polypropylene film capacitors

MKP 479

MKP 479 GENERAL DATA

PITCH 22.5/27.5 mm (lock lead)



Specific reference data for the 160 V DC capacitors (lock lead)

DESCRIPTION	VALUE		DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz		at 10 kHz	at 100 kHz
Tangent of loss angle: $C = 0.82 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 55 \times 10^{-4}$	Tangent of loss angle: $1.8 \mu\text{F} < C \leq 2.0 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 95 \times 10^{-4}$
$0.82 \mu\text{F} < C \leq 0.91 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 60 \times 10^{-4}$	$2.0 \mu\text{F} < C \leq 2.2 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 100 \times 10^{-4}$
$0.91 \mu\text{F} < C \leq 1.0 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 65 \times 10^{-4}$	$2.2 \mu\text{F} < C \leq 2.4 \mu\text{F}$	$\leq 15 \times 10^{-4}$	$\leq 105 \times 10^{-4}$
$1.0 \mu\text{F} < C \leq 1.2 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 70 \times 10^{-4}$	$2.4 \mu\text{F} < C \leq 2.7 \mu\text{F}$	$\leq 15 \times 10^{-4}$	$\leq 110 \times 10^{-4}$
$1.2 \mu\text{F} < C \leq 1.3 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 75 \times 10^{-4}$	$2.7 \mu\text{F} < C \leq 3.0 \mu\text{F}$	$\leq 15 \times 10^{-4}$	$\leq 115 \times 10^{-4}$
$1.3 \mu\text{F} < C \leq 1.5 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 80 \times 10^{-4}$	$3.0 \mu\text{F} < C \leq 3.3 \mu\text{F}$	$\leq 15 \times 10^{-4}$	$\leq 125 \times 10^{-4}$
$1.5 \mu\text{F} < C \leq 1.6 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 85 \times 10^{-4}$	$3.3 \mu\text{F} < C \leq 3.6 \mu\text{F}$	$\leq 15 \times 10^{-4}$	$\leq 130 \times 10^{-4}$
$1.6 \mu\text{F} < C \leq 1.8 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 90 \times 10^{-4}$	$3.6 \mu\text{F} < C \leq 3.9 \mu\text{F}$	$\leq 15 \times 10^{-4}$	$\leq 135 \times 10^{-4}$
Rated voltage pulse slope (dU/dt) _R at 160 V (DC): P = 22.5 mm	25 V/ μs		Rated voltage pulse slope (dU/dt) _R at 160 V (DC): P = 27.5 mm	15 V/ μs	
R between leads, for $C \leq 1 \mu\text{F}$ at 100 V; 1 minute	>100000 M Ω				
RC between leads, for $C > 1 \mu\text{F}$ at 100 V; 1 minute	>100000 s				
R between leads and case; 100 V; 1 minute	>100000 M Ω				
Ionization (AC) voltage (typical value) at 50 pC peak discharge	>220 V				
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	256 V; 1 minute				
Withstanding (DC) voltage between leads and case	2840 V; 1 minute				

Available 160 V DC versions (lock lead)

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 4.0 +1.0/-0.5 \text{ mm}$	$\pm 5\%$	2222 479 90...	preferred

AC and pulse metallized polypropylene film capacitors

MKP 479

$U_{Rdc} = 160 \text{ V}$; $U_{Rac} = 100 \text{ V}$; $U_{p-p} = 280 \text{ V}$ (lock lead)

C (μF)	DIMENSIONS $b_{\text{max}} \times h_{\text{max}} \times l_{\text{max}}$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 4.0 +1.0/-0.5 \text{ mm}$
			C-tol = $\pm 5\%$
Pitch = $22.5 \pm 1.0 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.82	$7.0 \times 23.0 \times 26.0$	1.8	2222 479 90117
0.91	$7.5 \times 23.5 \times 26.0$	1.9	2222 479 90118
1			2222 479 90119
1.1	$8.0 \times 24.0 \times 26.0$	2.0	2222 479 90121
1.2	$8.5 \times 24.5 \times 26.0$	2.1	2222 479 90122
1.3			2222 479 90036
1.5	$9.5 \times 25.5 \times 26.0$	2.4	2222 479 90037
1.6			2222 479 90038
1.8	$10.0 \times 26.0 \times 26.0$	2.5	2222 479 90039
Pitch = $27.5 \pm 1.0 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
2	$10.0 \times 26.0 \times 30.0$	5.0	2222 479 90041
2.2	$10.5 \times 26.5 \times 30.0$	5.0	2222 479 90042
2.4	$11.0 \times 27.0 \times 30.0$	5.5	2222 479 90123
2.7	$11.5 \times 27.5 \times 30.0$	5.5	2222 479 90124
3	$12.0 \times 28.0 \times 30.0$	6.0	2222 479 90125
3.3	$13.0 \times 29.0 \times 30.0$	6.5	2222 479 90126
3.6	$13.5 \times 29.5 \times 30.0$	7.0	2222 479 90127
3.9	$14.0 \times 30.0 \times 30.0$	7.0	2222 479 90128

AC and pulse metallized polypropylene film capacitors

MKP 479

MKP 479 GENERAL DATA

PITCH 10/15 mm
PITCH 7.5 mm (bent back leads)

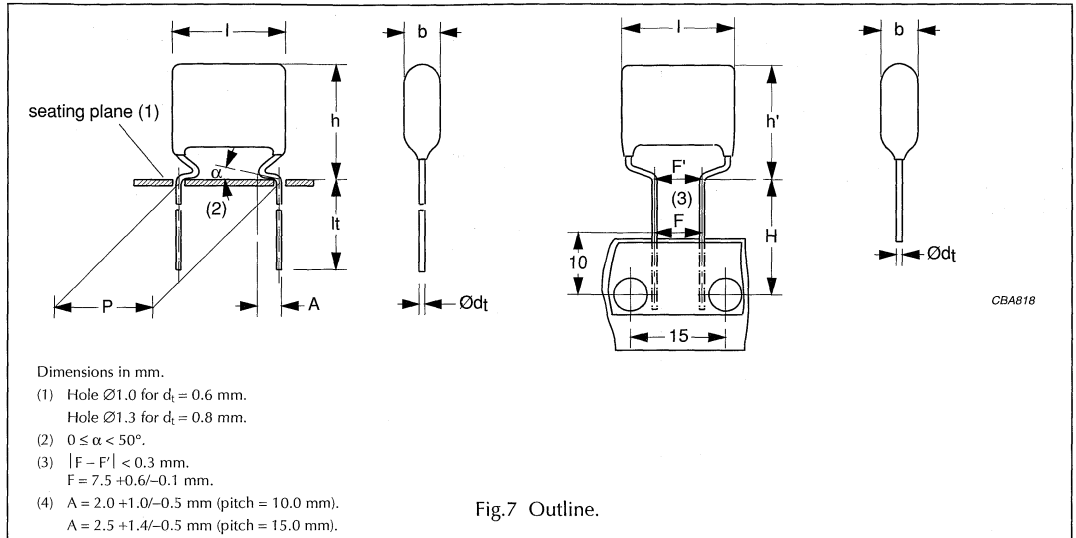


Fig.7 Outline.

Specific reference data for the 250 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
$0.047 \mu\text{F} < C \leq 0.075 \mu\text{F}$	$\leq 5 \times 10^{-4}$	$\leq 20 \times 10^{-4}$
$0.075 \mu\text{F} < C \leq 0.11 \mu\text{F}$	$\leq 5 \times 10^{-4}$	$\leq 25 \times 10^{-4}$
$0.11 \mu\text{F} < C \leq 0.18 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 30 \times 10^{-4}$
$0.18 \mu\text{F} < C \leq 0.3 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 35 \times 10^{-4}$
$0.3 \mu\text{F} < C \leq 0.39 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 40 \times 10^{-4}$
$0.39 \mu\text{F} < C \leq 0.47 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 45 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 250 V (DC): P = 10.0 mm P = 15.0 mm	70 V/ μs 60 V/ μs	
R between leads, for $C \leq 1.0 \mu\text{F}$ at 100 V; 1 minute	$> 100\,000 \text{ M}\Omega$	
R between leads and case; 100 V; 1 minute	$> 100\,000 \text{ M}\Omega$	
Ionization (AC) voltage (typical value) at 50 pC peak discharge	$> 220 \text{ V}$	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	400 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 250 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_1 = 5.0 \pm 1.0$ mm	$\pm 5\%$	2222 479 42...	preferred
	$l_1 = 3.5 \pm 0.5$ mm	$\pm 5\%$	2222 479 44...	on request
Taped on reel	$H = 16.0$ mm; $P_0 = 12.7$ mm	$\pm 5\%$	2222 479 45...	on request
Taped on reel (bent back)	$H = 16.0$ mm; $P_0 = 15.0$ mm	$\pm 5\%$	2222 479 46...	preferred

AC and pulse metallized polypropylene film capacitors

MKP 479

 $U_{Rdc} = 250 \text{ V}; U_{Rac} = 160 \text{ V}; U_{p-p} = 450 \text{ V}$

C (μF)	DIMENSIONS ⁽¹⁾ $b_{\max} \times h (h')_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER			
			LOOSE IN BOX	REEL DIAMETER = 500 mm		
			$l_t = 5.0 \pm 1.0 \text{ mm}$	H = 16.0 mm; P ₀ = 15.0 mm		
			C-tol = $\pm 5\%$	C-tol = $\pm 5\%$		
			catalogue number	last 5 digits		
Pitch = 10.0 \pm 0.4 mm; d_t = 0.60 \pm 0.06 mm			pitch = 7.5 mm (bent back)			
0.047	6.0 \times 15.0 \times 12.5	0.9	2222 479 42473	not available		
0.051			2222 479 42513			
0.056			2222 479 42563			
0.062			2222 479 42623			
0.068			2222 479 42683			
0.075			2222 479 42753			
0.082			2222 479 42823			
0.091			2222 479 42913			
0.1	6.5 \times 15.5 \times 12.5	1.0	2222 479 42104			
Pitch = 15.0 \pm 0.4 mm; d_t = 0.80 \pm 0.08 mm			pitch = 7.5 mm (bent back)			
0.11	6.5 \times 15.5 (17.0) \times 18.5	1.3	2222 479 42114	.. 46114		
0.12			2222 479 42124	.. 46124		
0.13			2222 479 42134	.. 46134		
0.15			2222 479 42154	.. 46154		
0.16			2222 479 42164	.. 46164		
0.18			2222 479 42184	.. 46184		
0.20			2222 479 42204	.. 46204		
0.22			2222 479 42224	.. 46224		
0.24			7.0 \times 16.0 (17.5) \times 18.5	1.4	2222 479 42244	.. 46244
0.27			7.5 \times 16.5 (18.0) \times 18.5	1.5	2222 479 42274	.. 46274
0.30	2222 479 42304	.. 46304				
0.33	8.0 \times 17.0 (18.5) \times 18.5	1.6	2222 479 42334	.. 46334		
0.36	8.5 \times 17.5 (19.0) \times 18.5	1.7	2222 479 42364	.. 46364		
0.39			2222 479 42394	.. 46394		
0.43	9.0 \times 18.0 (19.5) \times 18.5	1.8	2222 479 42434	.. 46434		
0.47	9.5 \times 18.5 (20.0) \times 18.5	1.9	2222 479 42474	.. 46474		

Note

1. Dimensions in brackets for bent back leads.

AC and pulse metallized polypropylene film capacitors

MKP 479

MKP 479 GENERAL DATA

PITCH 22.5/27.5 mm

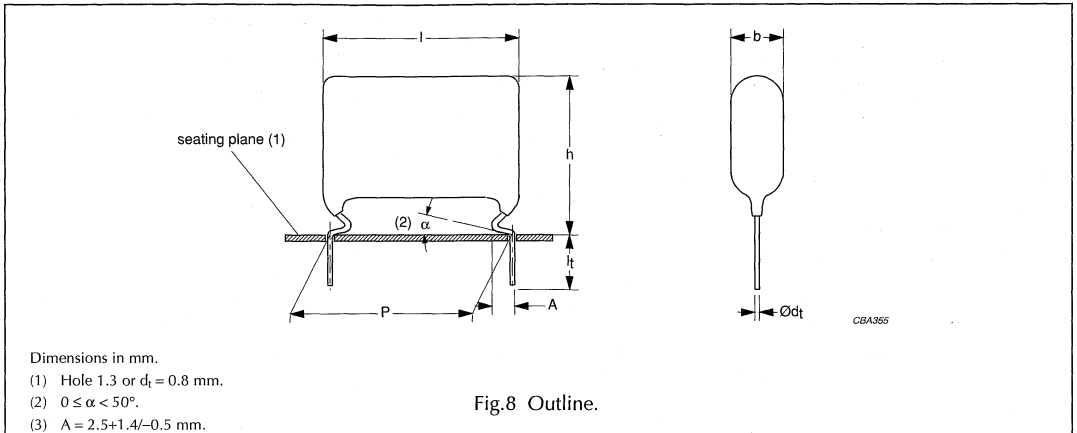


Fig.8 Outline.

Specific reference data for the 250 V DC capacitors

DESCRIPTION	VALUE		DESCRIPTION	VALUE	
Tangent of loss angle: 0.51 $\mu\text{F} < C \leq 0.56 \mu\text{F}$ 0.56 $\mu\text{F} < C \leq 0.68 \mu\text{F}$ 0.68 $\mu\text{F} < C \leq 0.82 \mu\text{F}$ 0.82 $\mu\text{F} < C \leq 0.91 \mu\text{F}$ 0.91 $\mu\text{F} < C \leq 1.0 \mu\text{F}$ 1.0 $\mu\text{F} < C \leq 1.2 \mu\text{F}$ 1.2 $\mu\text{F} < C \leq 1.3 \mu\text{F}$	at 10 kHz $\leq 10 \times 10^{-4}$	at 100 kHz $\leq 45 \times 10^{-4}$	Tangent of loss angle: 1.3 $\mu\text{F} < C \leq 1.5 \mu\text{F}$ 1.5 $\mu\text{F} < C \leq 1.6 \mu\text{F}$ 1.6 $\mu\text{F} < C \leq 1.8 \mu\text{F}$ 1.8 $\mu\text{F} < C \leq 2.0 \mu\text{F}$ 2.0 $\mu\text{F} < C \leq 2.2 \mu\text{F}$ 2.2 $\mu\text{F} < C \leq 2.4 \mu\text{F}$ 2.4 $\mu\text{F} < C \leq 2.7 \mu\text{F}$ 2.7 $\mu\text{F} < C \leq 3 \mu\text{F}$	at 10 kHz $\leq 10 \times 10^{-4}$	at 100 kHz $\leq 80 \times 10^{-4}$ $\leq 85 \times 10^{-4}$ $\leq 90 \times 10^{-4}$ $\leq 95 \times 10^{-4}$ $\leq 100 \times 10^{-4}$ $\leq 105 \times 10^{-4}$ $\leq 110 \times 10^{-4}$ $\leq 115 \times 10^{-4}$
Rated voltage pulse slope (dU/dt) _R at 250 V (DC): P = 22.5 mm	30 V/ μs		Rated voltage pulse slope (dU/dt) _R at 250 V (DC): P = 27.5 mm	20 V/ μs	
R between leads, for $C \leq 1 \mu\text{F}$ at 100 V; 1 minute			>100000 M Ω		
RC between leads, for $C > 1 \mu\text{F}$ at 100 V; 1 minute			>100000 s		
R between leads and case; 100 V; 1 minute			>100000 M Ω		
Ionization (AC) voltage (typical value) at 50 pC peak discharge			>220 V		
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s			400 V; 1 minute		
Withstanding (DC) voltage between leads and case			2840 V; 1 minute		

Available 250 V DC versions

PACKAGING ⁽¹⁾	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 5.0 \pm 1.0$ mm	$\pm 5\%$	2222 479 42...	preferred
	$l_t = 3.5 \pm 0.5$ mm	$\pm 5\%$	2222 479 44...	on request
Taped on reel	$H = 16.0$ mm; $P_0 = 12.7$ mm	$\pm 5\%$	2222 479 45...	on request

Note

1. Taped on reel pitch = 27.5 mm is not available.

AC and pulse metallized polypropylene film capacitors

MKP 479

 $U_{Rdc} = 250 \text{ V}; U_{Rac} = 160 \text{ V}; U_{p-p} = 450 \text{ V}$

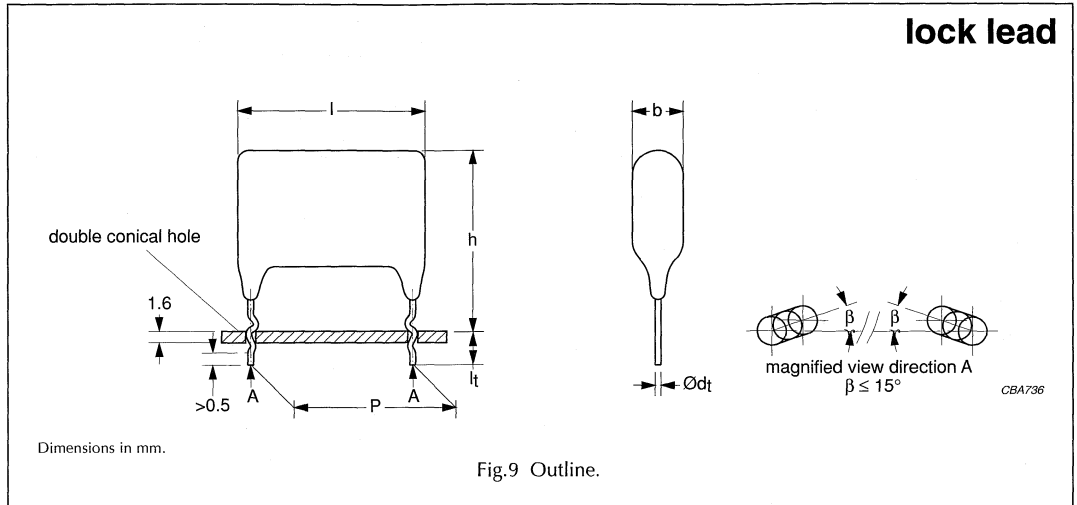
C (μF)	DIMENSIONS $b_{\text{max}} \times h_{\text{max}} \times l_{\text{max}}$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 5.0 \pm 1.0 \text{ mm}$
			C-tol = $\pm 5\%$
Pitch = $22.5 \pm 0.4 \text{ mm}; d_t = 0.80 \pm 0.08 \text{ mm}$			
0.51	7.0 × 20.0 × 26.0	1.8	2222 479 42514
0.56			2222 479 42564
0.62	7.5 × 20.5 × 26.0	1.9	2222 479 42624
0.68			2222 479 42684
0.75	8.0 × 21.0 × 26.0	2.0	2222 479 42754
0.82	8.5 × 21.5 × 26.0	2.1	2222 479 42824
0.91	9.0 × 22.0 × 26.0	2.4	2222 479 42914
1.0	9.5 × 22.5 × 26.0	2.5	2222 479 42105
1.1	10.0 × 23.0 × 26.0	2.6	2222 479 42115
1.2	10.5 × 23.5 × 26.0	2.7	2222 479 42125
Pitch = $27.5 \pm 0.4 \text{ mm}; d_t = 0.80 \pm 0.08 \text{ mm}$			
1.3	10.0 × 23.0 × 30.0	5.0	2222 479 42135
1.5	10.5 × 23.5 × 30.0	5.0	2222 479 42155
1.6	11.0 × 24.0 × 30.0	5.5	2222 479 42165
1.8	11.5 × 24.5 × 30.0	5.5	2222 479 42185
2.0	12.5 × 25.5 × 30.0	6.5	2222 479 42205
2.2	13.0 × 26.0 × 30.0	6.5	2222 479 42225
2.4	13.5 × 26.5 × 30.0	7.0	2222 479 42245
2.7	14.0 × 27.0 × 30.0	7.0	2222 479 42275
3.0	15.0 × 28.0 × 30.0	7.5	2222 479 42305

AC and pulse metallized polypropylene film capacitors

MKP 479

MKP 479 GENERAL DATA

PITCH 10/15 mm (lock lead)



Specific reference data for the 250 V DC capacitors (lock lead)

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
0.047 $\mu\text{F} < C \leq 0.075 \mu\text{F}$	$\leq 5 \times 10^{-4}$	$\leq 20 \times 10^{-4}$
0.075 $\mu\text{F} < C \leq 0.11 \mu\text{F}$	$\leq 5 \times 10^{-4}$	$\leq 25 \times 10^{-4}$
0.11 $\mu\text{F} < C \leq 0.18 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 30 \times 10^{-4}$
0.18 $\mu\text{F} < C \leq 0.3 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 35 \times 10^{-4}$
0.3 $\mu\text{F} < C \leq 0.39 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 40 \times 10^{-4}$
0.39 $\mu\text{F} < C \leq 0.47 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 45 \times 10^{-4}$
Rated voltage pulse slope (dU/dt) _R at 250 V (DC):		
P = 10.0 mm	70 V/ μs	
P = 15.0 mm	60 V/ μs	
R between leads, for C $\leq 1.0 \mu\text{F}$ at 100 V; 1 minute	>100000 M Ω	
R between leads and case; 100 V; 1 minute	>100000 M Ω	
Ionization (AC) voltage (typical value) at 50 pC peak discharge	>220 V	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	400 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 250 V DC versions (lock lead)

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 4.0 \pm 1.0 / -0.5 \text{ mm}$	$\pm 5\%$	2222 479 90...	preferred

AC and pulse metallized polypropylene film capacitors

MKP 479

$U_{Rdc} = 250 \text{ V}$; $U_{Rac} = 160 \text{ V}$; $U_{p-p} = 450 \text{ V}$ (lock lead)

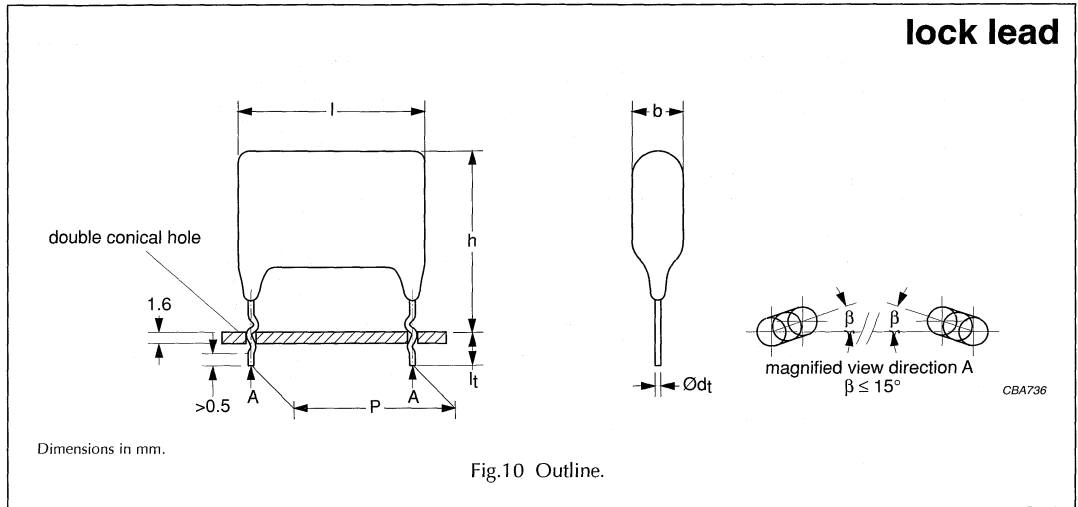
C (μF)	DIMENSIONS $b_{\text{max}} \times l_{\text{max}} \times l_{\text{max}}$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 4.0 +1/-0.5 \text{ mm}$
			C-tol = $\pm 5\%$
Pitch = 10.0 ± 1.0 mm; $d_t = 0.60 \pm 0.06$ mm			
0.047	6.0 \times 18.0 \times 12.5	0.9	2222 479 90052
0.051			2222 479 90129
0.056			2222 479 90131
0.062			2222 479 90132
0.068			2222 479 90133
0.075			2222 479 90134
0.082			2222 479 90135
0.091			2222 479 90136
0.1	6.5 \times 18.5 \times 12.5	1.0	2222 479 90137
Pitch = 15.0 ± 1.0 mm; $d_t = 0.80 \pm 0.08$ mm			
0.11	6.5 \times 18.5 \times 18.5	1.3	2222 479 90138
0.12			2222 479 90051
0.13			2222 479 90139
0.15			2222 479 90141
0.16			2222 479 90142
0.18			2222 479 90012
0.20			2222 479 90013
0.22			2222 479 90014
0.24	7.0 \times 19.0 \times 18.5	1.4	2222 479 90015
0.27	7.5 \times 19.5 \times 18.5	1.5	2222 479 90016
0.30			2222 479 90017
0.33	8.0 \times 20.0 \times 18.5	1.6	2222 479 90018
0.36	8.5 \times 20.5 \times 18.5	1.7	2222 479 90019
0.39			2222 479 90021
0.43	9.0 \times 21.0 \times 18.5	1.8	2222 479 90022
0.47	9.5 \times 21.5 \times 18.5	1.9	2222 479 90023

AC and pulse metallized polypropylene film capacitors

MKP 479

MKP 479 GENERAL DATA

PITCH 22.5/27.5 mm (lock lead)



Specific reference data for the 250 V DC capacitors (lock lead)

DESCRIPTION	VALUE		DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz		at 10 kHz	at 100 kHz
Tangent of loss angle:			Tangent of loss angle:		
0.51 $\mu\text{F} < C \leq 0.56 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 45 \times 10^{-4}$	1.3 $\mu\text{F} < C \leq 1.5 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 80 \times 10^{-4}$
0.56 $\mu\text{F} < C \leq 0.68 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 50 \times 10^{-4}$	1.5 $\mu\text{F} < C \leq 1.6 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 85 \times 10^{-4}$
0.68 $\mu\text{F} < C \leq 0.82 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 55 \times 10^{-4}$	1.6 $\mu\text{F} < C \leq 1.8 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 90 \times 10^{-4}$
0.82 $\mu\text{F} < C \leq 0.91 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 60 \times 10^{-4}$	1.8 $\mu\text{F} < C \leq 2.0 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 95 \times 10^{-4}$
0.91 $\mu\text{F} < C \leq 1.0 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 65 \times 10^{-4}$	2.0 $\mu\text{F} < C \leq 2.2 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 100 \times 10^{-4}$
1.0 $\mu\text{F} < C \leq 1.2 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 70 \times 10^{-4}$	2.2 $\mu\text{F} < C \leq 2.4 \mu\text{F}$	$\leq 15 \times 10^{-4}$	$\leq 105 \times 10^{-4}$
1.2 $\mu\text{F} < C \leq 1.3 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 75 \times 10^{-4}$	2.4 $\mu\text{F} < C \leq 2.7 \mu\text{F}$	$\leq 15 \times 10^{-4}$	$\leq 110 \times 10^{-4}$
2.7 $\mu\text{F} < C \leq 3 \mu\text{F}$			2.7 $\mu\text{F} < C \leq 3 \mu\text{F}$	$\leq 15 \times 10^{-4}$	$\leq 115 \times 10^{-4}$
Rated voltage pulse slope (dU/dt) _R at 250 V (DC): P = 22.5 mm	30 V/ μs		Rated voltage pulse slope (dU/dt) _R at 250 V (DC): P = 27.5 mm	20 V/ μs	
R between leads, for C $\leq 1 \mu\text{F}$ at 100 V; 1 minute	>100000 M Ω				
RC between leads, for C > 1 μF at 100 V; 1 minute	>100000 s				
R between leads and case; 100 V; 1 minute	>100000 M Ω				
Ionization (AC) voltage (typical value) at 50 pC peak discharge	>220 V				
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	400 V; 1 minute				
Withstanding (DC) voltage between leads and case	2840 V; 1 minute				

Available 250 V DC versions (lock lead)

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 4.0 +1.0/-0.5 \text{ mm}$	$\pm 5\%$	2222 479 90...	preferred

AC and pulse metallized polypropylene film capacitors

MKP 479

$U_{Rdc} = 250 \text{ V}$; $U_{Rac} = 160 \text{ V}$; $U_{p-p} = 450 \text{ V}$ (lock lead)

C (μF)	DIMENSIONS $b_{\max} \times h_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 4.0 +1.0/-0.5 \text{ mm}$
			C-tol = $\pm 5\%$
Pitch = $22.5 \pm 1.0 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.51	7.0 × 23.0 × 26.0	1.8	2222 479 90024
0.56			2222 479 90025
0.62	7.5 × 23.5 × 26.0	1.9	2222 479 90026
0.68			2222 479 90027
0.75	8.0 × 24.0 × 26.0	2.0	2222 479 90028
0.82	8.5 × 24.5 × 26.0	2.1	2222 479 90029
0.91	9.0 × 25.0 × 26.0	2.4	2222 479 90031
1.0	9.5 × 25.5 × 26.0	2.5	2222 479 90032
1.1	10.0 × 26.0 × 26.0	2.6	2222 479 90033
1.2	10.5 × 26.5 × 26.0	2.7	2222 479 90034
Pitch = $27.5 \pm 1.0 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
1.3	10.0 × 26.0 × 30.0	5.0	2222 479 90143
1.5	10.5 × 26.5 × 30.0	5.0	2222 479 90144
1.6	11.0 × 27.0 × 30.0	5.5	2222 479 90145
1.8	11.5 × 27.5 × 30.0	5.5	2222 479 90146
2.0	12.5 × 28.5 × 30.0	6.5	2222 479 90147
2.2	13.0 × 29.0 × 30.0	6.5	2222 479 90148
2.4	13.5 × 29.5 × 30.0	7.0	2222 479 90149
2.7	14.0 × 30.0 × 30.0	7.0	2222 479 90151
3.0	15.0 × 31.0 × 30.0	7.5	2222 479 90152

AC and pulse metallized polypropylene film capacitors

MKP 479 monitor

MKP 479 GENERAL DATA

PITCH 10/15 mm
PITCH 7.5 mm (bent back leads)

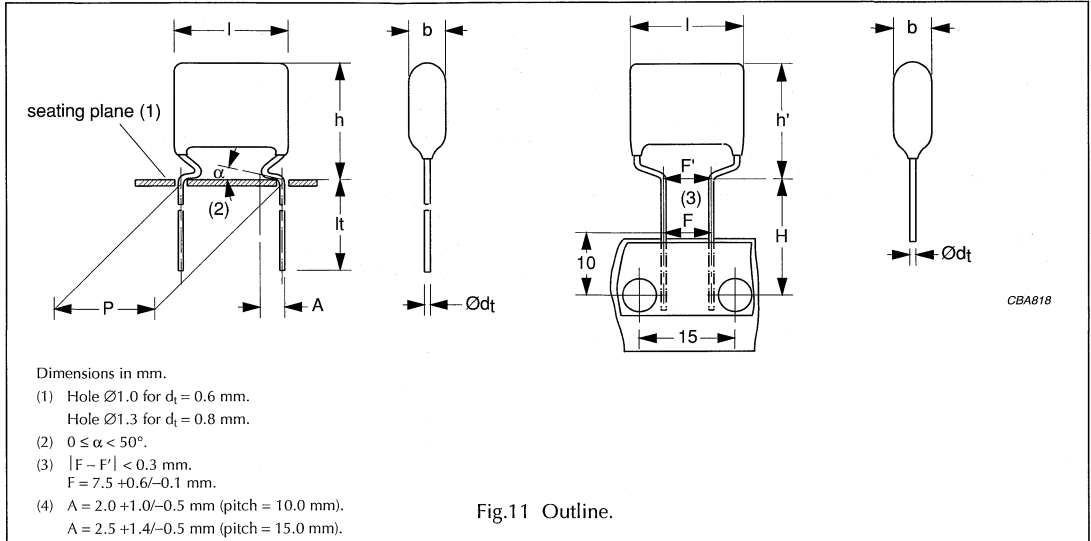


Fig.11 Outline.

Specific reference data for the 250 V DC capacitors (monitor type)

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
$0.022 \mu\text{F} < C \leq 0.027 \mu\text{F}$	$\leq 5 \times 10^{-4}$	$\leq 15 \times 10^{-4}$
$0.027 \mu\text{F} < C \leq 0.075 \mu\text{F}$	$\leq 5 \times 10^{-4}$	$\leq 20 \times 10^{-4}$
$0.075 \mu\text{F} < C \leq 0.11 \mu\text{F}$	$\leq 5 \times 10^{-4}$	$\leq 25 \times 10^{-4}$
$0.11 \mu\text{F} < C \leq 0.18 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 30 \times 10^{-4}$
$0.18 \mu\text{F} < C \leq 0.22 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 35 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 250 V (DC):		
P = 10.0 mm	160 V/ μs	
P = 15.0 mm	140 V/ μs	
R between leads, for $C \leq 1.0 \mu\text{F}$ at 100 V; 1 minute	$> 100000 \text{ M}\Omega$	
R between leads and case; 100 V; 1 minute	$> 100000 \text{ M}\Omega$	
Ionization (AC) voltage (typical value) at 50 pC peak discharge	$> 220 \text{ V}$	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	400 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 250 V DC versions (monitor type)

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 5.0 \pm 1.0$ mm	$\pm 5\%$	2222 479 41...	preferred
	$l_t = 3.5 \pm 0.5$ mm	$\pm 5\%$	2222 479 43...	on request
Taped on reel	$H = 16.0$ mm; $P_0 = 12.7$ mm	$\pm 5\%$	2222 479 47...	on request
Taped on reel (bent back)	$H = 16.0$ mm; $P_0 = 15.0$ mm	$\pm 5\%$	2222 479 49...	preferred

AC and pulse metallized polypropylene film capacitors

MKP 479 monitor

 $U_{Rdc} = 250 \text{ V}; U_{Rac} = 160 \text{ V}; U_{p-p} = 450 \text{ V (monitor type)}$

C (μF)	DIMENSIONS ⁽¹⁾ $b_{\max} \times h (h')_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER	
			LOOSE IN BOX	REEL DIAMETER = 500 mm
			$l_t = 5.0 \pm 1.0 \text{ mm}$	$H = 16.0 \text{ mm}; P_0 = 15.0 \text{ mm}$
			C-tol = $\pm 5\%$	C-tol = $\pm 5\%$
Pitch = $10.0 \pm 0.4 \text{ mm}; d_t = 0.60 \pm 0.06 \text{ mm}$			pitch = 7.5 mm (bent back)	
0.022	6.0 × 15.0 × 12.5	0.9	2222 479 41223	not available
0.024			2222 479 41243	
0.027			2222 479 41273	
0.03			2222 479 41303	
0.033			2222 479 41333	
0.036			2222 479 41363	
0.039			2222 479 41393	
0.043			2222 479 41433	
0.047			2222 479 41473	
Pitch = $15.0 \pm 0.4 \text{ mm}; d_t = 0.80 \pm 0.08 \text{ mm}$			pitch = 7.5 mm (bent back)	
0.051	6.5 × 15.5 (17.0) × 18.5	1.3	2222 479 41513	.. 49513
0.056			2222 479 41563	.. 49563
0.062			2222 479 41623	.. 49623
0.068			2222 479 41683	.. 49683
0.075			2222 479 41753	.. 49753
0.082			2222 479 41823	.. 49823
0.091	7.0 × 16.0 (17.5) × 18.5	1.4	2222 479 41913	.. 49913
0.1			2222 479 41104	.. 49104
0.11			2222 479 41114	.. 49114
0.12			2222 479 41124	.. 49124
0.13	7.5 × 16.5 (18.0) × 18.5	1.5	2222 479 41134	.. 49134
0.15			2222 479 41154	.. 49154
0.16	8.0 × 17.0 (18.5) × 18.5	1.6	2222 479 41164	.. 49164
0.18	8.5 × 17.5 (19.0) × 18.5	1.7	2222 479 41184	.. 49184
0.2			2222 479 41204	.. 49204
0.22			9.0 × 18.0 (19.5) × 18.5	1.8

Note

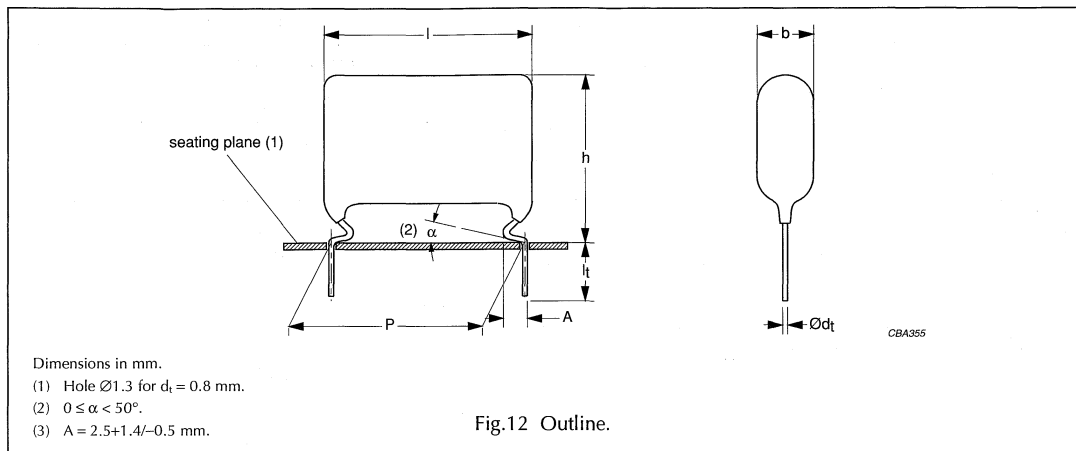
1. Dimensions in brackets for bent back leads.

AC and pulse metallized polypropylene film capacitors

MKP 479 monitor

MKP 479 GENERAL DATA

PITCH 22.5/27.5 mm



Specific reference data for the 250 V DC capacitors (monitor type)

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
0.24 $\mu\text{F} < C \leq 0.3 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 35 \times 10^{-4}$
0.3 $\mu\text{F} < C \leq 0.39 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 40 \times 10^{-4}$
0.39 $\mu\text{F} < C \leq 0.56 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 45 \times 10^{-4}$
0.56 $\mu\text{F} < C \leq 0.68 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 50 \times 10^{-4}$
0.68 $\mu\text{F} < C \leq 0.82 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 55 \times 10^{-4}$
0.82 $\mu\text{F} < C \leq 0.91 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 60 \times 10^{-4}$
0.91 $\mu\text{F} < C \leq 1.0 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 65 \times 10^{-4}$
1.0 $\mu\text{F} < C \leq 1.2 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 70 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 250 V (DC): P = 22.5 mm P = 27.5 mm	70 V/ μs 50 V/ μs	
R between leads, for $C \leq 1.0 \mu\text{F}$ at 100 V; 1 minute	$> 100\,000 \text{ M}\Omega$	
RC between leads, for $C > 1.0 \mu\text{F}$ at 100 V; 1 minute	$> 100\,000 \text{ s}$	
R between leads and case; 100 V; 1 minute	$> 100\,000 \text{ M}\Omega$	
Ionization (AC) voltage (typical value) at 50 pC peak discharge	$> 220 \text{ V}$	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	400 V; 1 minute	
Withstanding (DC) voltage between leads and case	2 840 V; 1 minute	

Available 250 V DC versions (monitor type)

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 5.0 \pm 1.0 \text{ mm}$	$\pm 5\%$	2222 479 41...	preferred
	$l_t = 3.5 \pm 0.5 \text{ mm}$	$\pm 5\%$	2222 479 43...	on request
Taped on reel	$H = 16.0 \text{ mm}; P_0 = 12.7 \text{ mm}$	$\pm 5\%$	2222 479 47...	on request

Note

1. Taped on reel pitch = 27.5 mm is not available.

AC and pulse metallized polypropylene film capacitors

MKP 479 monitor

$U_{Rdc} = 250 \text{ V}$; $U_{Rac} = 160 \text{ V}$; $U_{p-p} = 450 \text{ V}$ (monitor type)

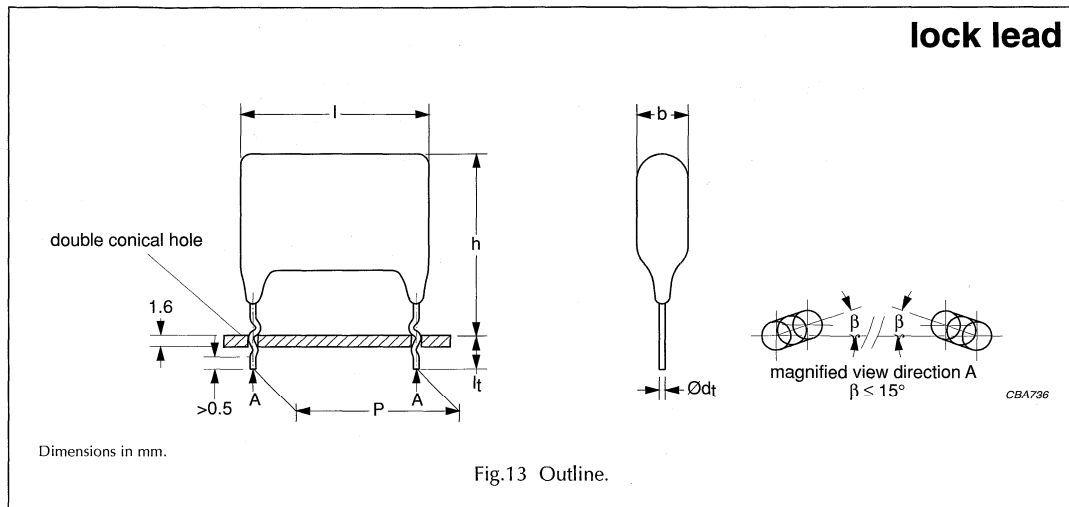
C (μF)	DIMENSIONS $b_{\text{max}} \times h_{\text{max}} \times l_{\text{max}}$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_1 = 5.0 \pm 1.0 \text{ mm}$
			C-tol = $\pm 5\%$
Pitch = $22.5 \pm 0.4 \text{ mm}$; $d_1 = 0.80 \pm 0.08 \text{ mm}$			
0.24	$6.5 \times 19.5 \times 26.0$	1.7	2222 479 41244
0.27	$7.0 \times 20.0 \times 26.0$	1.8	2222 479 41274
0.3	$7.5 \times 20.5 \times 26.0$	1.9	2222 479 41304
0.33			2222 479 41334
0.36	$8.0 \times 21.0 \times 26.0$	2.0	2222 479 41364
0.39	$8.5 \times 21.5 \times 26.0$	2.1	2222 479 41394
0.43			2222 479 41434
0.47	$9.0 \times 22.0 \times 26.0$	2.4	2222 479 41474
0.51	$9.5 \times 22.5 \times 26.0$	2.5	2222 479 41514
0.56	$10.0 \times 23.0 \times 26.0$	2.6	2222 479 41564
0.62	$10.5 \times 23.5 \times 26.0$	2.7	2222 479 41624
Pitch = $27.5 \pm 0.4 \text{ mm}$; $d_1 = 0.80 \pm 0.08 \text{ mm}$			
0.68	$10.0 \times 23.0 \times 30.0$	5.0	2222 479 41684
0.75	$10.5 \times 23.5 \times 30.0$	5.0	2222 479 41754
0.82	$11.0 \times 24.0 \times 30.0$	5.5	2222 479 41824
0.91	$11.5 \times 24.5 \times 30.0$	5.5	2222 479 41914
1.0	$12.0 \times 25.0 \times 30.0$	6.0	2222 479 41105
1.1	$12.5 \times 25.5 \times 30.0$	6.5	2222 479 41115
1.2	$13.0 \times 26.0 \times 30.0$	6.5	2222 479 41125

AC and pulse metallized polypropylene film capacitors

MKP 479 monitor

MKP 479 GENERAL DATA

PITCH 10/15 mm (lock lead)



Specific reference data for the 250 V DC capacitors (monitor type - lock lead)

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
0.022 $\mu\text{F} < C \leq 0.027 \mu\text{F}$	$\leq 5 \times 10^{-4}$	$\leq 15 \times 10^{-4}$
0.027 $\mu\text{F} < C \leq 0.075 \mu\text{F}$	$\leq 5 \times 10^{-4}$	$\leq 20 \times 10^{-4}$
0.075 $\mu\text{F} < C \leq 0.11 \mu\text{F}$	$\leq 5 \times 10^{-4}$	$\leq 25 \times 10^{-4}$
0.11 $\mu\text{F} < C \leq 0.18 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 30 \times 10^{-4}$
0.18 $\mu\text{F} < C \leq 0.22 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 35 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 400 V (DC):		
P = 10.0 mm	80 V/ μs	
P = 15.0 mm	70 V/ μs	
R between leads, for $C \leq 1.0 \mu\text{F}$ at 100 V; 1 minute	$> 100\,000 \text{ M}\Omega$	
R between leads and case; 100 V; 1 minute	$> 100\,000 \text{ M}\Omega$	
Ionization (AC) voltage (typical value) at 50 pC peak discharge	$> 220 \text{ V}$	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	640 V; 1 minute	
Withstanding (DC) voltage between leads and case	2 840 V; 1 minute	

Available 250 V DC versions (monitor type - lock lead)

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 4.0 + 1.0 / - 0.5 \text{ mm}$	$\pm 5\%$	2222 479 90...	preferred

AC and pulse metallized polypropylene film capacitors

MKP 479 monitor

$U_{Rdc} = 250 \text{ V}$; $U_{Rac} = 160 \text{ V}$; $U_{p-p} = 450 \text{ V}$ (monitor type - lock lead)

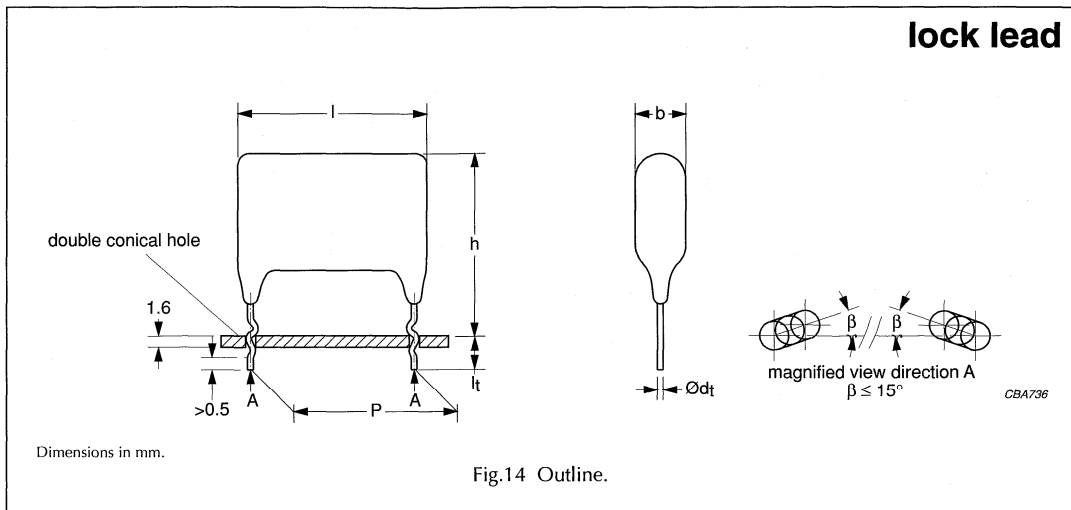
C (μF)	DIMENSIONS $b_{\max} \times h_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 4.0 +1.0/-0.5 \text{ mm}$
			C-tol = $\pm 5\%$
Pitch = $10.0 \pm 1.0 \text{ mm}$; $d_t = 0.60 \pm 0.06 \text{ mm}$			
0.022	6.0 × 18.0 × 12.5	0.9	2222 479 90379
0.024			2222 479 90381
0.027			2222 479 90382
0.03			2222 479 90383
0.033			2222 479 90384
0.036			2222 479 90385
0.039			2222 479 90386
0.043			2222 479 90387
0.047			2222 479 90388
Pitch = $15.0 \pm 1.0 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.051	6.5 × 18.5 × 18.5	1.3	2222 479 90389
0.056			2222 479 90391
0.062			2222 479 90392
0.068			2222 479 90393
0.075			2222 479 90394
0.082			2222 479 90395
0.091	7.0 × 19.0 × 18.5	1.4	2222 479 90396
0.1			2222 479 90397
0.11			2222 479 90398
0.12			2222 479 90399
0.13	7.5 × 19.5 × 18.5	1.5	2222 479 90401
0.15			2222 479 90402
0.16	8.0 × 20.0 × 18.5	1.6	2222 479 90403
0.18	8.5 × 20.5 × 18.5	1.7	2222 479 90404
0.2			2222 479 90405
0.22			9.0 × 21.0 × 18.5

AC and pulse metallized polypropylene film capacitors

MKP 479 monitor

MKP 479 GENERAL DATA

PITCH 22.5/27.5 mm (lock lead)



Specific reference data for the 250 V DC capacitors (monitor type - lock lead)

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
0.24 $\mu\text{F} < C \leq 0.3 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 35 \times 10^{-4}$
0.3 $\mu\text{F} < C \leq 0.39 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 40 \times 10^{-4}$
0.39 $\mu\text{F} < C \leq 0.56 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 45 \times 10^{-4}$
0.56 $\mu\text{F} < C \leq 0.68 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 50 \times 10^{-4}$
0.68 $\mu\text{F} < C \leq 0.82 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 55 \times 10^{-4}$
0.82 $\mu\text{F} < C \leq 0.91 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 60 \times 10^{-4}$
0.91 $\mu\text{F} < C \leq 1.0 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 65 \times 10^{-4}$
1.0 $\mu\text{F} < C \leq 1.2 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 70 \times 10^{-4}$
Rated voltage pulse slope (dU/dt) _R at 400 V (DC):		
P = 22.5 mm	35 V/ μs	
P = 27.5 mm	25 V/ μs	
R between leads, for C $\leq 1.0 \mu\text{F}$ at 100 V; 1 minute	$>100000 \text{ M}\Omega$	
RC between leads, for C $> 1.0 \mu\text{F}$ at 100 V; 1 minute	$>100000 \text{ s}$	
R between leads and case; 100 V; 1 minute	$>100000 \text{ M}\Omega$	
Ionization (AC) voltage (typical value) at 50 pC peak discharge	$>220 \text{ V}$	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	640 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 250 V DC versions (lock lead)

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 4.0 +1.0/-0.5 \text{ mm}$	$\pm 5\%$	2222 479 90...	preferred

AC and pulse metallized polypropylene film capacitors

MKP 479 monitor

$U_{Rdc} = 250 \text{ V}$; $U_{Rac} = 160 \text{ V}$; $U_{p-p} = 450 \text{ V}$ (monitor type - lock lead)

C (μF)	DIMENSIONS $b_{\max} \times h_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 4.0 +1.0/-0.5 \text{ mm}$
			C-tol = $\pm 5\%$
Pitch = $22.5 \pm 1.0 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.24	$6.5 \times 22.5 \times 26.0$	1.7	2222 479 90407
0.27	$7.0 \times 23.0 \times 26.0$	1.8	2222 479 90408
0.3	$7.5 \times 23.5 \times 26.0$	1.9	2222 479 90409
0.33			2222 479 90411
0.36	$8.0 \times 24.0 \times 26.0$	2.0	2222 479 90412
0.39	$8.5 \times 24.5 \times 26.0$	2.1	2222 479 90413
0.43			2222 479 90414
0.47	$9.0 \times 25.0 \times 26.0$	2.4	2222 479 90415
0.51	$9.5 \times 25.5 \times 26.0$	2.5	2222 479 90416
0.56	$10.0 \times 26.0 \times 26.0$	2.6	2222 479 90417
0.62	$10.5 \times 26.5 \times 26.0$	2.7	2222 479 90418
Pitch = $27.5 \pm 1.0 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.68	$10.0 \times 26.0 \times 30.0$	5.0	2222 479 90419
0.75	$10.5 \times 26.5 \times 30.0$	5.0	2222 479 90421
0.82	$11.0 \times 27.0 \times 30.0$	5.5	2222 479 90422
0.91	$11.5 \times 27.5 \times 30.0$	5.5	2222 479 90423
1.0	$12.0 \times 28.0 \times 30.0$	6.0	2222 479 90424
1.1	$12.5 \times 28.5 \times 30.0$	6.5	2222 479 90425
1.2	$13.0 \times 29.0 \times 30.0$	6.5	2222 479 90426

AC and pulse metallized polypropylene film capacitors

MKP 479

MKP 479 GENERAL DATA

**PITCH 10/15 mm
PITCH 7.5 mm (bent back leads)**

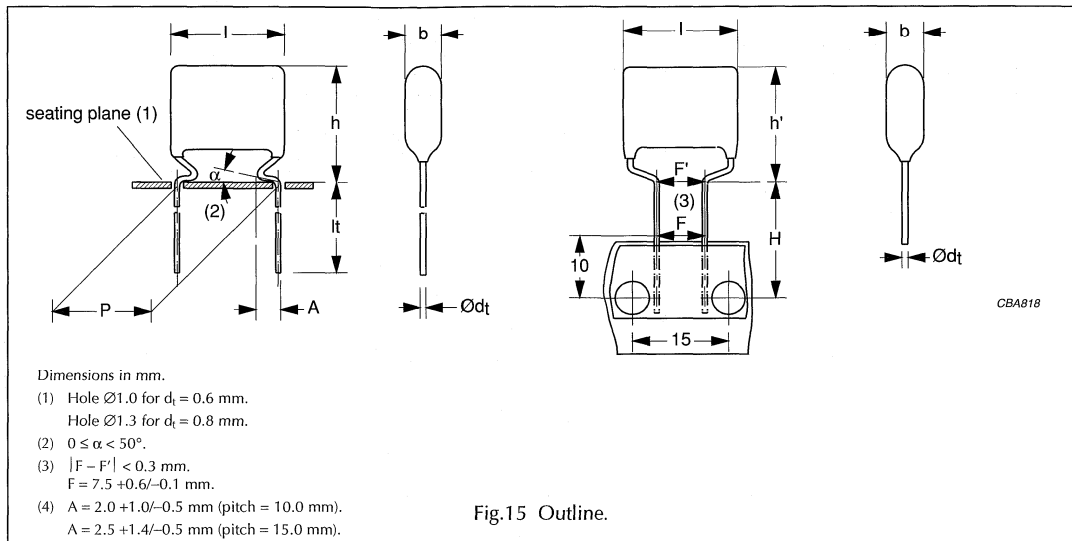


Fig.15 Outline.

Specific reference data for the 400 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
0.022 $\mu\text{F} < C \leq 0.027 \mu\text{F}$	$\leq 5 \times 10^{-4}$	$\leq 15 \times 10^{-4}$
0.027 $\mu\text{F} < C \leq 0.075 \mu\text{F}$	$\leq 5 \times 10^{-4}$	$\leq 20 \times 10^{-4}$
0.075 $\mu\text{F} < C \leq 0.11 \mu\text{F}$	$\leq 5 \times 10^{-4}$	$\leq 25 \times 10^{-4}$
0.11 $\mu\text{F} < C \leq 0.18 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 30 \times 10^{-4}$
0.18 $\mu\text{F} < C \leq 0.22 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 35 \times 10^{-4}$
Rated voltage pulse slope (dU/dt) _R at 400 V (DC): P = 10.0 mm P = 15.0 mm	80 V/ μs 70 V/ μs	
R between leads, for C $\leq 1.0 \mu\text{F}$ at 100 V; 1 minute	$> 100000 \text{ M}\Omega$	
R between leads and case; 100 V; 1 minute	$> 100000 \text{ M}\Omega$	
Ionization (AC) voltage (typical value) at 50 pC peak discharge	$> 220 \text{ V}$	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	640 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 400 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 5.0 \pm 1.0$ mm	$\pm 5\%$	2222 479 52...	preferred
	$l_t = 3.5 \pm 0.5$ mm	$\pm 5\%$	2222 479 54...	on request
Taped on reel	H = 16.0 mm; P ₀ = 12.7 mm	$\pm 5\%$	2222 479 55...	on request
Taped on reel (bent back)	H = 16.0 mm; P ₀ = 15.0 mm	$\pm 5\%$	2222 479 56...	preferred

AC and pulse metallized polypropylene film capacitors

MKP 479

 $U_{Rdc} = 400 \text{ V}; U_{Rac} = 200 \text{ V}; U_{p-p} = 560 \text{ V}$

C (μF)	DIMENSIONS ⁽¹⁾ $b_{\text{max}} \times h (h')_{\text{max}} \times l_{\text{max}}$ (mm)	MASS (g)	CATALOGUE NUMBER	
			LOOSE IN BOX	REEL DIAMETER = 500 mm
			$l_t = 5.0 \pm 1.0 \text{ mm}$	H = 16.0 mm; P ₀ = 15.0 mm
			C-tol = $\pm 5\%$	C-tol = $\pm 5\%$
			catalogue number	last 5 digits
Pitch = 10.0 ± 0.4 mm; $d_t = 0.60 \pm 0.06$ mm			pitch = 7.5 mm (bent back)	
0.022	6.0 \times 15.0 \times 12.5	0.9	2222 479 52223	not available
0.024			2222 479 52243	
0.027			2222 479 52273	
0.03			2222 479 52303	
0.033			2222 479 52333	
0.036			2222 479 52363	
0.039			2222 479 52393	
0.043			2222 479 52433	
0.047			2222 479 52473	
Pitch = 15.0 ± 0.4 mm; $d_t = 0.80 \pm 0.08$ mm			pitch = 7.5 mm (bent back)	
0.051	6.5 \times 15.5 (17.0) \times 18.5	1.3	2222 479 52513	.. 56513
0.056			2222 479 52563	.. 56563
0.062			2222 479 52623	.. 56623
0.068			2222 479 52683	.. 56683
0.075			2222 479 52753	.. 56753
0.082			2222 479 52823	.. 56823
0.091	7.0 \times 16.0 (17.5) \times 18.5	1.4	2222 479 52913	.. 56913
0.1			2222 479 52104	.. 56104
0.11			2222 479 52114	.. 56114
0.12			2222 479 52124	.. 56124
0.13	7.5 \times 16.5 (18.0) \times 18.5	1.5	2222 479 52134	.. 56134
0.15			2222 479 52154	.. 56154
0.16	8.0 \times 17.0 (18.5) \times 18.5	1.6	2222 479 52164	.. 56164
0.18	8.5 \times 17.5 (19.0) \times 18.5	1.7	2222 479 52184	.. 56184
0.2			2222 479 52204	.. 56204
0.22	9.0 \times 18.0 (19.5) \times 18.5	1.8	2222 479 52224	.. 56224

Note

1. Dimensions in brackets for bent back leads.

AC and pulse metallized polypropylene film capacitors

MKP 479

MKP 479 GENERAL DATA

PITCH 22.5/27.5 mm

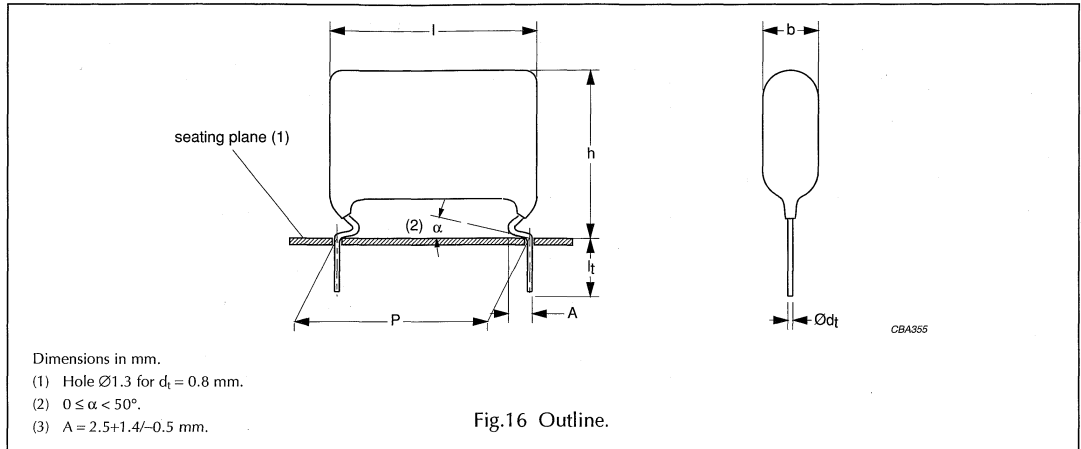


Fig.16 Outline.

Specific reference data for the 400 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
0.24 $\mu\text{F} < C \leq 0.3 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 35 \times 10^{-4}$
0.3 $\mu\text{F} < C \leq 0.39 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 40 \times 10^{-4}$
0.39 $\mu\text{F} < C \leq 0.56 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 45 \times 10^{-4}$
0.56 $\mu\text{F} < C \leq 0.68 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 50 \times 10^{-4}$
0.68 $\mu\text{F} < C \leq 0.82 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 55 \times 10^{-4}$
0.82 $\mu\text{F} < C \leq 0.91 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 60 \times 10^{-4}$
0.91 $\mu\text{F} < C \leq 1.0 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 65 \times 10^{-4}$
1.0 $\mu\text{F} < C \leq 1.2 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 70 \times 10^{-4}$
Rated voltage pulse slope (dU/dt) _R at 400 V (DC):		
P = 22.5 mm	35 V/ μs	
P = 27.5 mm	25 V/ μs	
R between leads, for $C \leq 1.0 \mu\text{F}$ at 100 V; 1 minute	$> 100000 \text{ M}\Omega$	
RC between leads, for $C > 1.0 \mu\text{F}$ at 100 V; 1 minute	$> 100000 \text{ s}$	
R between leads and case; 100 V; 1 minute	$> 100000 \text{ M}\Omega$	
Ionization (AC) voltage (typical value) at 50 pC peak discharge	$> 220 \text{ V}$	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	640 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 400 V DC versions

PACKAGING ⁽¹⁾	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_1 = 5.0 \pm 1.0 \text{ mm}$	$\pm 5\%$	2222 479 52...	preferred
	$l_1 = 3.5 \pm 0.5 \text{ mm}$	$\pm 5\%$	2222 479 54...	on request
Taped on reel	$H = 16.0 \text{ mm}; P_0 = 12.7 \text{ mm}$	$\pm 5\%$	2222 479 55...	on request

Note

1. Taped on reel pitch = 27.5 mm is not available.

AC and pulse metallized polypropylene film capacitors

MKP 479

 $U_{Rdc} = 400 \text{ V}; U_{Rac} = 200 \text{ V}; U_{p-p} = 560 \text{ V}$

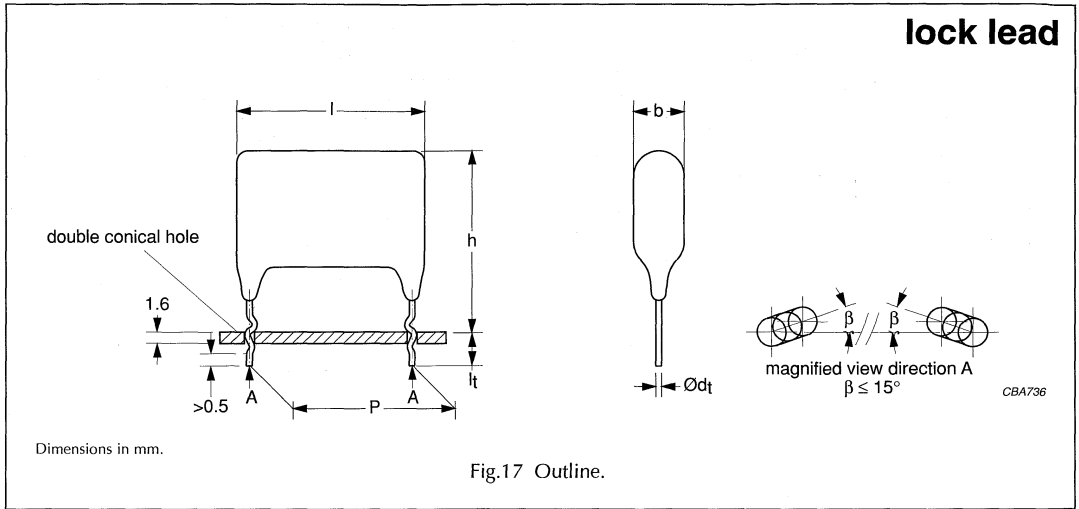
C (μF)	DIMENSIONS $b_{\max} \times h_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 5.0 \pm 1.0 \text{ mm}$
			C-tol = $\pm 5\%$
Pitch = $22.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.24	$6.5 \times 19.5 \times 26.0$	1.7	2222 479 52244
0.27	$7.0 \times 20.0 \times 26.0$	1.8	2222 479 52274
0.3	$7.5 \times 20.5 \times 26.0$	1.9	2222 479 52304
0.33			2222 479 52334
0.36	$8.0 \times 21.0 \times 26.0$	2.0	2222 479 52364
0.39	$8.5 \times 21.5 \times 26.0$	2.1	2222 479 52394
0.43			2222 479 52434
0.47	$9.0 \times 22.0 \times 26.0$	2.4	2222 479 52474
0.51	$9.5 \times 22.5 \times 26.0$	2.5	2222 479 52514
0.56	$10.0 \times 23.0 \times 26.0$	2.6	2222 479 52564
0.62	$10.5 \times 23.5 \times 26.0$	2.7	2222 479 52624
Pitch = $27.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.68	$10.0 \times 23.0 \times 30.0$	5.0	2222 479 52684
0.75	$10.5 \times 23.5 \times 30.0$	5.0	2222 479 52754
0.82	$11.0 \times 24.0 \times 30.0$	5.5	2222 479 52824
0.91	$11.5 \times 24.5 \times 30.0$	5.5	2222 479 52914
1.0	$12.0 \times 25.0 \times 30.0$	6.0	2222 479 52105
1.1	$12.5 \times 25.5 \times 30.0$	6.5	2222 479 52115
1.2	$13.0 \times 26.0 \times 30.0$	6.5	2222 479 52125

AC and pulse metallized polypropylene film capacitors

MKP 479

MKP 479 GENERAL DATA

PITCH 10/15 mm (lock lead)



Specific reference data for the 400 V DC capacitors (lock lead)

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
0.022 μF < C ≤ 0.027 μF	≤ 5 × 10 ⁻⁴	≤ 15 × 10 ⁻⁴
0.027 μF < C ≤ 0.075 μF	≤ 5 × 10 ⁻⁴	≤ 20 × 10 ⁻⁴
0.075 μF < C ≤ 0.11 μF	≤ 5 × 10 ⁻⁴	≤ 25 × 10 ⁻⁴
0.11 μF < C ≤ 0.18 μF	≤ 10 × 10 ⁻⁴	≤ 30 × 10 ⁻⁴
0.18 μF < C ≤ 0.22 μF	≤ 10 × 10 ⁻⁴	≤ 35 × 10 ⁻⁴
Rated voltage pulse slope (dU/dt) _R at 400 V (DC):		
P = 10.0 mm	80 V/μs	
P = 15.0 mm	70 V/μs	
R between leads, for C ≤ 1.0 μF at 100 V; 1 minute	>100000 MΩ	
R between leads and case; 100 V; 1 minute	>100000 MΩ	
Ionization (AC) voltage (typical value) at 50 pC peak discharge	>220 V	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	640 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 400 V DC versions (lock lead)

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	l _t = 4.0 +1.0/-0.5 mm	±5%	2222 479 90...	preferred

AC and pulse metallized polypropylene film capacitors

MKP 479

$U_{Rdc} = 400 \text{ V}$; $U_{Rac} = 200 \text{ V}$; $U_{p-p} = 560 \text{ V}$ (lock lead)

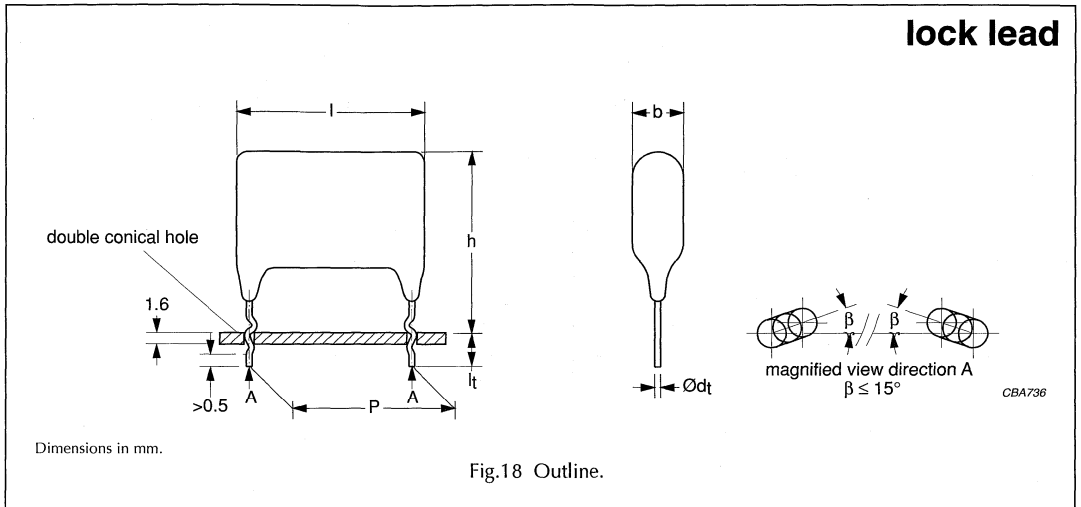
C (μF)	DIMENSIONS $b_{\max} \times h_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 4.0 +1.0/-0.5 \text{ mm}$
			C-tol = $\pm 5\%$
Pitch = $10.0 \pm 1.0 \text{ mm}$; $d_t = 0.60 \pm 0.06 \text{ mm}$			
0.022	6.0 × 18.0 × 12.5	0.9	2222 479 90153
0.024			2222 479 90154
0.027			2222 479 90155
0.03			2222 479 90156
0.033			2222 479 90157
0.036			2222 479 90158
0.039			2222 479 90159
0.043			2222 479 90161
0.047			2222 479 90162
Pitch = $15.0 \pm 1.0 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.051	6.5 × 18.5 × 18.5	1.3	2222 479 90163
0.056			2222 479 90164
0.062			2222 479 90165
0.068			2222 479 90166
0.075			2222 479 90167
0.082			2222 479 90168
0.091	7.0 × 19.0 × 18.5	1.4	2222 479 90169
0.1			2222 479 90171
0.11			2222 479 90172
0.12			2222 479 90173
0.13	7.5 × 19.5 × 18.5	1.5	2222 479 90174
0.15			2222 479 90175
0.16	8.0 × 20.0 × 18.5	1.6	2222 479 90176
0.18	8.5 × 20.5 × 18.5	1.7	2222 479 90177
0.2			2222 479 90178
0.22	9.0 × 21.0 × 18.5	1.8	2222 479 90179

AC and pulse metallized polypropylene film capacitors

MKP 479

MKP 479 GENERAL DATA

PITCH 22.5/27.5 mm (lock lead)



Specific reference data for the 400 V DC capacitors (lock lead)

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
0.24 μF < C ≤ 0.3 μF	≤10 × 10 ⁻⁴	≤35 × 10 ⁻⁴
0.3 μF < C ≤ 0.39 μF	≤10 × 10 ⁻⁴	≤40 × 10 ⁻⁴
0.39 μF < C ≤ 0.56 μF	≤10 × 10 ⁻⁴	≤45 × 10 ⁻⁴
0.56 μF < C ≤ 0.68 μF	≤10 × 10 ⁻⁴	≤50 × 10 ⁻⁴
0.68 μF < C ≤ 0.82 μF	≤10 × 10 ⁻⁴	≤55 × 10 ⁻⁴
0.82 μF < C ≤ 0.91 μF	≤10 × 10 ⁻⁴	≤60 × 10 ⁻⁴
0.91 μF < C ≤ 1.0 μF	≤10 × 10 ⁻⁴	≤65 × 10 ⁻⁴
1.0 μF < C ≤ 1.2 μF	≤10 × 10 ⁻⁴	≤70 × 10 ⁻⁴
Rated voltage pulse slope (dU/dt) _R at 400 V (DC):		
P = 22.5 mm	35 V/μs	
P = 27.5 mm	25 V/μs	
R between leads, for C ≤ 1.0 μF at 100 V; 1 minute	>100 000 MΩ	
RC between leads, for C > 1.0 μF at 100 V; 1 minute	>100 000 s	
R between leads and case; 100 V; 1 minute	>100 000 MΩ	
Ionization (AC) voltage (typical value) at 50 pC peak discharge	>220 V	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	640 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 400 V DC versions (lock lead)

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	l _t = 4.0 +1.0/-0.5 mm	±5%	2222 479 90...	preferred

AC and pulse metallized polypropylene film capacitors

MKP 479

$U_{Rdc} = 400 \text{ V}$; $U_{Rac} = 200 \text{ V}$; $U_{p-p} = 560 \text{ V}$ (lock lead)

C (μF)	DIMENSIONS $b_{\max} \times h_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 4.0 +1.0/-0.5 \text{ mm}$
			C-tol = $\pm 5\%$
Pitch = $22.5 \pm 1.0 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.24	$6.5 \times 22.5 \times 26.0$	1.7	2222 479 90181
0.27	$7.0 \times 23.0 \times 26.0$	1.8	2222 479 90182
0.3	$7.5 \times 23.5 \times 26.0$	1.9	2222 479 90183
0.33			2222 479 90184
0.36	$8.0 \times 24.0 \times 26.0$	2.0	2222 479 90185
0.39	$8.5 \times 24.5 \times 26.0$	2.1	2222 479 90186
0.43			2222 479 90187
0.47	$9.0 \times 25.0 \times 26.0$	2.4	2222 479 90188
0.51	$9.5 \times 25.5 \times 26.0$	2.5	2222 479 90189
0.56	$10.0 \times 26.0 \times 26.0$	2.6	2222 479 90191
0.62	$10.5 \times 26.5 \times 26.0$	2.7	2222 479 90192
Pitch = $27.5 \pm 1.0 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.68	$10.0 \times 26.0 \times 30.0$	5.0	2222 479 90193
0.75	$10.5 \times 26.5 \times 30.0$	5.0	2222 479 90194
0.82	$11.0 \times 27.0 \times 30.0$	5.5	2222 479 90195
0.91	$11.5 \times 27.5 \times 30.0$	5.5	2222 479 90196
1.0	$12.0 \times 28.0 \times 30.0$	6.0	2222 479 90086
1.1	$12.5 \times 28.5 \times 30.0$	6.5	2222 479 90197
1.2	$13.0 \times 29.0 \times 30.0$	6.5	2222 479 90198

AC and pulse metallized polypropylene film capacitors

MKP 479 monitor

MKP 479 GENERAL DATA

**PITCH 10/15 mm
PITCH 7.5 mm (bent back leads)**

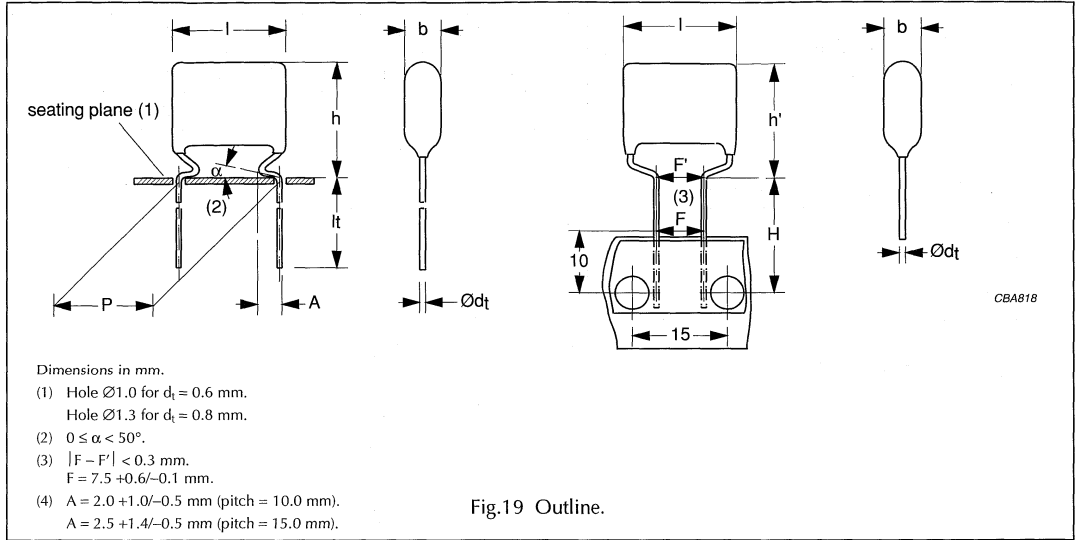


Fig.19 Outline.

Specific reference data for the 400 V DC capacitors (monitor type)

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
$0.01 \mu\text{F} < C \leq 0.027 \mu\text{F}$	$\leq 5 \times 10^{-4}$	$\leq 15 \times 10^{-4}$
$0.027 \mu\text{F} < C \leq 0.075 \mu\text{F}$	$\leq 5 \times 10^{-4}$	$\leq 20 \times 10^{-4}$
$0.075 \mu\text{F} < C \leq 0.11 \mu\text{F}$	$\leq 5 \times 10^{-4}$	$\leq 25 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 400 V (DC):		
P = 10.0 mm	200 V/ μs	
P = 15.0 mm	180 V/ μs	
R between leads, for $C \leq 1.0 \mu\text{F}$ at 100 V; 1 minute	$> 100000 \text{ M}\Omega$	
R between leads and case; 100 V; 1 minute	$> 100000 \text{ M}\Omega$	
Ionization (AC) voltage (typical value) at 50 pC peak discharge	$> 220 \text{ V}$	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	640 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 400 V DC versions (monitor type)

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 5.0 \pm 1.0$ mm	$\pm 5\%$	2222 479 51...	preferred
	$l_t = 3.5 \pm 0.5$ mm	$\pm 5\%$	2222 479 53...	on request
Taped on reel	$H = 16.0$ mm; $P_0 = 12.7$ mm	$\pm 5\%$	2222 479 57...	on request
Taped on reel (bent back)	$H = 16.0$ mm; $P_0 = 15.0$ mm	$\pm 5\%$	2222 479 59...	preferred

AC and pulse metallized polypropylene film capacitors

MKP 479 monitor

 $U_{Rdc} = 400 \text{ V}; U_{Rac} = 200 \text{ V}; U_{p-p} = 560 \text{ V (monitor type)}$

C (μF)	DIMENSIONS ⁽¹⁾ $b_{\max} \times h (h')_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER	
			LOOSE IN BOX	REEL DIAMETER = 500 mm
			$l_t = 5.0 \pm 1.0 \text{ mm}$	H = 16.0 mm; P ₀ = 15.0 mm
			C-tol = $\pm 5\%$	C-tol = $\pm 5\%$
			catalogue number	last 5 digits
Pitch = $10.0 \pm 0.4 \text{ mm}; d_t = 0.60 \pm 0.06 \text{ mm}$			pitch = 7.5 mm (bent back)	
0.01	6.0 × 15.0 × 12.5	0.9	2222 479 51103	not available
0.011			2222 479 51113	
0.012			2222 479 51123	
0.013			2222 479 51133	
0.015			2222 479 51153	
0.016			2222 479 51163	
0.018			2222 479 51183	
0.02			2222 479 51203	
0.022			2222 479 51223	
0.024			2222 479 51243	
0.027	6.5 × 15.5 × 12.5	1.0	2222 479 51273	
Pitch = $15.0 \pm 0.4 \text{ mm}; d_t = 0.80 \pm 0.08 \text{ mm}$			pitch = 7.5 mm (bent back)	
0.03	6.5 × 15.5 (17.0) × 18.5	1.3	2222 479 51303	.. 59303
0.033			2222 479 51333	.. 59333
0.036			2222 479 51363	.. 59363
0.039			2222 479 51393	.. 59393
0.043			2222 479 51433	.. 59433
0.047			2222 479 51473	.. 59473
0.051			2222 479 51513	.. 59513
0.056			2222 479 51563	.. 59563
0.062			7.0 × 16.0 (17.5) × 18.5	1.4
0.068	7.5 × 16.5 (18.0) × 18.5	1.5	2222 479 51683	.. 59683
0.075	8.0 × 17.0 (18.5) × 18.5	1.6	2222 479 51753	.. 59753
0.082			2222 479 51823	.. 59823
0.091	8.5 × 17.5 (19.0) × 18.5	1.7	2222 479 51913	.. 59913
0.1	9.0 × 18.0 (19.5) × 18.5	1.8	2222 479 51104	.. 59104
0.11	9.5 × 18.5 (20.0) × 18.5	1.9	2222 479 51114	.. 59114

Note

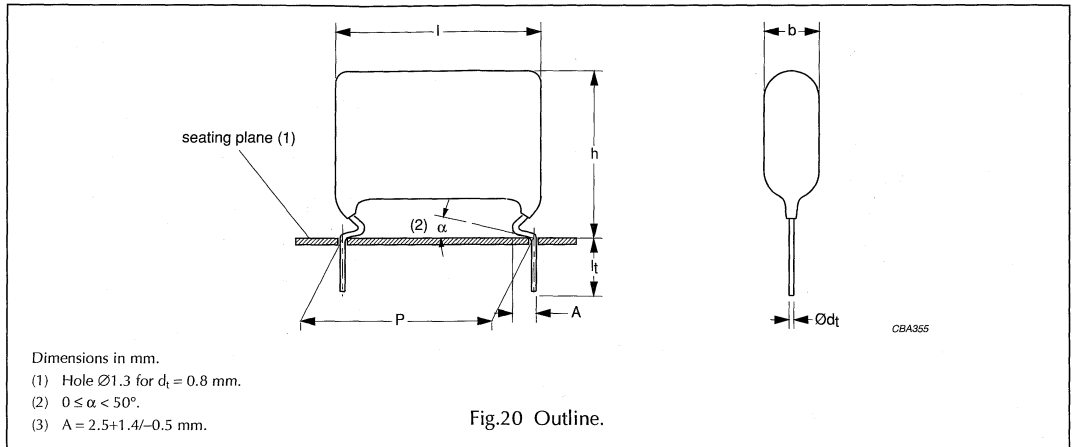
- Dimensions in brackets for bent back leads.

AC and pulse metallized polypropylene film capacitors

MKP 479 monitor

MKP 479 GENERAL DATA

PITCH 22.5/27.5 mm



Specific reference data for the 400 V DC capacitors (monitor type)

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
0.12 $\mu\text{F} < C \leq 0.18 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 30 \times 10^{-4}$
0.18 $\mu\text{F} < C \leq 0.3 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 35 \times 10^{-4}$
0.3 $\mu\text{F} < C \leq 0.39 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 40 \times 10^{-4}$
0.39 $\mu\text{F} < C \leq 0.56 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 45 \times 10^{-4}$
0.56 $\mu\text{F} < C \leq 0.68 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 50 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 400 V (DC):		
P = 22.5 mm	90 V/ μs	
P = 27.5 mm	60 V/ μs	
R between leads, for $C \leq 1.0 \mu\text{F}$ at 100 V; 1 minute	$> 100000 \text{ M}\Omega$	
R between leads and case; 100 V; 1 minute	$> 100000 \text{ M}\Omega$	
Ionization (AC) voltage (typical value) at 50 pC peak discharge	$> 220 \text{ V}$	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	640 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 400 V DC versions (monitor type)

PACKAGING ⁽¹⁾	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 5.0 \pm 1.0 \text{ mm}$	$\pm 5\%$	2222 479 51...	preferred
	$l_t = 3.5 \pm 0.5 \text{ mm}$	$\pm 5\%$	2222 479 53...	on request
Taped on reel	$H = 16.0 \text{ mm}; P_0 = 12.7 \text{ mm}$	$\pm 5\%$	2222 479 57...	on request

Note

1. Taped on reel pitch = 27.5 mm is not available.

AC and pulse metallized polypropylene film capacitors

MKP 479 monitor

$U_{Rdc} = 400 \text{ V}$; $U_{Rac} = 200 \text{ V}$; $U_{p-p} = 560 \text{ V}$ (monitor type)

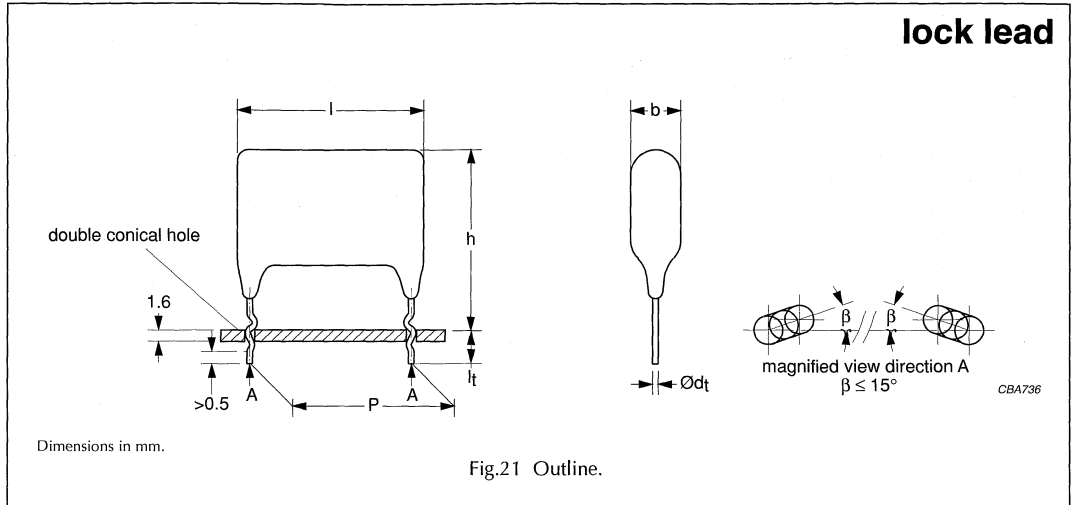
C (μF)	DIMENSIONS $b_{\text{max}} \times h_{\text{max}} \times l_{\text{max}}$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 5.0 \pm 1.0 \text{ mm}$
			C-tol = $\pm 5\%$
Pitch = $22.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.12	$6.5 \times 19.5 \times 26.0$	1.7	2222 479 51124
0.13	$7.0 \times 20.0 \times 26.0$	1.8	2222 479 51134
0.15	$7.5 \times 20.5 \times 26.0$	1.9	2222 479 51154
0.16			2222 479 51164
0.18	$8.0 \times 21.0 \times 26.0$	2.0	2222 479 51184
0.20	$8.5 \times 21.5 \times 26.0$	2.1	2222 479 51204
0.22	$9.0 \times 22.0 \times 26.0$	2.4	2222 479 51224
0.24			2222 479 51244
0.27	$9.5 \times 22.5 \times 26.0$	2.5	2222 479 51274
0.30	$10.0 \times 23.0 \times 26.0$	2.7	2222 479 51304
Pitch = $27.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.33	$9.5 \times 22.5 \times 30.0$	5.0	2222 479 51334
0.36	$10.0 \times 22.5 \times 30.0$	5.0	2222 479 51364
0.39	$10.5 \times 23.0 \times 30.0$	5.0	2222 479 51394
0.43	$11.0 \times 23.0 \times 30.0$	5.5	2222 479 51434
0.47	$11.5 \times 24.5 \times 30.0$	5.5	2222 479 51474
0.51	$12.0 \times 25.0 \times 30.0$	6.0	2222 479 51514
0.56	$13.0 \times 26.0 \times 30.0$	6.5	2222 479 51564
0.62	$13.5 \times 26.5 \times 30.0$	6.5	2222 479 51624
0.68	$14.0 \times 27.0 \times 30.0$	7.0	2222 479 51684

**AC and pulse
metallized polypropylene film capacitors**

**MKP 479
monitor**

MKP 479 GENERAL DATA

PITCH 10/15 mm (monitor type - lock lead)



Specific reference data for the 400 V DC capacitors (monitor type - lock lead)

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
0.01 μF < C ≤ 0.027 μF	≤ 5 × 10 ⁻⁴	≤ 15 × 10 ⁻⁴
0.027 μF < C ≤ 0.075 μF	≤ 5 × 10 ⁻⁴	≤ 20 × 10 ⁻⁴
0.075 μF < C ≤ 0.11 μF	≤ 5 × 10 ⁻⁴	≤ 25 × 10 ⁻⁴
Rated voltage pulse slope (dU/dt) _R at 630 V (DC):		
P = 10.0 mm	100 V/μs	
P = 15.0 mm	90 V/μs	
R between leads, for C ≤ 1.0 μF at 500 V; 1 minute	>100000 MΩ	
R between leads and case; 500 V; 1 minute	>100000 MΩ	
Ionization (AC) voltage (typical value) at 50 pC peak discharge	>220 V	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	1008 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 400 V DC versions (monitor type - lock lead)

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	l _t = 4.0 +1.0/-0.5 mm	±5%	2222 479 90...	preferred

AC and pulse metallized polypropylene film capacitors

MKP 479 monitor

$U_{Rdc} = 400 \text{ V}$; $U_{Rac} = 200 \text{ V}$; $U_{p-p} = 560 \text{ V}$ (monitor type - lock lead)

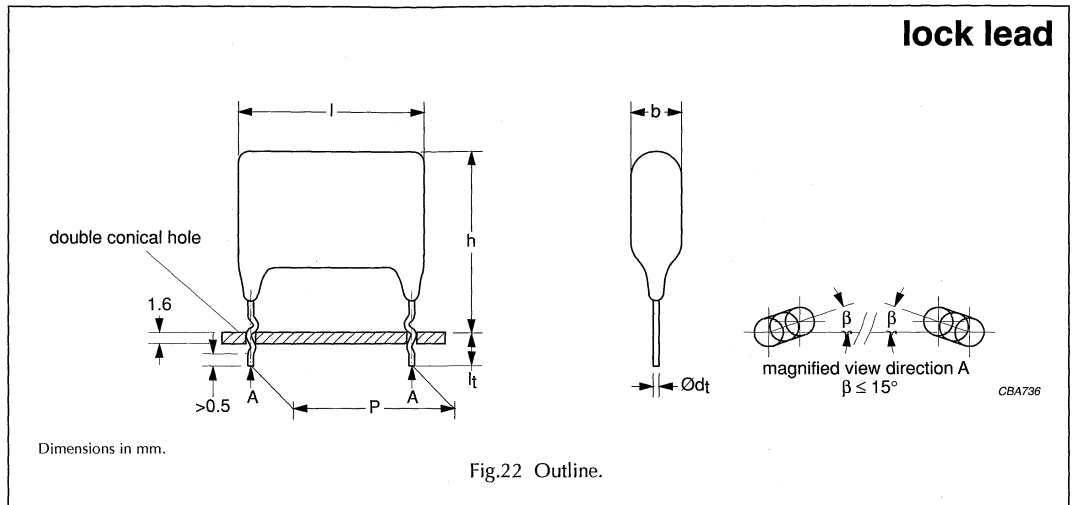
C (μF)	DIMENSIONS $b_{\max} \times h_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER		
			LOOSE IN BOX		
			$l_t = 4.0 +1.0/-0.5 \text{ mm}$		
			C-tol = $\pm 5\%$		
Pitch = $10.0 \pm 1.0 \text{ mm}$; $d_t = 0.60 \pm 0.06 \text{ mm}$					
0.01	$6.0 \times 18.0 \times 12.5$	0.9	2222 479 90427		
0.011			2222 479 90428		
0.012			2222 479 90429		
0.013			2222 479 90431		
0.015			2222 479 90432		
0.016			2222 479 90433		
0.018			2222 479 90434		
0.02			2222 479 90435		
0.022			2222 479 90436		
0.024			2222 479 90437		
0.027	$6.5 \times 18.5 \times 12.5$	1.0	2222 479 90438		
Pitch = $15.0 \pm 1.0 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$					
0.03	$6.5 \times 18.5 \times 18.5$	1.3	2222 479 90439		
0.033			2222 479 90441		
0.036			2222 479 90442		
0.039			2222 479 90443		
0.043			2222 479 90444		
0.047			2222 479 90445		
0.051			2222 479 90446		
0.056			2222 479 90447		
0.062			$7.0 \times 19.0 \times 18.5$	1.4	2222 479 90448
0.068			$7.5 \times 19.5 \times 18.5$	1.5	2222 479 90449
0.075	$8.0 \times 20.0 \times 18.5$	1.6	2222 479 90451		
0.082			2222 479 90452		
0.091	$8.5 \times 20.5 \times 18.5$	1.7	2222 479 90453		
0.1	$9.0 \times 21.0 \times 18.5$	1.8	2222 479 90454		
0.11	$9.5 \times 21.5 \times 18.5$	1.9	2222 479 90455		

AC and pulse metallized polypropylene film capacitors

MKP 479 monitor

MKP 479 GENERAL DATA

PITCH 22.5/27.5 mm (monitor type - lock lead)



Specific reference data for the 400 V DC capacitors (monitor type - lock lead)

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
0.12 µF < C ≤ 0.18 µF	≤10 × 10 ⁻⁴	≤30 × 10 ⁻⁴
0.18 µF < C ≤ 0.3 µF	≤10 × 10 ⁻⁴	≤35 × 10 ⁻⁴
0.3 µF < C ≤ 0.39 µF	≤10 × 10 ⁻⁴	≤40 × 10 ⁻⁴
0.39 µF < C ≤ 0.56 µF	≤10 × 10 ⁻⁴	≤45 × 10 ⁻⁴
0.56 µF < C ≤ 0.68 µF	≤10 × 10 ⁻⁴	≤50 × 10 ⁻⁴
Rated voltage pulse slope (dU/dt) _R at 630 V (DC):		
P = 22.5 mm	45 V/µs	
P = 27.5 mm	30 V/µs	
R between leads, for C ≤ 1.0 µF at 500 V; 1 minute	>100000 MΩ	
R between leads and case; 500 V; 1 minute	>100000 MΩ	
Ionization (AC) voltage (typical value) at 50 pC peak discharge	>220 V	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	1008 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 400 V DC versions (monitor type - lock lead)

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	l _t = 4.0 +1.0/-0.5 mm	±5%	2222 479 90...	preferred

AC and pulse metallized polypropylene film capacitors

MKP 479 monitor

$U_{Rdc} = 400 \text{ V}$; $U_{Rac} = 200 \text{ V}$; $U_{p-p} = 560 \text{ V}$ (monitor type - lock lead)

C (μF)	DIMENSIONS $b_{\max} \times h_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 4.0 +1.0/-0.5 \text{ mm}$
			C-tol = $\pm 5\%$
Pitch = $22.5 \pm 1.0 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.12	$6.5 \times 22.5 \times 26.0$	1.7	2222 479 90456
0.13	$7.0 \times 23.0 \times 26.0$	1.8	2222 479 90457
0.15	$7.5 \times 23.5 \times 26.0$	1.9	2222 479 90458
0.16			2222 479 90459
0.18	$8.0 \times 24.0 \times 26.0$	2.0	2222 479 90461
0.20	$8.5 \times 24.5 \times 26.0$	2.1	2222 479 90462
0.22	$9.0 \times 25.0 \times 26.0$	2.4	2222 479 90463
0.24			2222 479 90464
0.27	$9.5 \times 25.5 \times 26.0$	2.5	2222 479 90465
0.30	$10.0 \times 26.0 \times 26.0$	2.7	2222 479 90466
Pitch = $27.5 \pm 1.0 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.33	$9.5 \times 25.5 \times 30.0$	5.0	2222 479 90467
0.36	$10.0 \times 25.5 \times 30.0$	5.0	2222 479 90468
0.39	$10.5 \times 26.0 \times 30.0$	5.0	2222 479 90469
0.43	$11.0 \times 26.0 \times 30.0$	5.5	2222 479 90471
0.47	$11.5 \times 27.5 \times 30.0$	5.5	2222 479 90472
0.51	$12.0 \times 28.0 \times 30.0$	6.0	2222 479 90473
0.56	$13.0 \times 29.0 \times 30.0$	6.5	2222 479 90474
0.62	$13.5 \times 29.5 \times 30.0$	6.5	2222 479 90475
0.68	$14.0 \times 30.0 \times 30.0$	7.0	2222 479 90476

AC and pulse metallized polypropylene film capacitors

MKP 479

MKP 479 GENERAL DATA

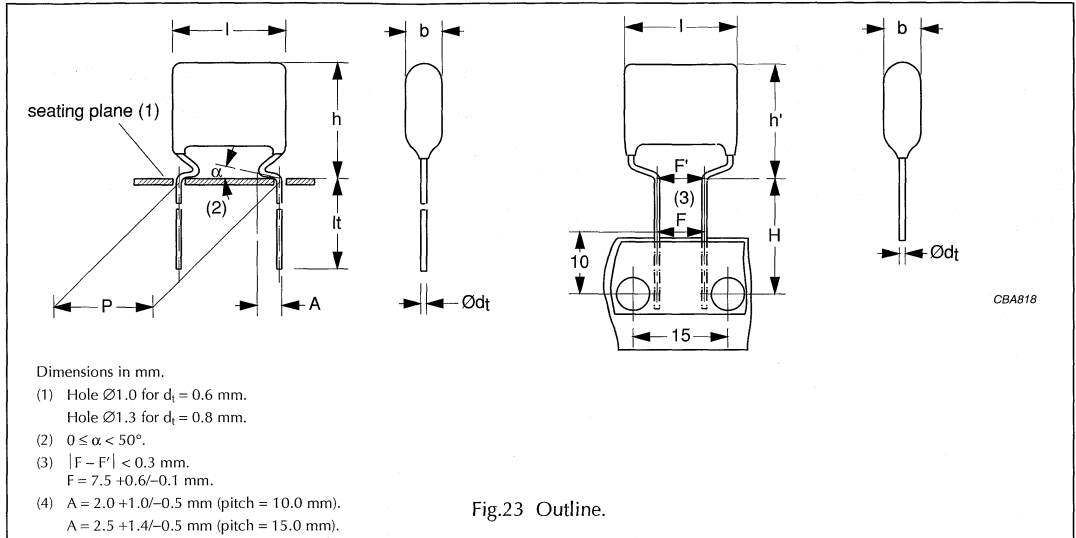
 PITCH 10/15 mm
 PITCH 7.5 mm (bent back leads)


Fig.23 Outline.

Specific reference data for the 630 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
$0.01 \mu\text{F} < C \leq 0.027 \mu\text{F}$	$\leq 5 \times 10^{-4}$	$\leq 15 \times 10^{-4}$
$0.027 \mu\text{F} < C \leq 0.075 \mu\text{F}$	$\leq 5 \times 10^{-4}$	$\leq 20 \times 10^{-4}$
$0.075 \mu\text{F} < C \leq 0.11 \mu\text{F}$	$\leq 5 \times 10^{-4}$	$\leq 25 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 630 V (DC):		
$P = 10.0$ mm	100 V/ μs	
$P = 15.0$ mm	90 V/ μs	
R between leads, for $C \leq 1.0 \mu\text{F}$ at 500 V; 1 minute	$> 100000 \text{ M}\Omega$	
R between leads and case; 500 V; 1 minute	$> 100000 \text{ M}\Omega$	
Ionization (AC) voltage (typical value) at 50 pC peak discharge	$> 220 \text{ V}$	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	1008 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 630 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 5.0 \pm 1.0$ mm	$\pm 5\%$	2222 479 62...	preferred
	$l_t = 3.5 \pm 0.5$ mm	$\pm 5\%$	2222 479 64...	on request
Taped on reel	$H = 16.0$ mm; $P_0 = 12.7$ mm	$\pm 5\%$	2222 479 65...	on request
Taped on reel (bent back)	$H = 16.0$ mm; $P_0 = 15.0$ mm	$\pm 5\%$	2222 479 66...	preferred

AC and pulse metallized polypropylene film capacitors

MKP 479

 $U_{Rdc} = 630 \text{ V}; U_{Rac} = 200 \text{ V}; U_{p-p} = 560 \text{ V}$

C (μF)	DIMENSIONS ⁽¹⁾ $b_{\max} \times h (h')_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER	
			LOOSE IN BOX	REEL DIAMETER = 500 mm
			$l_t = 5.0 \pm 1.0 \text{ mm}$	H = 16.0 mm; $P_0 = 15.0 \text{ mm}$
			C-tol = $\pm 5\%$	C-tol = $\pm 5\%$
			catalogue number	last 5 digits
Pitch = $10.0 \pm 0.4 \text{ mm}$; $d_t = 0.60 \pm 0.06 \text{ mm}$			pitch = 7.5 mm (bent back)	
0.01	6.0 × 15.0 × 12.5	0.9	2222 479 62103	not available
0.011			2222 479 62113	
0.012			2222 479 62123	
0.013			2222 479 62133	
0.015			2222 479 62153	
0.016			2222 479 62163	
0.018			2222 479 62183	
0.02			2222 479 62203	
0.022			2222 479 62223	
0.024			2222 479 62243	
0.027	6.5 × 15.5 × 12.5	1.0	2222 479 62273	
Pitch = $15.0 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			pitch = 7.5 mm (bent back)	
0.03	6.5 × 15.5 (17.0) × 18.5	1.3	2222 479 62303	.. 66303
0.033			2222 479 62333	.. 66333
0.036			2222 479 62363	.. 66363
0.039			2222 479 62393	.. 66393
0.043			2222 479 62433	.. 66433
0.047			2222 479 62473	.. 66473
0.051			2222 479 62513	.. 66513
0.056			2222 479 62563	.. 66563
0.062	7.0 × 16.0 (17.5) × 18.5	1.4	2222 479 62623	.. 66623
0.068	7.5 × 16.5 (18.0) × 18.5	1.5	2222 479 62683	.. 66683
0.075	8.0 × 17.0 (18.5) × 18.5	1.6	2222 479 62753	.. 66753
0.082			2222 479 62823	.. 66823
0.091	8.5 × 17.5 (19.0) × 18.5	1.7	2222 479 62913	.. 66913
0.1	9.0 × 18.0 (19.5) × 18.5	1.8	2222 479 62104	.. 66104
0.11	9.5 × 18.5 (20.0) × 18.5	1.9	2222 479 62114	.. 66114

Note

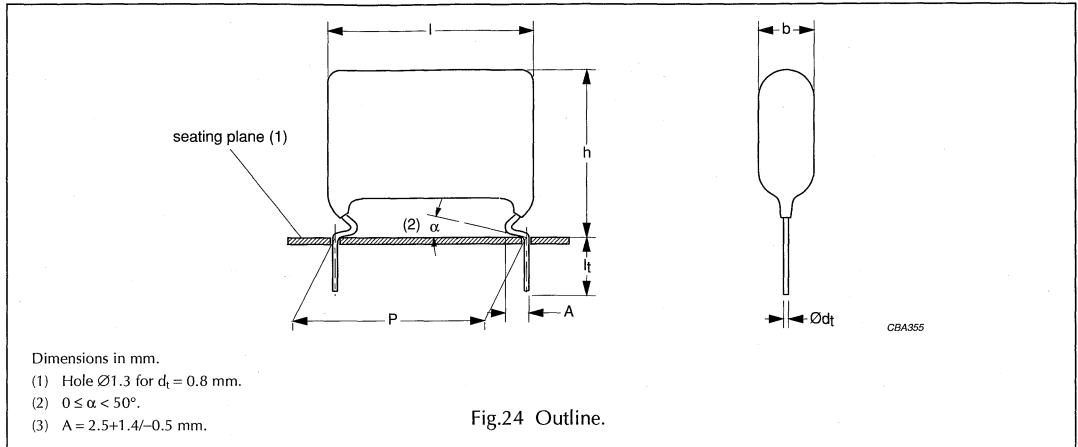
1. Dimensions in brackets for bent back leads.

AC and pulse metallized polypropylene film capacitors

MKP 479

MKP 479 GENERAL DATA

PITCH 22.5/27.5 mm



Specific reference data for the 630 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
$0.12 \mu\text{F} < C \leq 0.18 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 30 \times 10^{-4}$
$0.18 \mu\text{F} < C \leq 0.3 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 35 \times 10^{-4}$
$0.3 \mu\text{F} < C \leq 0.39 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 40 \times 10^{-4}$
$0.39 \mu\text{F} < C \leq 0.56 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 45 \times 10^{-4}$
$0.56 \mu\text{F} < C \leq 0.68 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 50 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 630 V (DC):		
$P = 22.5$ mm	45 V/ μs	
$P = 27.5$ mm	30 V/ μs	
R between leads, for $C \leq 1.0 \mu\text{F}$ at 500 V; 1 minute	$> 1000000 \text{ M}\Omega$	
R between leads and case; 500 V; 1 minute	$> 1000000 \text{ M}\Omega$	
Ionization (AC) voltage (typical value) at 50 pC peak discharge	$> 220 \text{ V}$	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	1008 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 630 V DC versions

PACKAGING ⁽¹⁾	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 5.0 \pm 1.0$ mm	$\pm 5\%$	2222 479 62...	preferred
	$l_t = 3.5 \pm 0.5$ mm	$\pm 5\%$	2222 479 64...	on request
Taped on reel	$H = 16.0$ mm; $P_0 = 12.7$ mm	$\pm 5\%$	2222 479 65...	on request

Note

1. Taped on reel pitch = 27.5 mm is not available.

AC and pulse metallized polypropylene film capacitors

MKP 479

$U_{Rdc} = 630 \text{ V}$; $U_{Rac} = 200 \text{ V}$; $U_{p-p} = 560 \text{ V}$

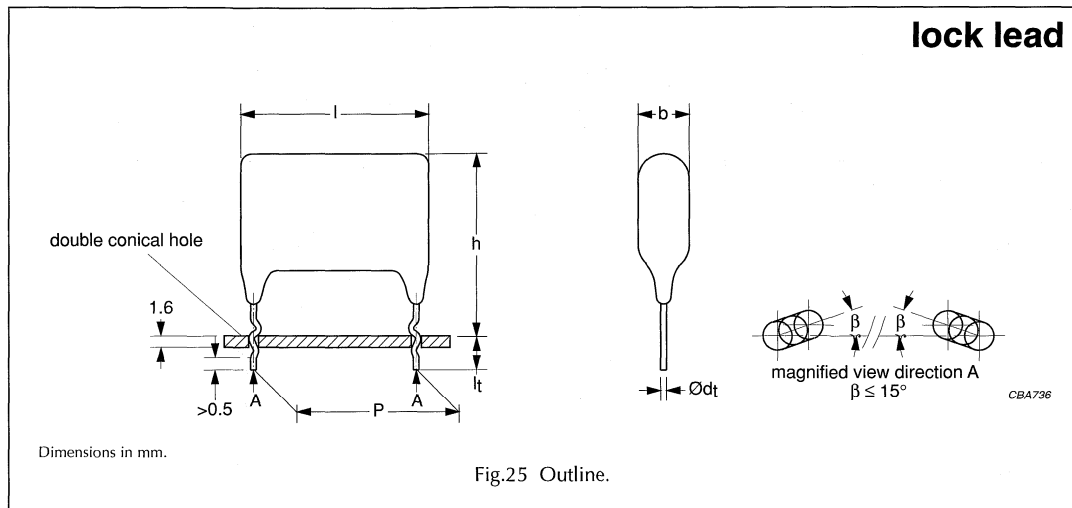
C (μF)	DIMENSIONS $b_{\max} \times h_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 5.0 \pm 1.0 \text{ mm}$
			C-tol = $\pm 5\%$
Pitch = $22.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.12	$6.5 \times 19.5 \times 26.0$	1.7	2222 479 62124
0.13	$7.0 \times 20.0 \times 26.0$	1.8	2222 479 62134
0.15	$7.5 \times 20.5 \times 26.0$	1.9	2222 479 62154
0.16			2222 479 62164
0.18	$8.0 \times 21.0 \times 26.0$	2.0	2222 479 62184
0.20	$8.5 \times 21.5 \times 26.0$	2.1	2222 479 62204
0.22	$9.0 \times 22.0 \times 26.0$	2.4	2222 479 62224
0.24			2222 479 62244
0.27	$9.5 \times 22.5 \times 26.0$	2.5	2222 479 62274
0.30	$10.0 \times 23.0 \times 26.0$	2.7	2222 479 62304
Pitch = $27.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.33	$9.5 \times 22.5 \times 30.0$	5.0	2222 479 62334
0.36	$10.0 \times 22.5 \times 30.0$	5.0	2222 479 62364
0.39	$10.5 \times 23.0 \times 30.0$	5.0	2222 479 62394
0.43	$11.0 \times 23.0 \times 30.0$	5.5	2222 479 62434
0.47	$11.5 \times 24.5 \times 30.0$	5.5	2222 479 62474
0.51	$12.0 \times 25.0 \times 30.0$	6.0	2222 479 62514
0.56	$13.0 \times 26.0 \times 30.0$	6.5	2222 479 62564
0.62	$13.5 \times 26.5 \times 30.0$	6.5	2222 479 62624
0.68	$14.0 \times 27.0 \times 30.0$	7.0	2222 479 62684

AC and pulse metallized polypropylene film capacitors

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MKP 479 GENERAL DATA

PITCH 10/15 mm (lock lead)



Specific reference data for the 630 V DC capacitors (lock lead)

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
0.01 $\mu\text{F} < C \leq 0.027 \mu\text{F}$	$\leq 5 \times 10^{-4}$	$\leq 15 \times 10^{-4}$
0.027 $\mu\text{F} < C \leq 0.075 \mu\text{F}$	$\leq 5 \times 10^{-4}$	$\leq 20 \times 10^{-4}$
0.075 $\mu\text{F} < C \leq 0.11 \mu\text{F}$	$\leq 5 \times 10^{-4}$	$\leq 25 \times 10^{-4}$
Rated voltage pulse slope (dU/dt) _R at 630 V (DC):		
P = 10.0 mm	100 V/ μs	
P = 15.0 mm	90 V/ μs	
R between leads, for C $\leq 1.0 \mu\text{F}$ at 500 V; 1 minute	>100000 M Ω	
R between leads and case; 500 V; 1 minute	>100000 M Ω	
Ionization (AC) voltage (typical value) at 50 pC peak discharge	>220 V	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	1008 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 630 V DC versions (lock lead)

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 4.0 +1.0/-0.5 \text{ mm}$	$\pm 5\%$	2222 479 90...	preferred

AC and pulse metallized polypropylene film capacitors

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$U_{Rdc} = 630 \text{ V}$; $U_{Rac} = 200 \text{ V}$; $U_{p-p} = 560 \text{ V}$ (lock lead)

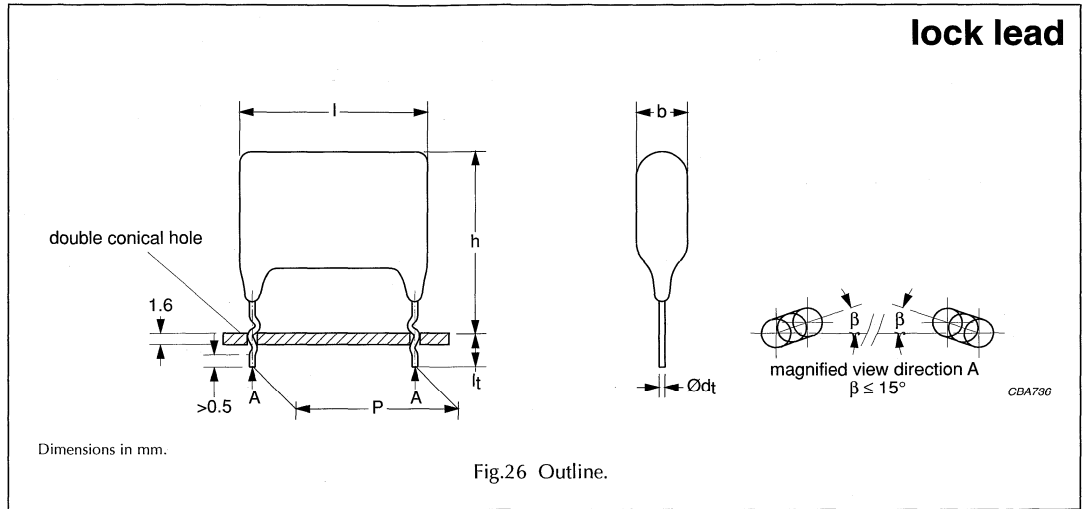
C (μF)	DIMENSIONS $b_{\max} \times h_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 4.0 +1.0/-0.5 \text{ mm}$
			C-tol = $\pm 5\%$
Pitch = $10.0 \pm 1.0 \text{ mm}$; $d_t = 0.60 \pm 0.06 \text{ mm}$			
0.01	6.0 × 18.0 × 12.5	0.9	2222 479 90199
0.011			2222 479 90201
0.012			2222 479 90202
0.013			2222 479 90203
0.015			2222 479 90204
0.016			2222 479 90205
0.018			2222 479 90206
0.02			2222 479 90207
0.022			2222 479 90208
0.024	2222 479 90209		
0.027	6.5 × 18.5 × 12.5	1.0	2222 479 90211
Pitch = $15.0 \pm 1.0 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.03	6.5 × 18.5 × 18.5	1.3	2222 479 90212
0.033			2222 479 90213
0.036			2222 479 90214
0.039			2222 479 90215
0.043			2222 479 90216
0.047			2222 479 90217
0.051			2222 479 90218
0.056			2222 479 90219
0.062	7.0 × 19.0 × 18.5	1.4	2222 479 90221
0.068	7.5 × 19.5 × 18.5	1.5	2222 479 90222
0.075	8.0 × 20.0 × 18.5	1.6	2222 479 90223
0.082			2222 479 90224
0.091	8.5 × 20.5 × 18.5	1.7	2222 479 90225
0.1	9.0 × 21.0 × 18.5	1.8	2222 479 90226
0.11	9.5 × 21.5 × 18.5	1.9	2222 479 90227

AC and pulse metallized polypropylene film capacitors

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MKP 479 GENERAL DATA

PITCH 22.5/27.5 mm (lock lead)



Specific reference data for the 630 V DC capacitors (lock lead)

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
0.12 $\mu\text{F} < C \leq 0.18 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 30 \times 10^{-4}$
0.18 $\mu\text{F} < C \leq 0.3 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 35 \times 10^{-4}$
0.3 $\mu\text{F} < C \leq 0.39 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 40 \times 10^{-4}$
0.39 $\mu\text{F} < C \leq 0.56 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 45 \times 10^{-4}$
0.56 $\mu\text{F} < C \leq 0.68 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 50 \times 10^{-4}$
Rated voltage pulse slope (dU/dt) _R at 630 V (DC):		
P = 22.5 mm	45 V/ μs	
P = 27.5 mm	30 V/ μs	
R between leads, for C $\leq 1.0 \mu\text{F}$ at 500 V; 1 minute	$>100\,000 \text{ M}\Omega$	
R between leads and case; 500 V; 1 minute	$>100\,000 \text{ M}\Omega$	
Ionization (AC) voltage (typical value) at 50 pC peak discharge	$>220 \text{ V}$	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	1008 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 630 V DC versions (lock lead)

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 4.0 +1.0/-0.5 \text{ mm}$	$\pm 5\%$	222 479 90...	preferred

AC and pulse metallized polypropylene film capacitors

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$U_{Rdc} = 630 \text{ V}$; $U_{Rac} = 200 \text{ V}$; $U_{p-p} = 560 \text{ V}$ (lock lead)

C (μF)	DIMENSIONS $b_{\max} \times h_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 4.0 +1.0/-0.5 \text{ mm}$
			C-tol = $\pm 5\%$
Pitch = $22.5 \pm 1.0 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.12	$6.5 \times 22.5 \times 26.0$	1.7	2222 479 90228
0.13	$7.0 \times 23.0 \times 26.0$	1.8	2222 479 90229
0.15	$7.5 \times 23.5 \times 26.0$	1.9	2222 479 90231
0.16			2222 479 90232
0.18	$8.0 \times 24.0 \times 26.0$	2.0	2222 479 90233
0.20	$8.5 \times 24.5 \times 26.0$	2.1	2222 479 90234
0.22	$9.0 \times 25.0 \times 26.0$	2.4	2222 479 90235
0.24			2222 479 90236
0.27	$9.5 \times 25.5 \times 26.0$	2.5	2222 479 90237
0.30	$10.0 \times 26.0 \times 26.0$	2.7	2222 479 90238
Pitch = $27.5 \pm 1.0 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.33	$9.5 \times 25.5 \times 30.0$	5.0	2222 479 90239
0.36	$10.0 \times 25.5 \times 30.0$	5.0	2222 479 90241
0.39	$10.5 \times 26.0 \times 30.0$	5.0	2222 479 90242
0.43	$11.0 \times 26.0 \times 30.0$	5.5	2222 479 90243
0.47	$11.5 \times 27.5 \times 30.0$	5.5	2222 479 90244
0.51	$12.0 \times 28.0 \times 30.0$	6.0	2222 479 90245
0.56	$13.0 \times 29.0 \times 30.0$	6.5	2222 479 90246
0.62	$13.5 \times 29.5 \times 30.0$	6.5	2222 479 90247
0.68	$14.0 \times 30.0 \times 30.0$	7.0	2222 479 90248

AC and pulse metallized polypropylene film capacitors

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CONSTRUCTION

Description

- Low-inductive wound cell of metallized polypropylene (PP) film, epoxy lacquered
- Radial leads, solder-coated wire.

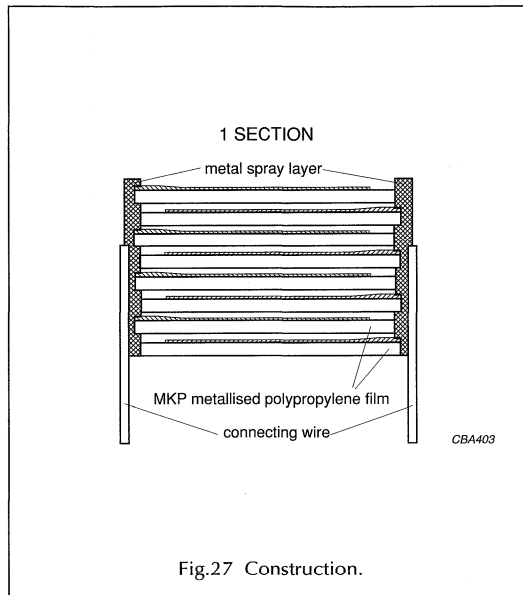


Fig.27 Construction.

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 tape specifications refer to this handbook, chapter "Packaging information".

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 crimps are in good contact with the printed-circuit board:

- For original 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.

Storage temperature

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

RATINGS AND CHARACTERISTICS REFERENCE CONDITIONS

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 $50 \pm 2\%$.

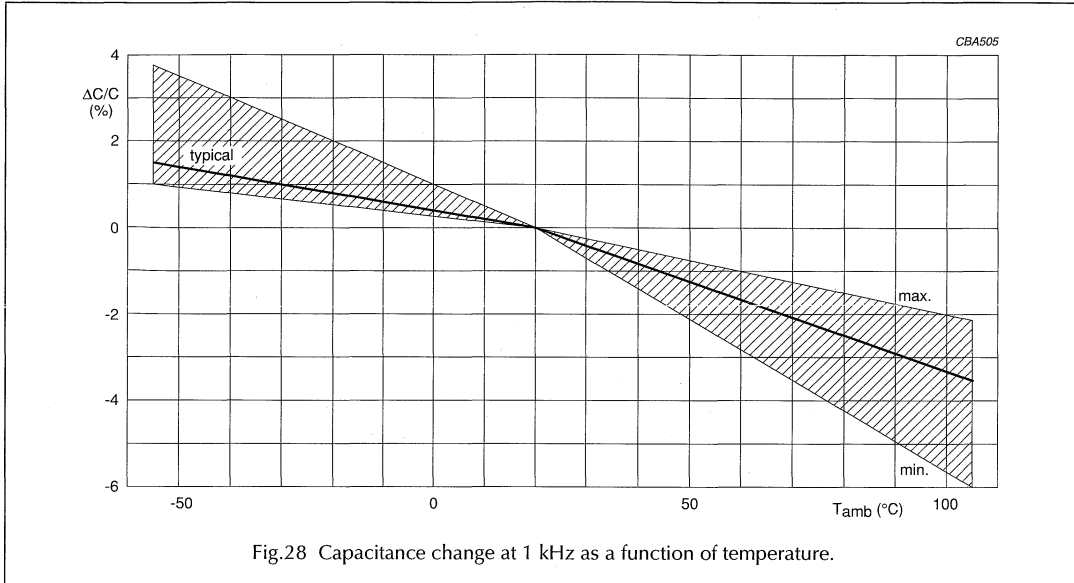
For reference testing, a conditioning period shall be applied over 96 ± 4 hours by heating the products in a circulating air oven at the rated temperature and a relative humidity not exceeding 20%.

AC and pulse metallized polypropylene film capacitors

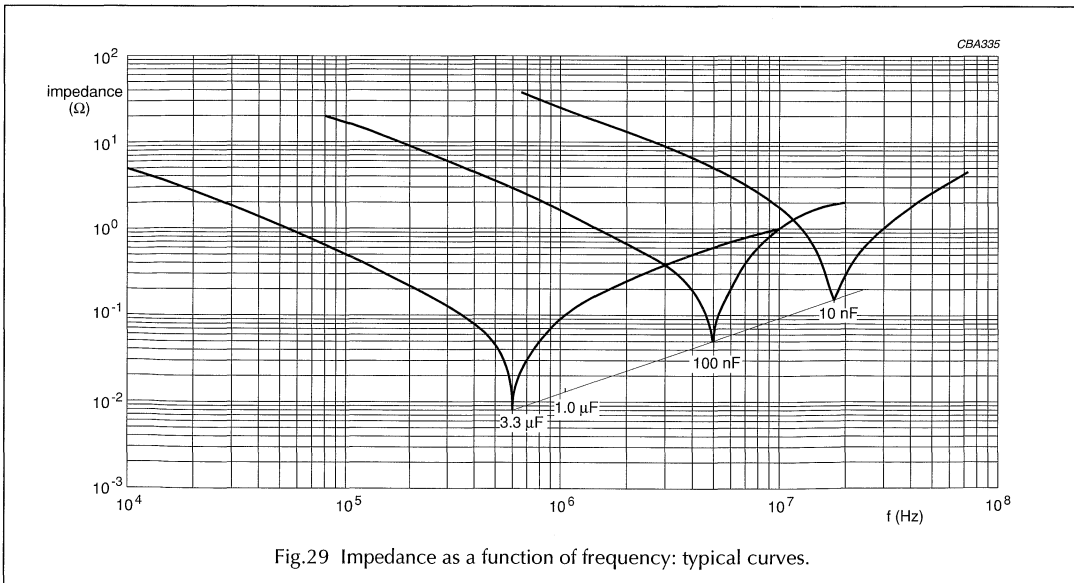
MKP 479

CHARACTERISTICS

Capacitance



Impedance



AC and pulse metallized polypropylene film capacitors

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Maximum DC and AC voltage as a function of temperature

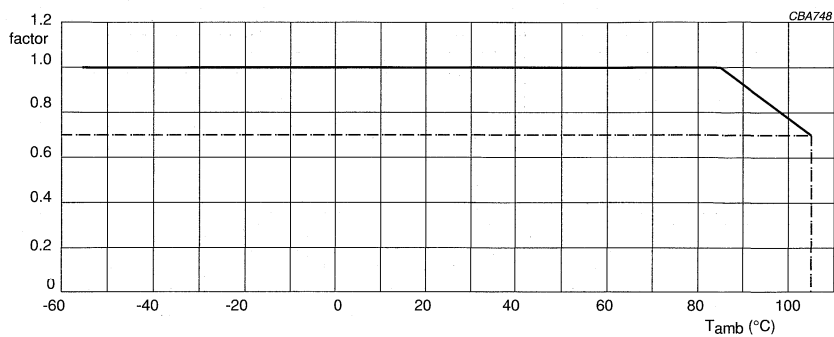
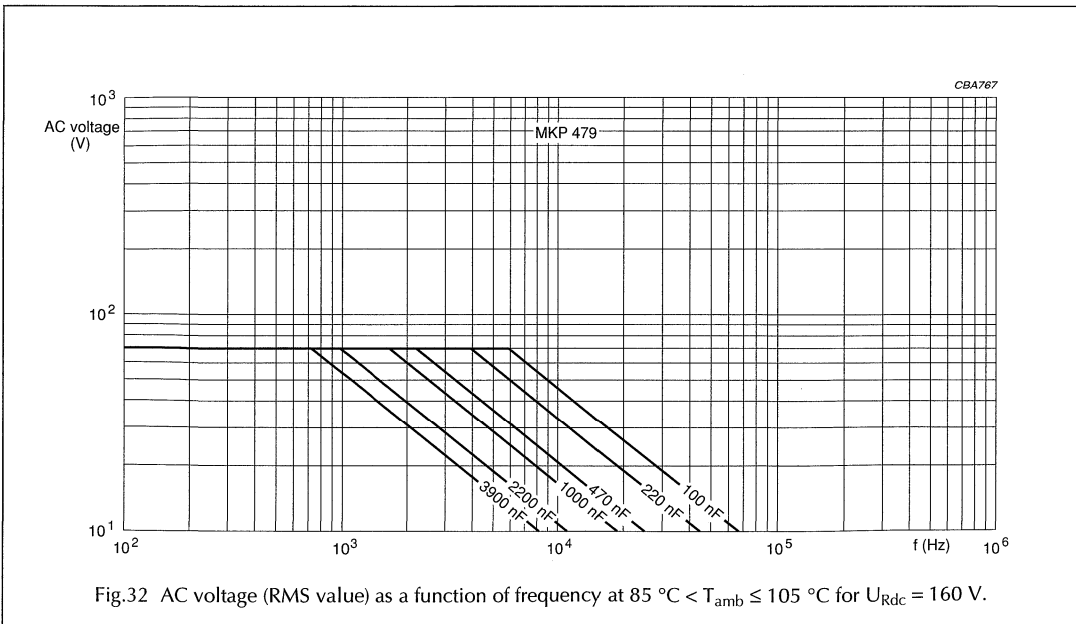
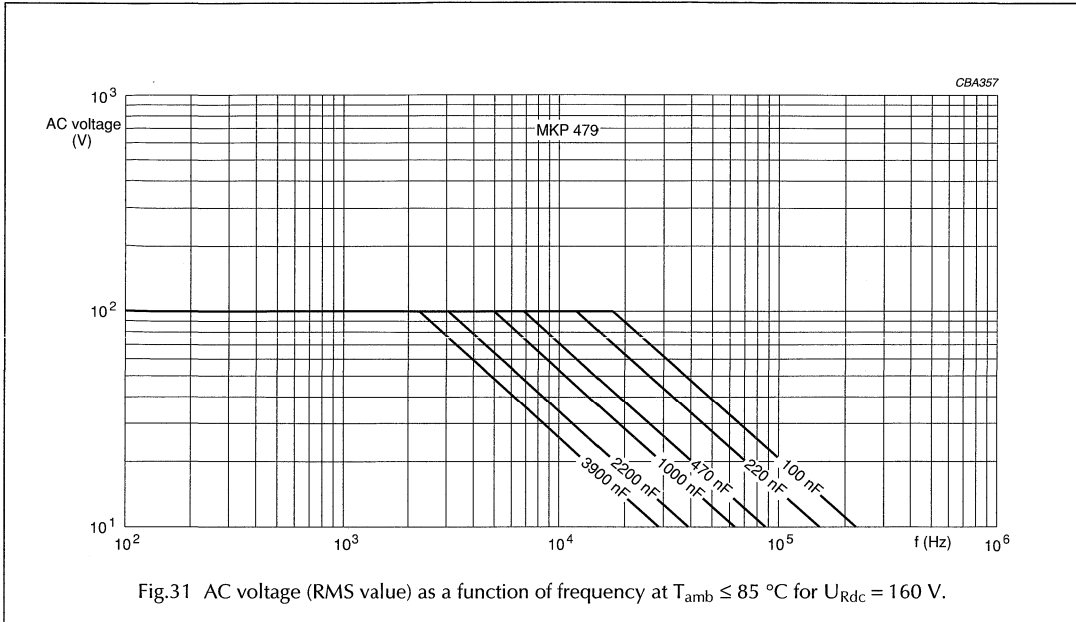


Fig.30 Multiplying factor for DC and AC voltage as a function of temperature.

AC and pulse metallized polypropylene film capacitors

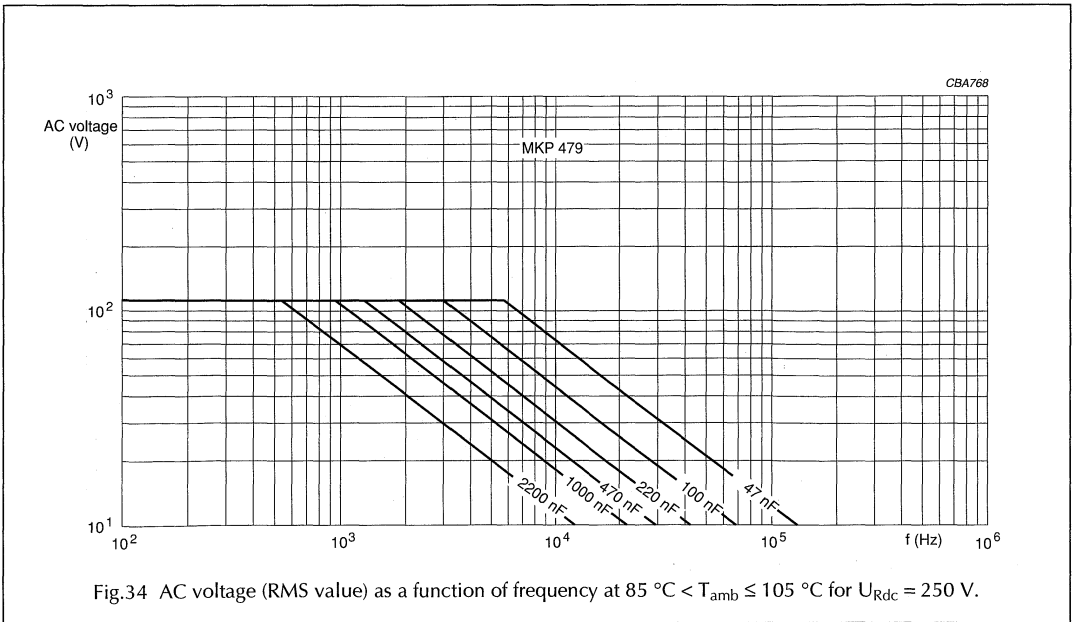
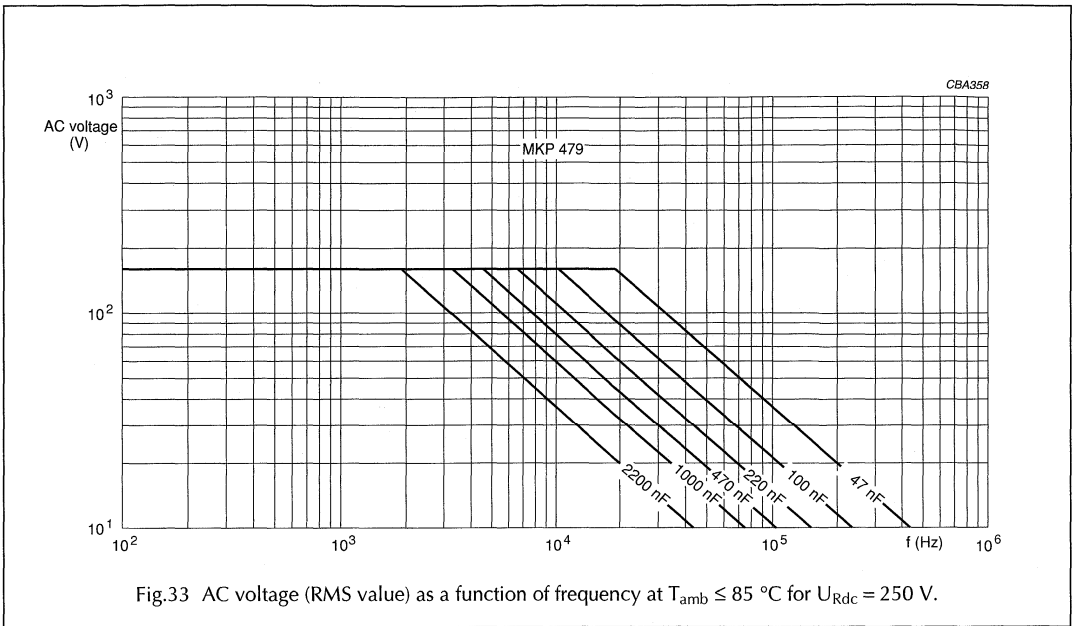
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Maximum RMS voltage (sinewave) as a function of frequency



**AC and pulse
metallized polypropylene film capacitors**

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AC and pulse metallized polypropylene film capacitors

MKP 479 monitor

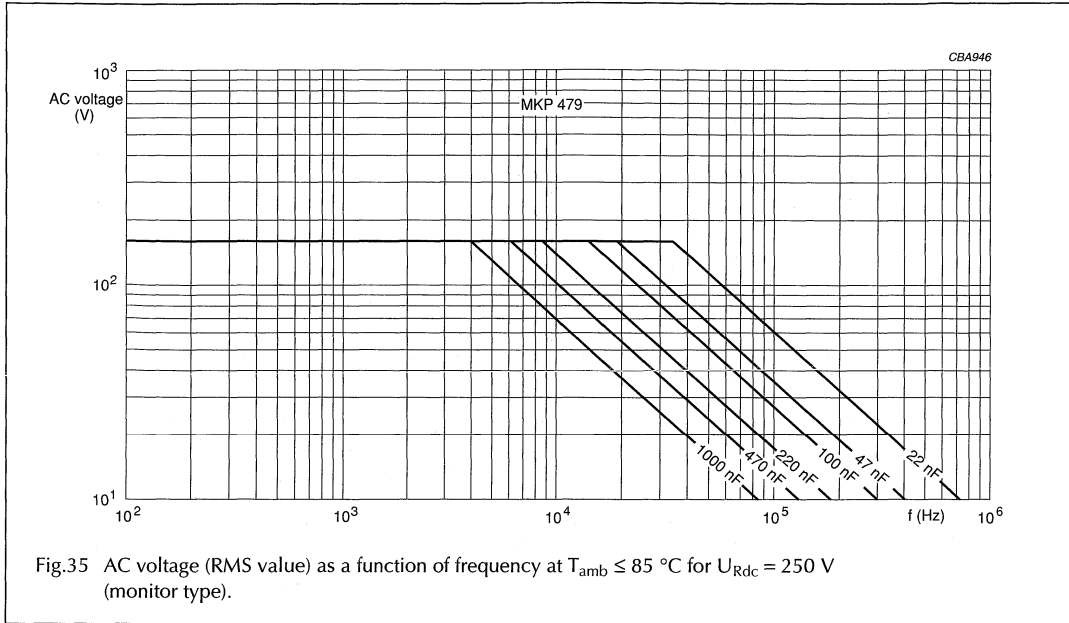


Fig.35 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85 \text{ }^\circ\text{C}$ for $U_{Rdc} = 250 \text{ V}$ (monitor type).

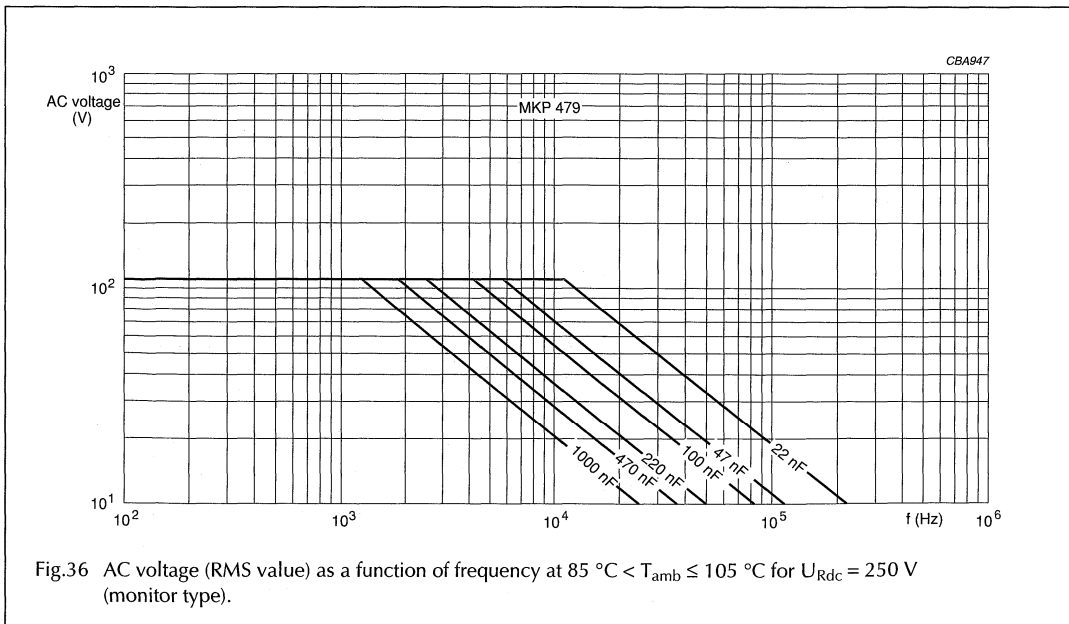
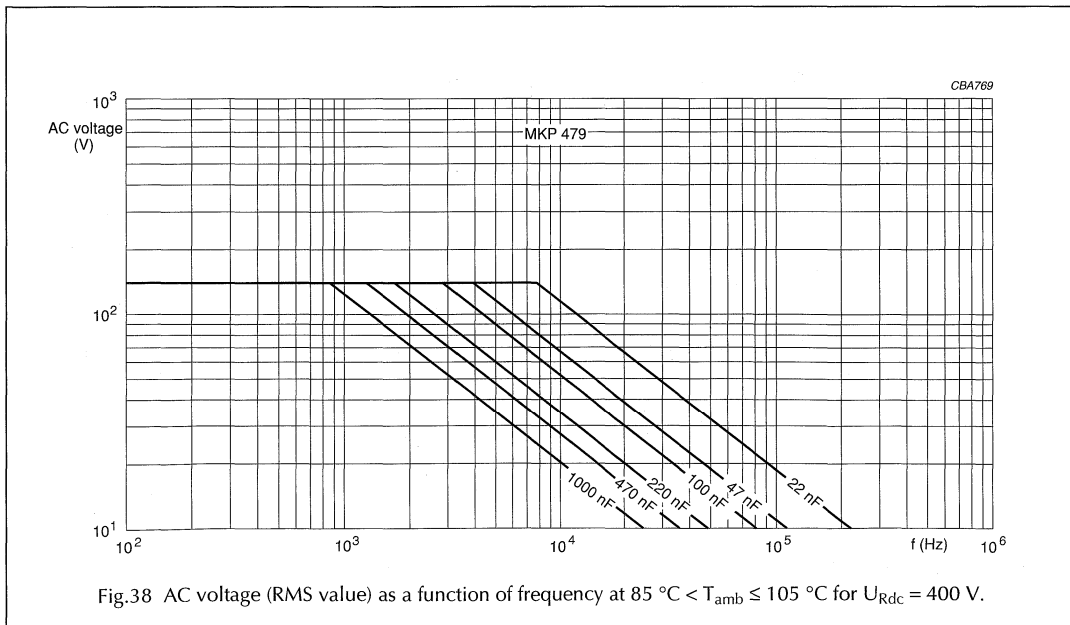
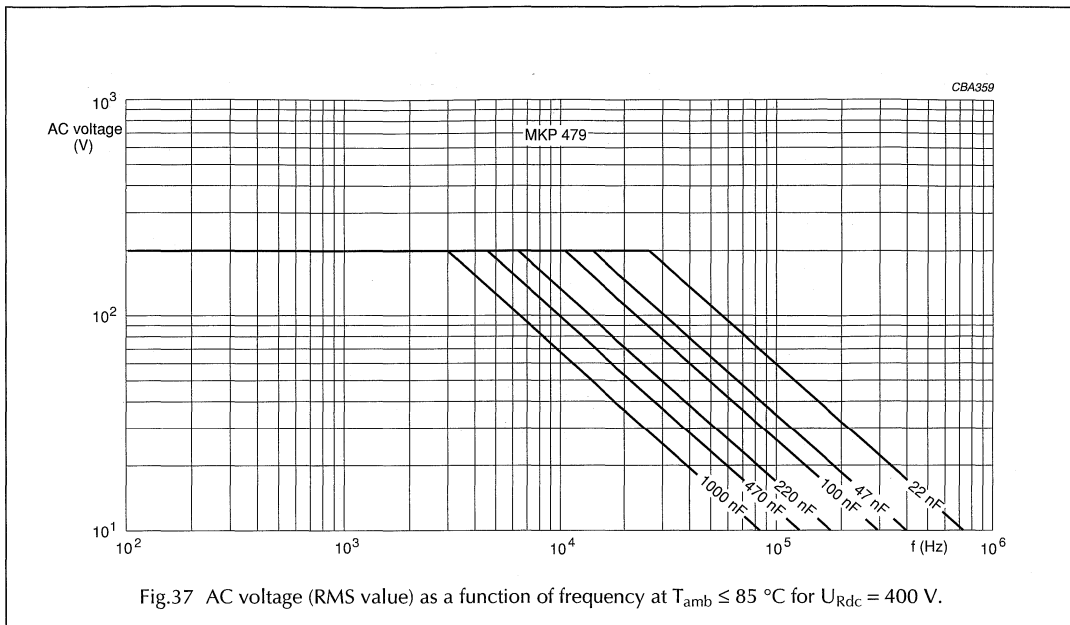


Fig.36 AC voltage (RMS value) as a function of frequency at $85 \text{ }^\circ\text{C} < T_{amb} \leq 105 \text{ }^\circ\text{C}$ for $U_{Rdc} = 250 \text{ V}$ (monitor type).

AC and pulse metallized polypropylene film capacitors

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AC and pulse metallized polypropylene film capacitors

MKP 479 monitor

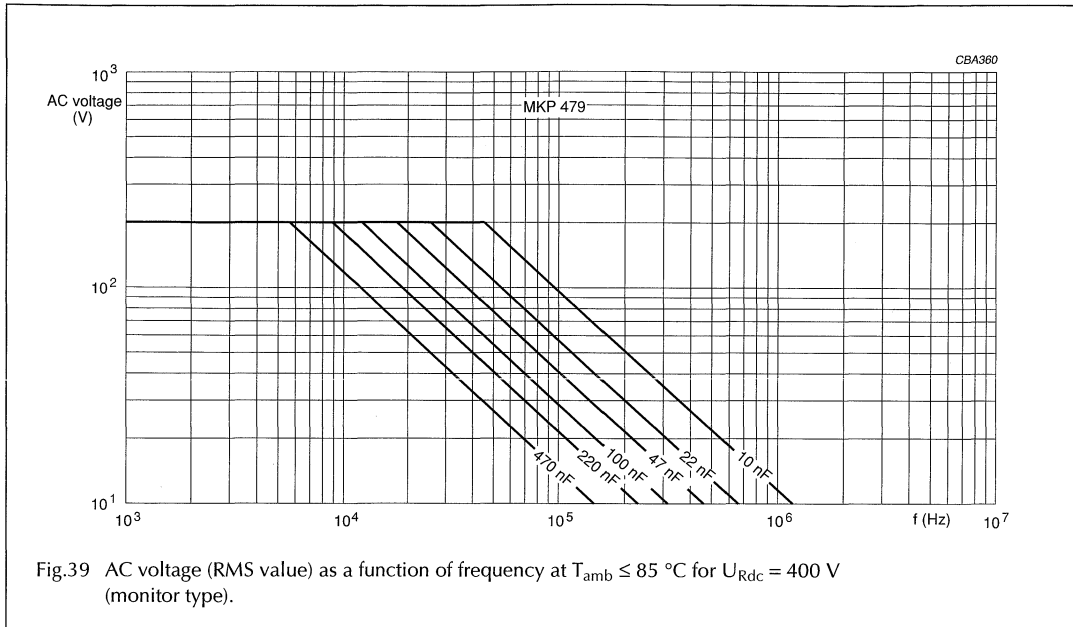


Fig.39 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85 \text{ }^\circ\text{C}$ for $U_{Rdc} = 400 \text{ V}$ (monitor type).

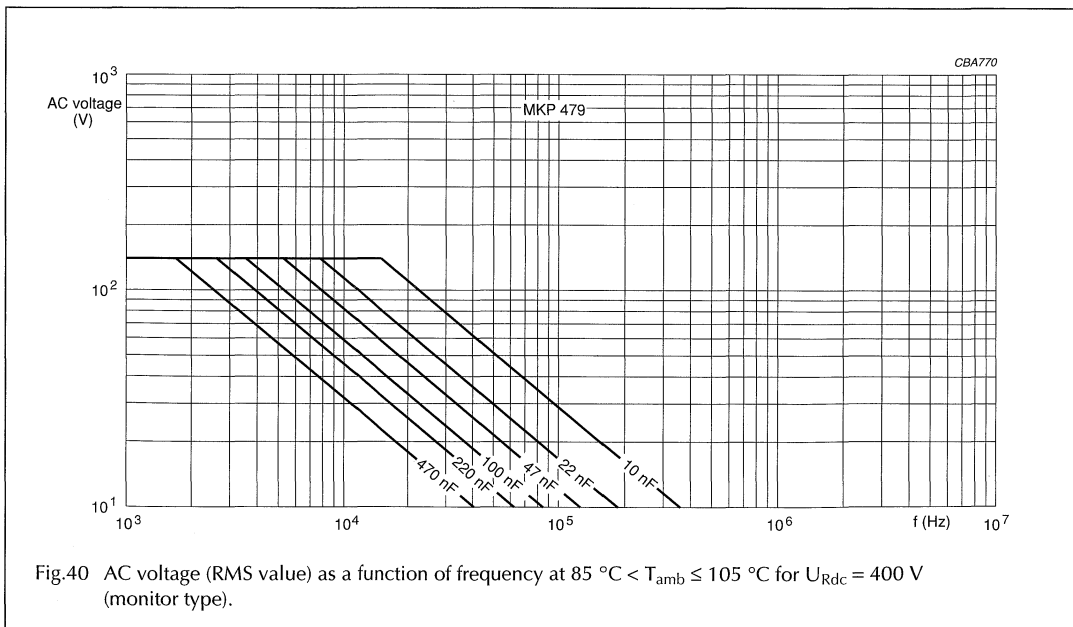
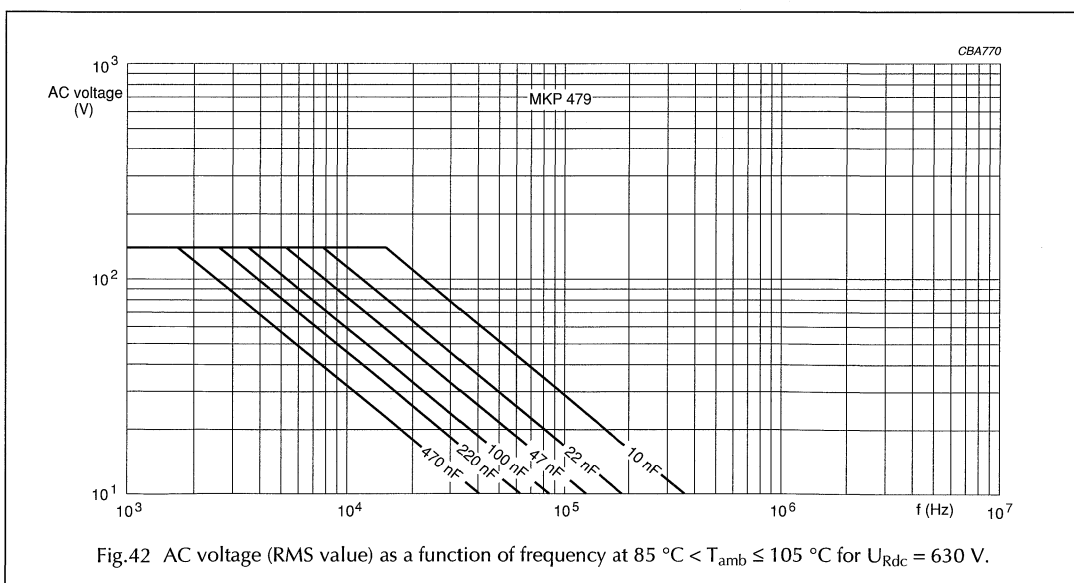
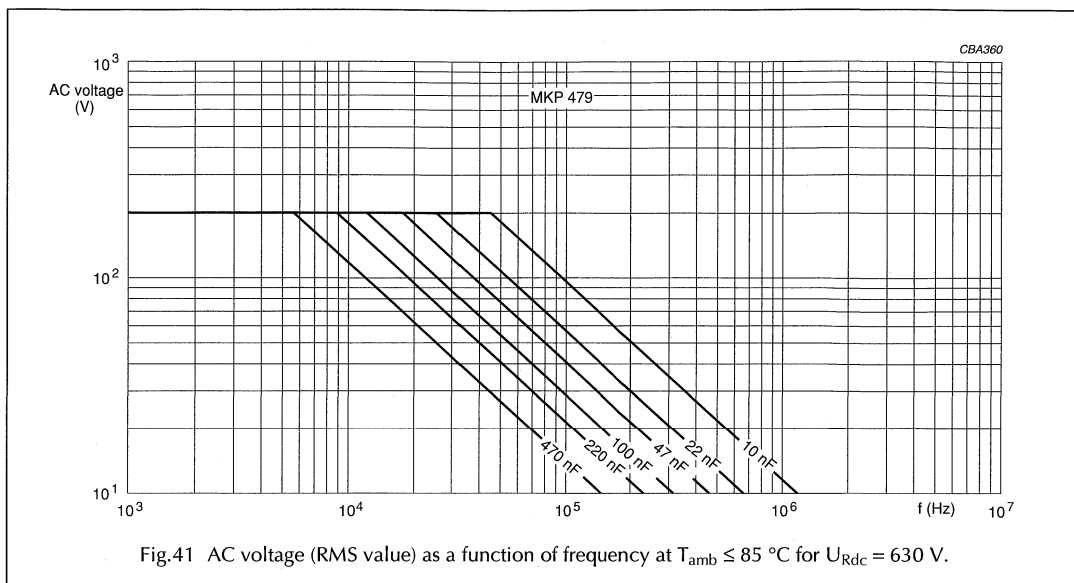


Fig.40 AC voltage (RMS value) as a function of frequency at $85 \text{ }^\circ\text{C} < T_{amb} \leq 105 \text{ }^\circ\text{C}$ for $U_{Rdc} = 400 \text{ V}$ (monitor type).

AC and pulse metallized polypropylene film capacitors

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Maximum RMS current (sinewave) as a function of frequency

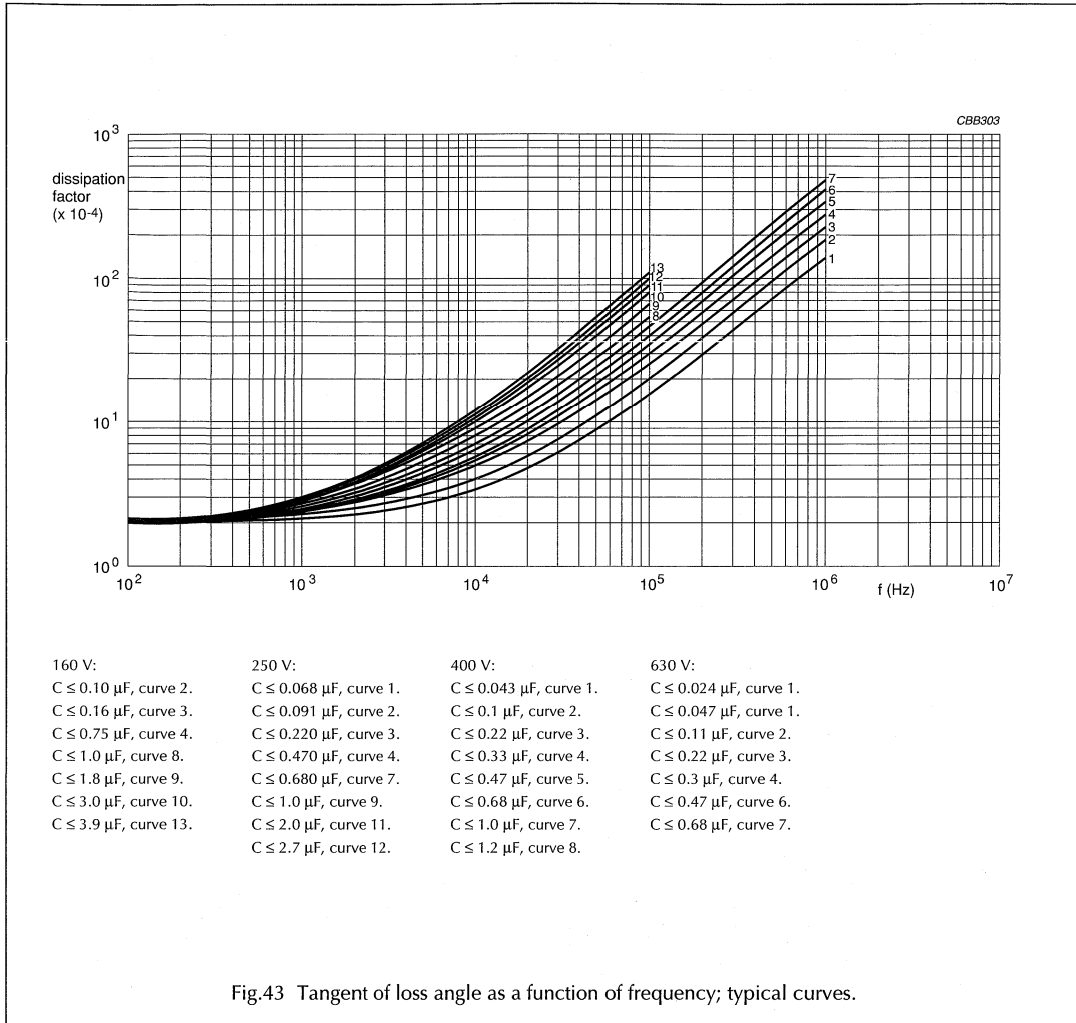
The maximum RMS current is defined by $I_{ac} = \omega \times C \times U_{ac}$.

U_{ac} is the maximum AC voltage depending on the ambient temperature in Figs 31 to 42.

AC and pulse metallized polypropylene film capacitors

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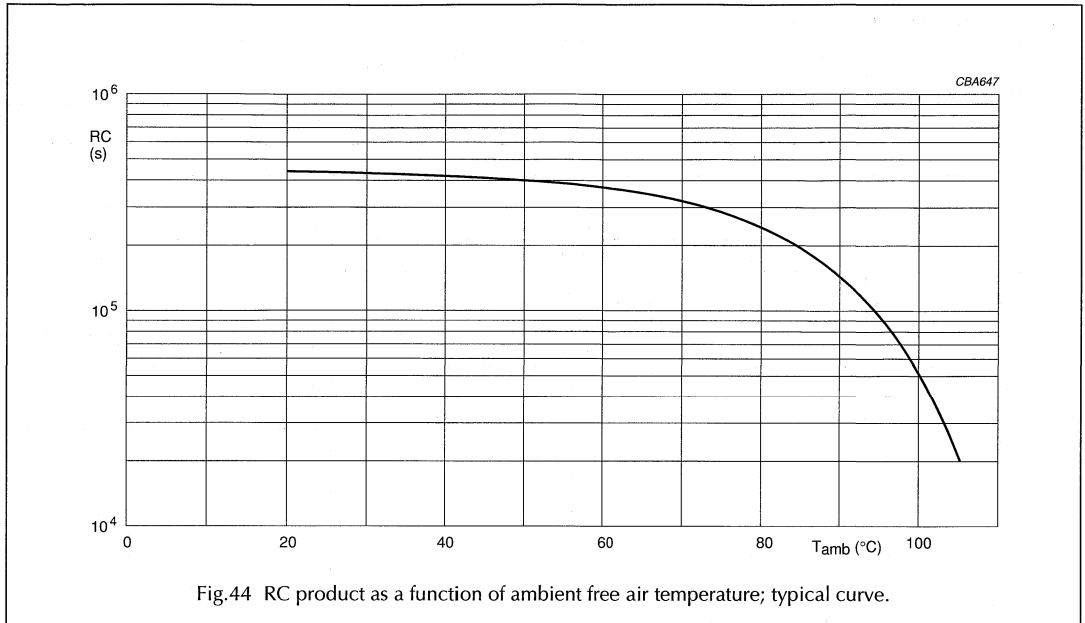
Tangent of loss angle



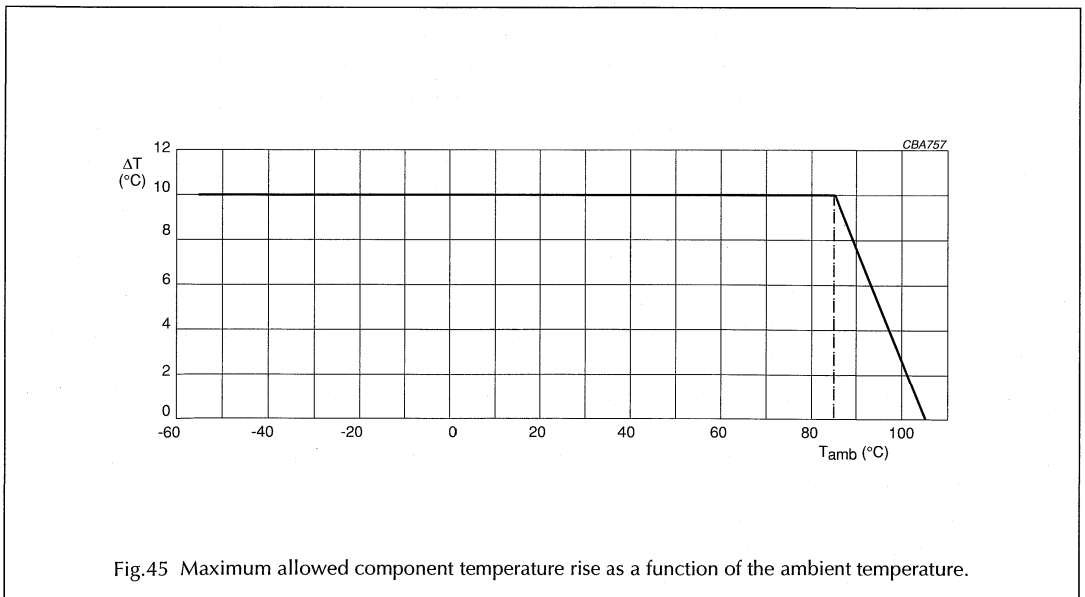
AC and pulse metallized polypropylene film capacitors

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Insulation resistance



Maximum allowed component temperature rise (ΔT) as a function of the ambient temperature (T_{amb})



AC and pulse metallized polypropylene film capacitors

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Heat conductivity (G) as a function of pitch and capacitor body thickness in mW/°C

Table 1 Heat conductivity

b_{\max} (mm)	ORIGINAL PITCH (mm)			
	10	15	22.5	27.5
4.0	4.0	5.0	–	–
4.5	4.5	6.0	–	–
5.0	5.0	6.0	12.0	13.0
5.5	6.0	6.5	13.0	15.0
6.0	6.0	6.5	13.0	15.0
6.5	6.5	8.0	15.0	17.0
7.0	–	8.0	15.0	17.0
7.5	–	9.0	17.0	18.0
8.0	–	9.0	17.0	20.0
8.5	–	11.0	18.0	20.0
9.0	–	11.0	18.0	22.0
9.5	–	12.0	20.0	22.0
10.0	–	12.0	20.0	23.0
10.5	–	–	22.0	25.0
11.0	–	–	–	25.0
11.5	–	–	–	27.0
12.0	–	–	–	27.0
12.5	–	–	–	30.0
13.0	–	–	–	30.0
13.5	–	–	–	30.0
14.0	–	–	–	30.0
14.5	–	–	–	33.0
15.0	–	–	–	33.0
15.5	–	–	–	37.0
16.0	–	–	–	37.0

Power dissipation and maximum component temperature rise

The power dissipation must be limited in order not to exceed the maximum allowed component temperature rise as a function of the free air ambient temperature.

The power dissipation can be calculated according chapter "Introduction", section "Maximum power dissipation" with the typical $\tan \delta$ of the curves in Fig.43.

The component temperature rise (ΔT) can be measured (see section "Measuring the component temperature" for more details) or calculated by $\Delta T = P/G$:

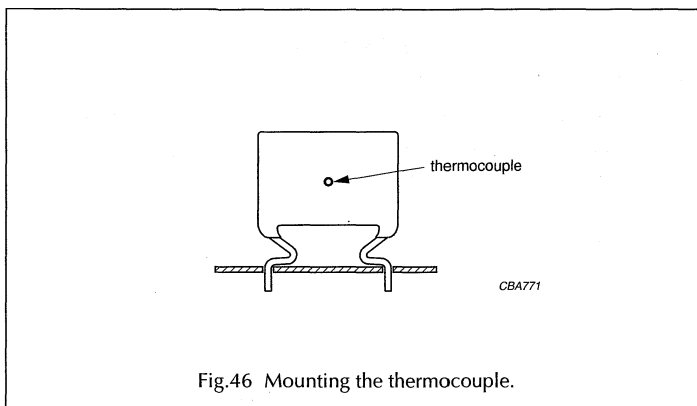
- ΔT = component temperature rise (°C).
- P = power dissipation of the component (mW).
- G = heat conductivity of the component (mW/°C).

AC and pulse metallized polypropylene film capacitors

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Measuring the component temperature

A thermocouple must be attached to the capacitor body; see Fig.46.



The temperature is measured in unloaded (T_{amb}) and maximum loaded condition (T_c).

The temperature rise is given by $\Delta T = T_c - T_{amb}$.

To avoid radiation or convection, the capacitor should be tested in a wind-free box.

AC and pulse metallized polypropylene film capacitors

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Application note and limiting conditions

These capacitors are not suitable for mains applications as across-the-line capacitors without additional protection, as described hereunder. These mains applications are strictly regulated in safety standards and therefore electromagnetic interference suppression capacitors conforming the standards must be used.

To select the capacitor for a certain application, the following 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 the maximum U_{p-p} to avoid the ionisation inception level.
3. The voltage pulse slope (dU/dt) shall not exceed the rated voltage pulse slope in an RC-circuit at rated voltage and without ringing. If the pulse voltage is lower than the rated DC voltage, the rated voltage pulse slope may be multiplied by U_{Rdc} and divided by the applied voltage.

For all other pulses following equation must be fulfilled:

$$2 \times \int_0^T \left(\frac{dU}{dt} \right)^2 \times dt < U_{Rdc} \times \left(\frac{dU}{dt} \right)_{rated}$$

T is the pulse duration.

The rated voltage pulse slope is valid for ambient temperatures up to 85 °C. For higher temperatures a derating factor of 3% per K shall be applied.

4. The maximum component surface temperature rise must be lower than the limits in Fig.45.
5. Since in circuits used at voltages over 280 V peak-to-peak the risk for an intrinsically active flammability after a capacitor breakdown (short circuit) increases, it is recommended that the power to the component is limited to 100 times the values mentioned in Table 1 "Heat conductivity".
6. When using these capacitors as across-the-line capacitor in the input filter for mains applications or as series connected with an impedance to the mains the applicant must guarantee that following conditions are fulfilled in any case (spikes and surge voltages from the mains included).

VOLTAGE CONDITIONS FOR 6 ABOVE

ALLOWED VOLTAGES	$T_{amb} \leq 85 \text{ } ^\circ\text{C}$	$85 \text{ } ^\circ\text{C} < T_{amb} \leq 105 \text{ } ^\circ\text{C}$
Maximum continuous RMS voltage	U_{Rac}	$0.7 \times U_{Rac}$
Maximum temporary RMS -overvoltage (<24 hours)	$1.25 \times U_{Rac}$	$0.875 \times U_{Rac}$
Maximum peak voltage (V_{o-p}) (<2 s)	$1.6 \times U_{Rdc}$	$1.1 \times U_{Rdc}$

AC and pulse metallized polypropylene film capacitors

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Example: 2222 479 42474

$C = 470 \text{ nF}$, 250 V used for S-correction:

This is a signal as in Fig.47 with:

$$U_{p-p} = 108 \text{ V}; U_p = 170 \text{ V}; T_1 = 12 \text{ } \mu\text{s}; T_2 = 64 \text{ } \mu\text{s}; I_{p-p} = 5 \text{ A}$$

The ambient temperature is $50 \text{ }^\circ\text{C}$.

Checking the conditions:

1. The peak voltage $U_p = 170 \text{ V}$ is lower than 250 V (DC) .
2. The peak-to-peak voltage 108 V is lower than $2 \times \sqrt{2} \times 160\text{V(AC)} = 450 U_{p-p}$.
3. $I_p = 2.5 \text{ A}$ is lower than $0.47 \text{ } \mu\text{F} \times 60 \text{ V}/\mu\text{s} = 28 \text{ A}$.
4. The dissipated power is about 40 mW as calculated with Fourier terms and $\text{tg}\delta$ maximum values.

This gives a temperature rise of $\frac{40 \text{ mW}}{12 \text{ mW}/^\circ\text{C}} = 3.3 \text{ }^\circ\text{C}$ which is which is permitted; see Fig.45.

5. Depends on actual application.
6. Not applicable.

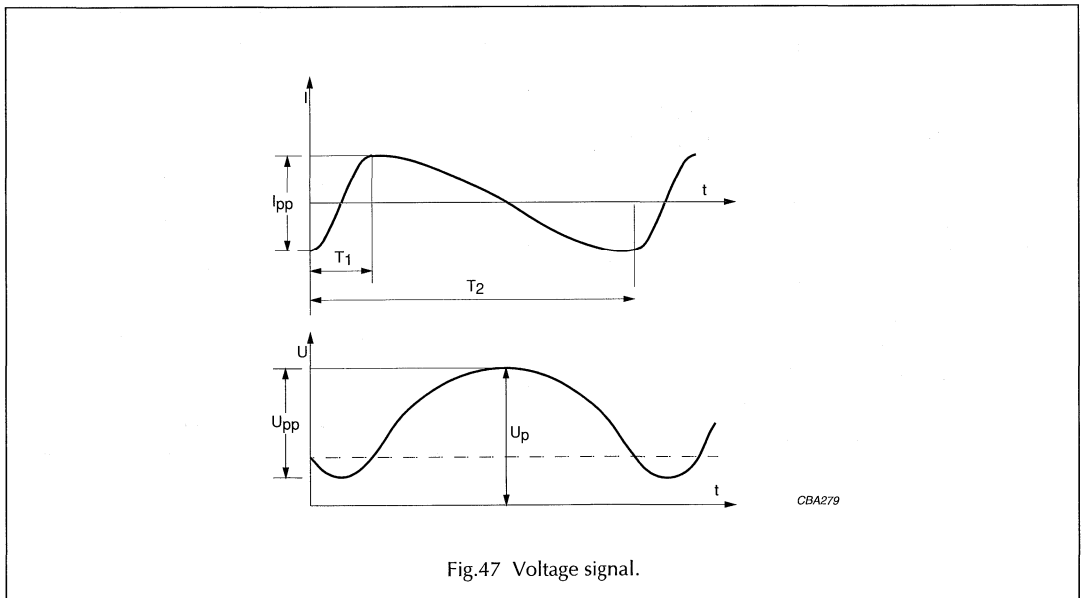


Fig.47 Voltage signal.

AC and pulse metallized polypropylene film capacitors

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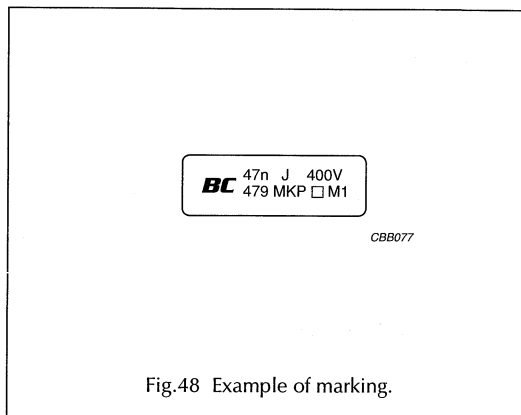
MARKING

Product marking

COUNTRY OF ORIGIN: BELGIUM (INK PRINT)

Capacitors are marked on top (see Fig.48) with the following information:

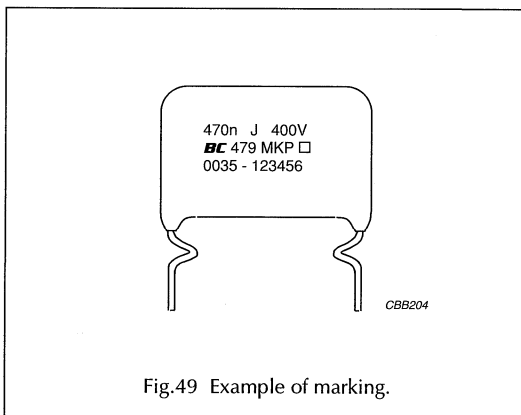
1. Manufacturer's logo (only for original pitches > 10 mm)
 2. Rated capacitance code in accordance with "IEC 60062"
 3. Tolerance on rated capacitance $J = \pm 5\%$
 4. Rated (DC) voltage (e.g. 400 V)
 5. Manufacturer's type designation with code for dielectric material (479 MKP)
- Code for monitor type: "□" if monitor types
6. Year and month of manufacture in code (e.g. K1) (see Section 1 "Letter codes for year and numbers for month of production" for more details).



COUNTRY OF ORIGIN: BELGIUM (LASER PRINTING ONLY FOR PITCH ≥ 15 MM)

Capacitors are marked on side for original pitches > 10 mm (see Fig.49) with the following information by laser printing:

1. Rated capacitance code in accordance with "IEC 60062"
 2. Tolerance on rated capacitance $J = \pm 5\%$
 3. Rated (DC) voltage (e.g. 400 V)
 4. Manufacturer's logo
 5. Manufacturer's type designation with code for dielectric material (479 MKP)
- Code for monitor type: "□" if monitor types
6. Year and week of manufacture code - batch code).



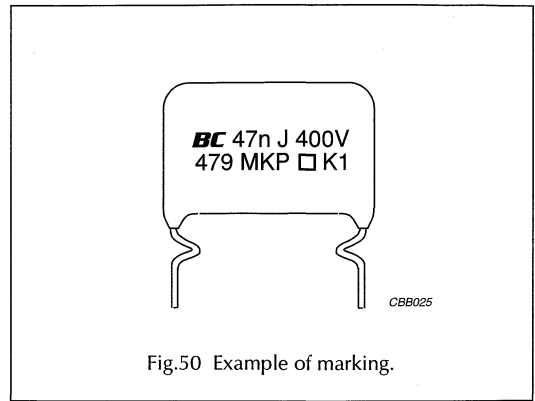
AC and pulse metallized polypropylene film capacitors

MKP 479

COUNTRY OF ORIGIN: PRC (PEOPLE'S REPUBLIC OF CHINA)

The capacitors are marked on the front (see Fig.50) with the following information:

1. Manufacturer's logo (BC)
2. Capacitance code in accordance with "IEC 60062"
3. Capacitance tolerance: J = $\pm 5\%$
4. Rated (DC) voltage (e.g. 400 V)
5. Manufacturer's type designation (479)
6. Code for dielectric material (MKP)
Code for monitor type: "□" if monitor types
7. Year and month of manufacture in code (e.g. K1)
(see Section 1 "Letter codes for year and numbers for month of production" for more details).



LETTER CODES FOR YEAR AND NUMBERS FOR MONTH OF PRODUCTION

YEAR	LETTER CODE	MONTH	CODE
1998	K	January	1
1999	L	February	2
2000	M	March	3
2001	N	April	4
2002	P	May	5
2003	R	June	6
2004	S	July	7
2005	T	August	8
2006	U	September	9
2007	V	October	O
2008	W	November	N
2009	X	December	D

AC and pulse metallized polypropylene film capacitors

MKP 479

QUICK REFERENCE TEST REQUIREMENTS

TEST	PROCEDURE (quick reference)	REQUIREMENTS
Robustness of leads		
Tensile: "IEC 60068-2-21"	load 10 N; 10 s	no visible damage legible marking
Bending: "IEC 60068-2-21"	load 5 N; $4 \times 90^\circ$	$ \Delta C/C \leq 1\%$ for 250 to 630 V: pitch = 22.5 or 27.5 mm
Resistance to soldering heat: "IEC 60068-2-20"	solder bath: 260 °C; 10 s	$ \Delta C/C \leq 2\%$ for 160 V: all pitches;
Component solvent resistance	isopropyl alcohol; 23 °C; 5 minutes	for 250 V to 630 V: original pitch = 10 and 15 mm $\Delta \tan \delta \leq 5 \times 10^{-4}$ ($C \leq 100$ nF) $\Delta \tan \delta \leq 10 \times 10^{-4}$ (100 nF < $C \leq 470$ nF) $\Delta \tan \delta \leq 15 \times 10^{-4}$ ($C > 470$ nF)
Robustness of component		
Vibration: "IEC 60068-2-6"	10 Hz to 55 kHz; amplitude 0.75 mm or acceleration 98 m/s ² ; 6 hours	$ \Delta C/C \leq 1\%$ for 250 to 630 V: pitch = 22.5 or 27.5 mm $ \Delta C/C \leq 2\%$
Shock: "IEC 60068-2-27"	half sinewave; 490 m/s ² ; 11 ms	for 160 V: all pitches; for 250 V to 630 V: original pitch = 10 and 15 mm $\Delta \tan \delta \leq 5 \times 10^{-4}$ ($C \leq 100$ nF) $\Delta \tan \delta \leq 10 \times 10^{-4}$ (100 nF < $C \leq 470$ nF) $\Delta \tan \delta \leq 15 \times 10^{-4}$ ($C > 470$ nF)
Climatic sequence		
Dry heat: "IEC 60068-2-2"	16 hours; 105 °C	$ \Delta C/C \leq 1\%$ for 250 to 630 V: pitch = 22.5 or 27.5 mm
Damp heat, cyclic, test Db, first cycle: "IEC 60068-2-30"		$ \Delta C/C \leq 3\%$ for 160 V: all pitches; for 250 V to 630 V: original pitch = 10 and 15 mm
Cold: "IEC 60068-2-1"	2 hours; -55 °C	$\Delta \tan \delta \leq 5 \times 10^{-4}$ ($C \leq 100$ nF)
Damp heat, cyclic, test Db, remaining cycles: "IEC 60068-2-30"		$\Delta \tan \delta \leq 10 \times 10^{-4}$ (100 nF < $C \leq 470$ nF) $\Delta \tan \delta \leq 15 \times 10^{-4}$ ($C > 470$ nF) $R_{ins} \geq 50\%$ of specified value
Other applicable tests		
Damp heat, steady state: "IEC 60068-2-3"	56 days; 40 °C; 90 to 95% RH	$ \Delta C/C \leq 1\%$ for 250 to 630 V: pitch = 22.5 or 27.5 mm $ \Delta C/C \leq 3\%$ for 160 V: all pitches; for 250 V to 630 V: original pitch = 10 and 15 mm $\Delta \tan \delta \leq 5 \times 10^{-4}$ $R_{ins} \geq 50\%$ of specified value

AC and pulse metallized polypropylene film capacitors

MKP 479

TEST	PROCEDURE (quick reference)	REQUIREMENTS
Endurance (AC): "IEC 60384-17"	2 000 hours; 85 °C $1.25 \times U_{Rac}$ (RMS); 50 Hz 2 000 hours; 105 °C $0.875 \times U_{Rac}$ (RMS); 50 Hz	$ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 5 \times 10^{-4}$ ($C \leq 100$ nF) $\Delta \tan \delta \leq 10 \times 10^{-4}$ (100 nF < $C \leq 470$ nF) $\Delta \tan \delta \leq 15 \times 10^{-4}$ ($C > 470$ nF) $R_{ins} \geq 50\%$ of specified value
Heat storage: "IEC 60384-17"	2 000 hours; 105 °C	$ \Delta C/C \leq 1\%$ for 250 to 630 V: pitch = 22.5 or 27.5 mm $ \Delta C/C \leq 3\%$ for 160 V: all pitches; for 250 V to 630 V: original pitch = 10 and 15 mm $\Delta \tan \delta \leq 5 \times 10^{-4}$ ($C \leq 100$ nF) $\Delta \tan \delta \leq 10 \times 10^{-4}$ (100 nF < $C \leq 470$ nF) $\Delta \tan \delta \leq 15 \times 10^{-4}$ ($C > 470$ nF)
Resistance to soldering heat with preheating: "IEC 60384-17"	body temperature: 105 °C bath temperature: 260 °C dwell time: 10 s	$ \Delta C/C \leq 1\%$ for 250 to 630 V: pitch = 22.5 or 27.5 mm $ \Delta C/C \leq 2\%$ for 160 V: all pitches; for 250 V to 630 V: original pitch = 10 and 15 mm $\Delta \tan \delta \leq 5 \times 10^{-4}$ ($C \leq 100$ nF) $\Delta \tan \delta \leq 10 \times 10^{-4}$ (100 nF < $C \leq 470$ nF) $\Delta \tan \delta \leq 15 \times 10^{-4}$ ($C > 470$ nF)
Passive flammability: "IEC 60384-1"	class C	no burning
Endurance (DC): "IEC 60384-17"	2 000 hours: $1.25 \times U_{Rdc}$; 85 °C $0.875 \times U_{Rdc}$; 105 °C	$ \Delta C/C \leq 1\%$ for 250 to 630 V: pitch = 22.5 or 27.5 mm $ \Delta C/C \leq 3\%$ for 160 V: all pitches; for 250 V to 630 V: original pitch = 10 and 15 mm $\Delta \tan \delta \leq 5 \times 10^{-4}$ ($C \leq 100$ nF) $\Delta \tan \delta \leq 10 \times 10^{-4}$ (100 nF < $C \leq 470$ nF) $\Delta \tan \delta \leq 15 \times 10^{-4}$ ($C > 470$ nF) $R_{ins} \geq 50\%$ of specified value

AC and pulse double metallized polypropylene film capacitors

MMKP 383

MMKP RADIAL POTTED TYPE

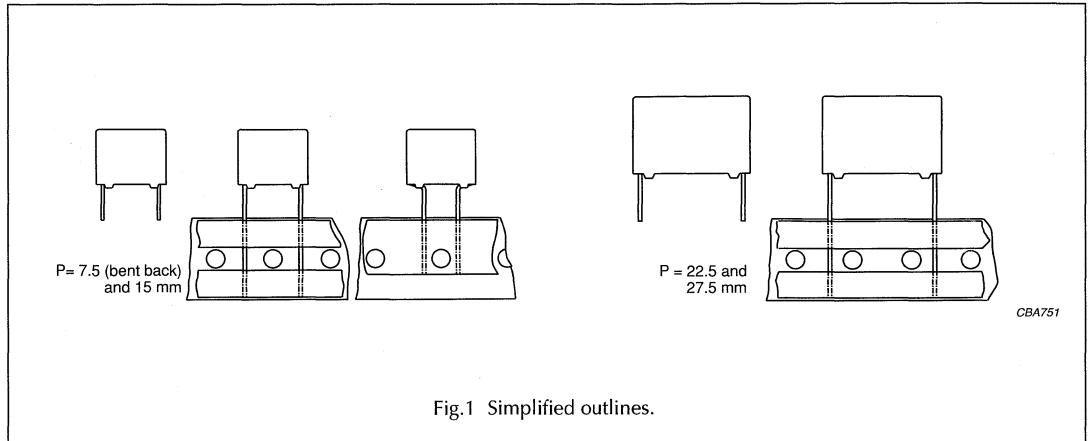
 PITCH 15/22.5/27.5 mm
 PITCH 7.5 mm (bent back leads)


Fig.1 Simplified outlines.

FEATURES

- 7.5 mm bent back pitch
- 15 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

- Electronic lighting e.g. Ballast
- Motor control circuits
- S - correction
- Where steep pulses occur e.g. SMPS (switch mode power supplies)
- For flyback applications please use 1 400 V series
- For hot asphalt encapsulation process.

DETAIL SPECIFICATION

For more detailed data and test requirements see "Type detail specification HQN-384-17/106".

QUICK REFERENCE DATA

DESCRIPTION	VALUE
Capacitance range (E24 series)	0.001 to 2.7 μ F
Capacitance tolerance	\pm 5%
Rated (DC) voltage	250 V; 400 V; 630 V; 1 000 V; 1 400 V; 1 600 V; 2 000 V; 2 500 V
Rated (AC) voltage	125 V; 200 V; 220 V; 350 V; 500 V; 550 V; 700 V; 900 V
Rated peak-to-peak voltage	350 V; 560 V; 630 V; 1 000 V; 1 400 V; 1 600 V; 2 000 V; 2 500 V
Climatic category	55/105/56
Rated temperature (DC)	85 °C
Rated temperature (AC)	105 °C
Maximum application temperature	105 °C
Reference specification	IEC 60384-17
Performance grade	grade 1 (long life)
Stability grade	grade 2
Materials	qualified in accordance with UL94 V-0

AC and pulse double metallized polypropylene film capacitors

MMKP 383

COMPOSITION OF CATALOGUE NUMBER

TYPE AND PITCHES	
383	15.0/7.5 mm
	15.0 mm
	22.5 mm
	27.5 mm

MULTIPLIER (nF)	
0.1	2
1	3
10	4
100	5

CAPACITANCE
(numerically)

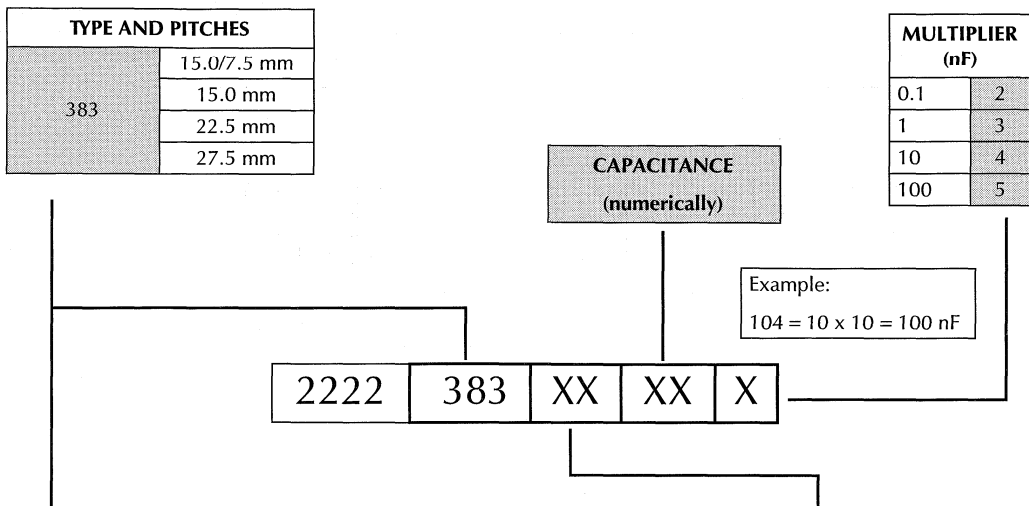
Example:
104 = 10 x 10 = 100 nF

2222 383 XX XX X

TYPE	PACKAGING	LEAD CONFIGURATION	PREFERRED TYPES				
			C-TOL	250 V	400 V	630 V	1000 V
383	loose in box	lead length 3.5 mm	±5%	00	10	20	30
	taped on reel	bent back leads reel diameter 500 mm	±5%	03	13	23	33
			ON REQUEST				
383	loose in box	lead length 5.0 mm	±5%	01	11	21	31
		lead length 25.0 mm	±5%	04	14	24	34
	taped on reel		±5%	02	12	22	32
	taped on reel	bent back leads reel diameter 356 mm for hot asphalt encapsulation	±5%	-	-	-	-

AC and pulse double metallized polypropylene film capacitors

MMKP 383



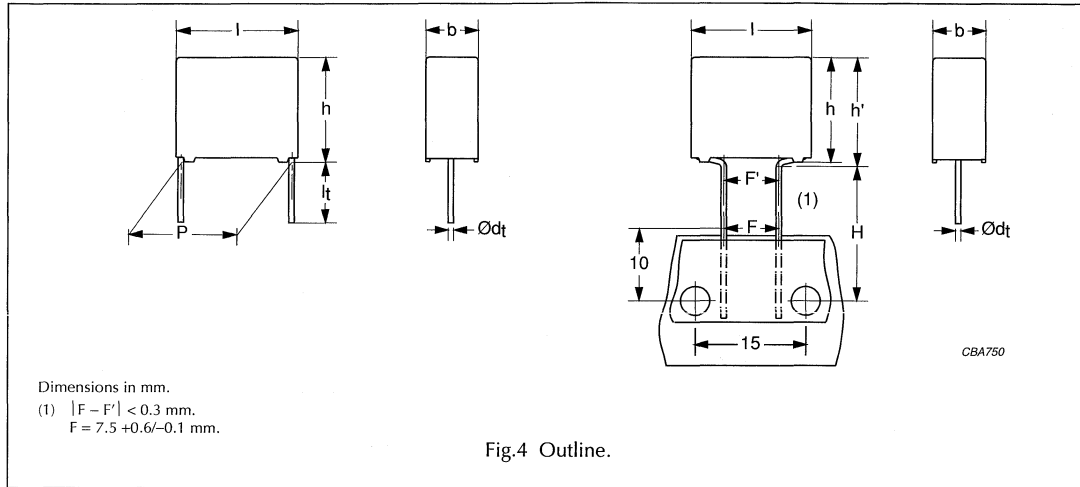
TYPE	PACKAGING	LEAD CONFIGURATION	PREFERRED TYPES				
			C-TOL	1 400 V	1 600 V	2 000 V	2 500 V
383	loose in box	lead length 3.5 mm	±5%	40	50	60	70
	taped on reel	bent back leads reel diameter 500 mm	±5%	43	53	63	—
			ON REQUEST				
383	loose in box	lead length 5.0 mm	±5%	41	51	61	71
		lead length 25.0 mm	±5%	44	54	64	74
	taped on reel		±5%	42	52	62	72
	taped on reel	bent back leads reel diameter 356 mm for hot asphalt encapsulation	±5%	46	56	66	—

AC and pulse double metallized polypropylene film capacitors

MMKP 383

MMKP 383 GENERAL DATA

PITCH 15 mm
PITCH 7.5 mm (bent back leads)



Specific reference data for the 250 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: $C \leq 0.15 \mu\text{F}$ $0.15 \mu\text{F} < C \leq 0.39 \mu\text{F}$	$\leq 5 \times 10^{-4}$ $\leq 5 \times 10^{-4}$	$\leq 20 \times 10^{-4}$ $\leq 25 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 250 V (DC): $C \leq 0.15 \mu\text{F}$ $0.15 \mu\text{F} < C \leq 0.39 \mu\text{F}$	450 V/ μs 900 V/ μs	
R between leads, for $C \leq 1 \mu\text{F}$ at 100 V; 1 minute	$>100000 \text{ M}\Omega$	
R between leads and case; 100 V; 1 minute	$>30000 \text{ M}\Omega$	
Ionization (AC) voltage (typical value) at 50 pC peak discharge	$>220 \text{ V}$	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	400 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 250 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 3.5 \pm 0.3 \text{ mm}$	$\pm 5\%$	2222 383 00...	preferred
	$l_t = 5.0 \pm 1.0 \text{ mm}$	$\pm 5\%$	2222 383 01...	on request
	$l_t = 25.0 \pm 2.0 \text{ mm}$	$\pm 5\%$	2222 383 04...	on request
Taped on reel	$H = 18.5 \text{ mm}; P_0 = 12.7 \text{ mm}$	$\pm 5\%$	2222 383 02...	on request
Taped on reel (bent back)	$H = 16.0 \text{ mm}; P_0 = 15.0 \text{ mm}$	$\pm 5\%$	2222 383 03...	preferred

AC and pulse double metallized polypropylene film capacitors

MMKP 383

 $U_{Rdc} = 250 \text{ V}; U_{Rac} = 125 \text{ V}; U_{p-p} = 350 \text{ V}$

C (μF)	DIMENSIONS ⁽¹⁾ $b \times h (h') \times l$ (mm)	MASS (g)	CATALOGUE NUMBER	
			LOOSE IN BOX	REEL DIAMETER = 500 mm
			$l_t = 3.5 \pm 0.3 \text{ mm}$	$H = 16.0 \text{ mm}; P_0 = 15.0 \text{ mm}$
			C-tol = $\pm 5\%$	C-tol = $\pm 5\%$
			catalogue number	last 5 digits
Pitch = $15.0 \pm 0.4 \text{ mm}; d_t = 0.80 \pm 0.08 \text{ mm}$			pitch = 7.5 mm (bent back)	
0.082	$5.0 \times 11.0 (13.0) \times 17.5$	1.2	2222 383 00823	.. 03823
0.091			2222 383 00913	.. 03913
0.1			2222 383 00104	.. 03104
0.11	$6.0 \times 12.0 (14.0) \times 17.5$	1.5	2222 383 00114	.. 03114
0.12			2222 383 00124	.. 03124
0.13			2222 383 00134	.. 03134
0.15			2222 383 00154	.. 03154
0.16	$7.0 \times 13.5 (15.5) \times 17.5$	2.0	2222 383 00164	.. 03164
0.18			2222 383 00184	.. 03184
0.2			2222 383 00204	.. 03204
0.22	$8.5 \times 15.0 (17.0) \times 17.5$	2.7	2222 383 00224	.. 03224
0.24			2222 383 00244	.. 03244
0.27			2222 383 00274	.. 03274
0.3			2222 383 00304	.. 03304
0.33	$10.0 \times 16.5 (18.5) \times 17.5$	3.3	2222 383 00334	.. 03334
0.36			2222 383 00364	.. 03364
0.39			2222 383 00394	.. 03394

Note

- Dimensions in brackets for bent back leads.

AC and pulse double metallized polypropylene film capacitors

MMKP 383

MMKP 383 GENERAL DATA

PITCH 22.5/27.5 mm

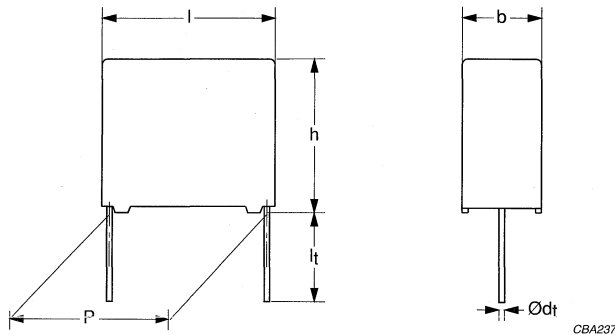


Fig.5 Outline.

Specific reference data for the 250 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
0.39 $\mu\text{F} < C \leq 0.56 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 45 \times 10^{-4}$
0.56 $\mu\text{F} < C \leq 0.82 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 50 \times 10^{-4}$
0.82 $\mu\text{F} < C \leq 1.2 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 65 \times 10^{-4}$
1.2 $\mu\text{F} < C \leq 1.8 \mu\text{F}$	$\leq 15 \times 10^{-4}$	$\leq 75 \times 10^{-4}$
1.8 $\mu\text{F} < C \leq 2.2 \mu\text{F}$	$\leq 15 \times 10^{-4}$	$\leq 85 \times 10^{-4}$
2.2 $\mu\text{F} < C \leq 2.7 \mu\text{F}$	$\leq 15 \times 10^{-4}$	$\leq 95 \times 10^{-4}$
Rated voltage pulse slope (dU/dt) _R at 250 V (DC):		
P = 22.5 mm		290 V/ μs
P = 27.5 mm, for 0.82 $\mu\text{F} < C \leq 2 \mu\text{F}$		190 V/ μs
P = 27.5 mm, for 2 $\mu\text{F} < C \leq 2.7 \mu\text{F}$		130 V/ μs
R between leads, for C $\leq 1 \mu\text{F}$ at 100 V; 1 minute	>100000 M Ω	
RC between leads, for C >1 μF at 100 V; 1 minute	>100000 s	
R between leads and case; 100 V; 1 minute	>30000 M Ω	
Ionization (AC) voltage (typical value) at 50 pC peak discharge	>220 V	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	400 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 250 V DC versions

PACKAGING ⁽¹⁾	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 3.5 \pm 0.3 \text{ mm}$	$\pm 5\%$	2222 383 00...	preferred
	$l_t = 5.0 \pm 1.0 \text{ mm}$	$\pm 5\%$	2222 383 01...	on request
	$l_t = 25.0 \pm 2.0 \text{ mm}$	$\pm 5\%$	2222 383 04...	on request
Taped on reel	H = 18.5 mm; P ₀ = 12.7 mm	$\pm 5\%$	2222 383 02...	on request

Note

1. Taped on reel pitch = 27.5 mm is not available.

AC and pulse double metallized polypropylene film capacitors

MMKP 383

$U_{Rdc} = 250 \text{ V}$; $U_{Rac} = 125 \text{ V}$; $U_{p-p} = 350 \text{ V}$

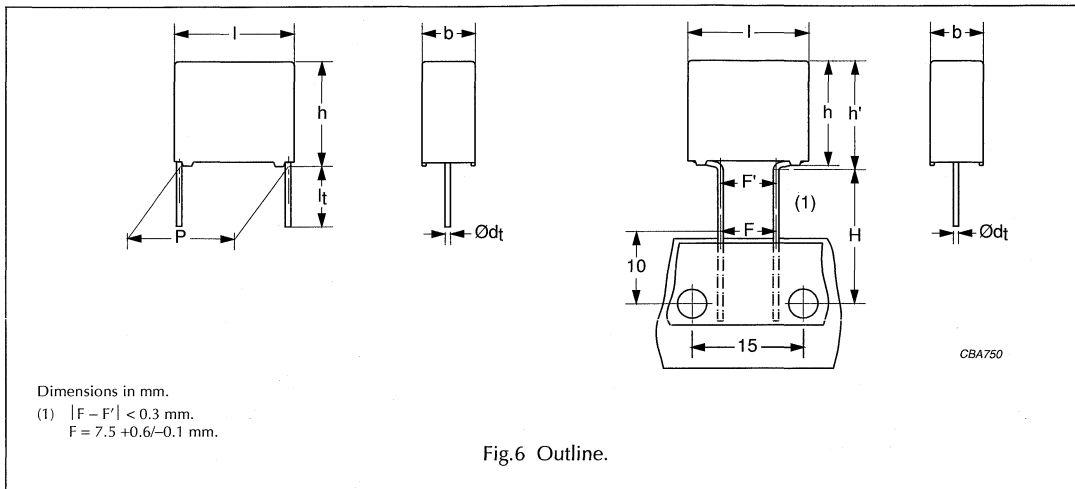
C (μF)	DIMENSIONS $b \times h \times l$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_1 = 3.5 \pm 0.3 \text{ mm}$
			C-tol = $\pm 5\%$
Pitch = $22.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.43	$7.0 \times 16.5 \times 26.0$	3.5	2222 383 00434
0.47	$8.5 \times 18.0 \times 26.0$	4.8	2222 383 00474
0.51			2222 383 00514
0.56			2222 383 00564
0.62			2222 383 00624
0.68			$10.0 \times 19.5 \times 26.0$
0.75	2222 383 00754		
0.82	2222 383 00824		
Pitch = $27.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.91	$11.0 \times 21.0 \times 31.0$	8.4	2222 383 00914
1.0			2222 383 00105
1.1			2222 383 00115
1.2			2222 383 00125
1.3	$13.0 \times 23.0 \times 31.0$	11.0	2222 383 00135
1.5			2222 383 00155
1.6			2222 383 00165
1.8	$15.0 \times 25.0 \times 31.0$	13.6	2222 383 00185
2.0			2222 383 00205
2.2	$18.0 \times 28.0 \times 31.0$	18.5	2222 383 00225
2.4			2222 383 00245
2.7			2222 383 00275

AC and pulse double metallized polypropylene film capacitors

MMKP 383

MMKP 383 GENERAL DATA

PITCH 15 mm
PITCH 7.5 mm (bent back leads)



Specific reference data for the 400 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: $C \leq 0.22 \mu\text{F}$	$\leq 5 \times 10^{-4}$	$\leq 20 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 400 V (DC): $C \leq 0.082 \mu\text{F}$ $0.082 \mu\text{F} < C \leq 0.22 \mu\text{F}$	600 V/ μs 1200 V/ μs	
R between leads, for $C \leq 1 \mu\text{F}$ at 100 V; 1 minute	$>100000 \text{ M}\Omega$	
R between leads and case; 100 V; 1 minute	$>30000 \text{ M}\Omega$	
Ionization (AC) voltage (typical value) at 50 pC peak discharge	$>220 \text{ V}$	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	640 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 400 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 3.5 \pm 0.3 \text{ mm}$	$\pm 5\%$	2222 383 10...	preferred
	$l_t = 5.0 \pm 1.0 \text{ mm}$	$\pm 5\%$	2222 383 11...	on request
	$l_t = 25.0 \pm 2.0 \text{ mm}$	$\pm 5\%$	2222 383 14...	on request
Taped on reel	$H = 18.5 \text{ mm}; P_0 = 12.7 \text{ mm}$	$\pm 5\%$	2222 383 12...	on request
Taped on reel (bent back)	$H = 16.0 \text{ mm}; P_0 = 15.0 \text{ mm}$	$\pm 5\%$	2222 383 13...	preferred

AC and pulse double metallized polypropylene film capacitors

MMKP 383

 $U_{Rdc} = 400 \text{ V}; U_{Rac} = 200 \text{ V}; U_{p-p} = 560 \text{ V}$

C (μF)	DIMENSIONS ⁽¹⁾ b × h (h') × l (mm)	MASS (g)	CATALOGUE NUMBER	
			LOOSE IN BOX	REEL DIAMETER = 500 mm
			$l_t = 3.5 \pm 0.3 \text{ mm}$	H = 16.0 mm; P ₀ = 15.0 mm
			C-tol = $\pm 5\%$	C-tol = $\pm 5\%$
			catalogue number	last 5 digits
Pitch = $15.0 \pm 0.4 \text{ mm}; d_t = 0.80 \pm 0.08 \text{ mm}$			pitch = 7.5 mm (bent back)	
0.047	5.0 × 11.0 (13.0) × 17.5	1.2	2222 383 10473	.. 13473
0.051			2222 383 10513	.. 13513
0.056			2222 383 10563	.. 13563
0.062	6.0 × 12.0 (14.0) × 17.5	1.5	2222 383 10623	.. 13623
0.068			2222 383 10683	.. 13683
0.075			2222 383 10753	.. 13753
0.082			2222 383 10823	.. 13823
0.091	7.0 × 13.5 (15.5) × 17.5	2.0	2222 383 10913	.. 13913
0.1			2222 383 10104	.. 13104
0.11			2222 383 10114	.. 13114
0.12	8.5 × 15.0 (17.0) × 17.5	2.7	2222 383 10124	.. 13124
0.13			2222 383 10134	.. 13134
0.15			2222 383 10154	.. 13154
0.16			2222 383 10164	.. 13164
0.18	10.0 × 16.5 (18.5) × 17.5	3.3	2222 383 10184	.. 13184
0.2			2222 383 10204	.. 13204
0.22			2222 383 10224	.. 13224

Note

1. Dimensions in brackets for bent back leads.

AC and pulse double metallized polypropylene film capacitors

MMKP 383

MMKP 383 GENERAL DATA

PITCH 22.5/27.5 mm

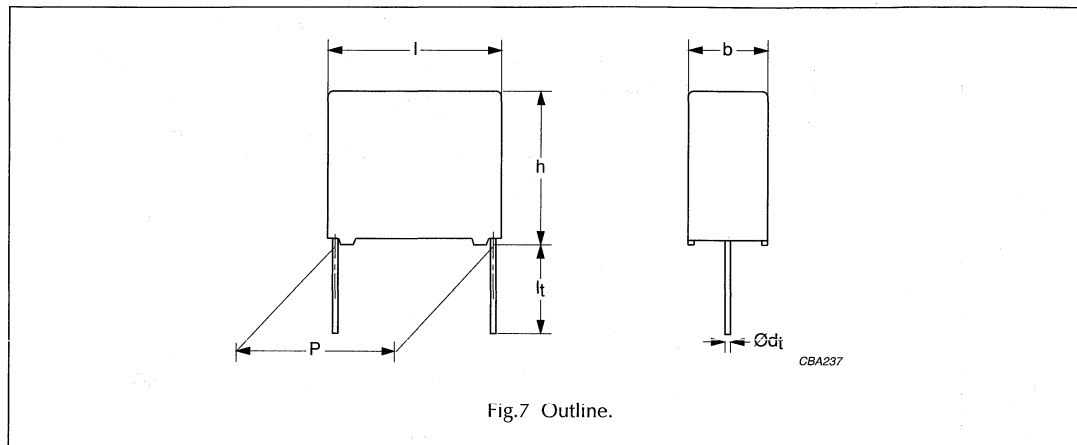


Fig.7 Outline.

Specific reference data for the 400 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
0.22 µF < C ≤ 0.33 µF	≤10 × 10 ⁻⁴	≤35 × 10 ⁻⁴
0.33 µF < C ≤ 0.43 µF	≤10 × 10 ⁻⁴	≤40 × 10 ⁻⁴
0.43 µF < C ≤ 0.68 µF	≤10 × 10 ⁻⁴	≤50 × 10 ⁻⁴
0.68 µF < C ≤ 0.82 µF	≤10 × 10 ⁻⁴	≤55 × 10 ⁻⁴
0.82 µF < C ≤ 1.2 µF	≤10 × 10 ⁻⁴	≤60 × 10 ⁻⁴
1.2 µF < C ≤ 1.5 µF	≤10 × 10 ⁻⁴	≤65 × 10 ⁻⁴
Rated voltage pulse slope (dU/dt) _R at 400 V (DC):		
P = 22.5 mm	410 V/µs	
P = 27.5 mm; for 0.43 µF < C ≤ 1.1 µF	260 V/µs	
P = 27.5 mm; for 1.1 µF < C ≤ 1.5 µF	180 V/µs	
R between leads, for C ≤ 1 µF at 100 V; 1 minute	>100000 MΩ	
RC between leads, for C > 1 µF at 100 V; 1 minute	>100000 s	
R between leads and case; 100 V; 1 minute	>30000 MΩ	
Ionization (AC) voltage (typical value) at 50 pC peak discharge	>220 V	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	640 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 400 V DC versions

PACKAGING ⁽¹⁾	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	l _t = 3.5 ±0.3 mm	±5%	2222 383 10...	preferred
	l _t = 5.0 ±1.0 mm	±5%	2222 383 11...	on request
	l _t = 25.0 ±2.0 mm	±5%	2222 383 14...	on request
Taped on reel	H = 18.5 mm; P ₀ = 12.7 mm	±5%	2222 383 12...	on request

Note

1. Taped on reel pitch = 27.5 mm is not available.

AC and pulse double metallized polypropylene film capacitors

MMKP 383

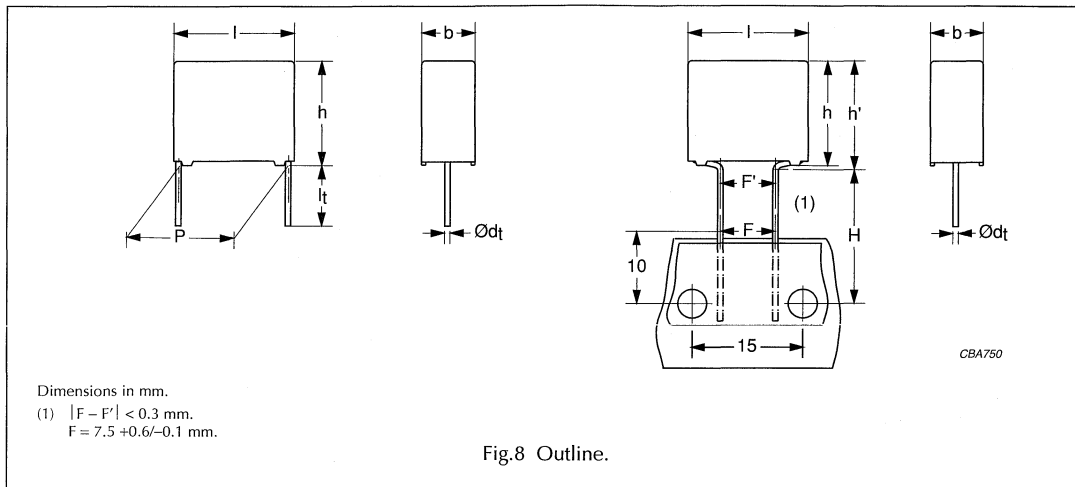
$U_{Rdc} = 400 \text{ V}$; $U_{Rac} = 200 \text{ V}$; $U_{p-p} = 560 \text{ V}$

C (μF)	DIMENSIONS $b \times h \times l$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 3.5 \pm 0.3 \text{ mm}$
			C-tol = $\pm 5\%$
Pitch = $22.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.24	$7.0 \times 16.5 \times 26.0$	3.5	2222 383 10244
0.27	$8.5 \times 18.0 \times 26.0$	4.8	2222 383 10274
0.3			2222 383 10304
0.33			2222 383 10334
0.36			2222 383 10364
0.39	$10.0 \times 19.5 \times 26.0$	6.0	2222 383 10394
0.43			2222 383 10434
Pitch = $27.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.47	$11.0 \times 21.0 \times 31.0$	8.4	2222 383 10474
0.51			2222 383 10514
0.56			2222 383 10564
0.62			2222 383 10624
0.68	$13.0 \times 23.0 \times 31.0$	11.0	2222 383 10684
0.75			2222 383 10754
0.82			2222 383 10824
0.91			2222 383 10914
1	$15.0 \times 25.0 \times 31.0$	13.6	2222 383 10105
1.1			2222 383 10115
1.2			2222 383 10125
1.3	$18.0 \times 28.0 \times 31.0$	18.5	2222 383 10135
1.5			2222 383 10155

AC and pulse double metallized polypropylene film capacitors

MMKP 383

MMKP 383 GENERAL DATA

 PITCH 15 mm
 PITCH 7.5 mm (bent back leads)


Specific reference data for the 630 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: $C \leq 0.15 \mu\text{F}$	$\leq 5 \times 10^{-4}$	$\leq 15 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 630 V (DC): $C \leq 0.056 \mu\text{F}$ $0.056 \mu\text{F} < C \leq 0.15 \mu\text{F}$	700 V/ μs 1400 V/ μs	
R between leads, for $C \leq 1 \mu\text{F}$ at 500 V; 1 minute	$>100000 \text{ M}\Omega$	
R between leads and case; 500 V; 1 minute	$>30000 \text{ M}\Omega$	
Ionization (AC) voltage (typical value) at 50 pC peak discharge	$>250 \text{ V}$	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	1000 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 630 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 3.5 \pm 0.3 \text{ mm}$	$\pm 5\%$	2222 383 20...	preferred
	$l_t = 5.0 \pm 1.0 \text{ mm}$	$\pm 5\%$	2222 383 21...	on request
	$l_t = 25.0 \pm 2.0 \text{ mm}$	$\pm 5\%$	2222 383 24...	on request
Taped on reel	$H = 18.5 \text{ mm}; P_0 = 12.7 \text{ mm}$	$\pm 5\%$	2222 383 22...	on request
Taped on reel (bent back)	$H = 16.0 \text{ mm}; P_0 = 15.0 \text{ mm}$	$\pm 5\%$	2222 383 23...	preferred

AC and pulse double metallized polypropylene film capacitors

MMKP 383

 $U_{Rdc} = 630 \text{ V}; U_{Rac} = 220 \text{ V}; U_{p-p} = 630 \text{ V}$

C (μF)	DIMENSIONS ⁽¹⁾ $b \times h (h') \times l$ (mm)	MASS (g)	CATALOGUE NUMBER	
			LOOSE IN BOX	REEL DIAMETER = 500 mm
			$l_t = 3.5 \pm 0.3 \text{ mm}$	H = 16.0 mm; $P_0 = 15.0 \text{ mm}$
			C-tol = $\pm 5\%$	C-tol = $\pm 5\%$
Pitch = $15.0 \pm 0.4 \text{ mm}; d_t = 0.80 \pm 0.08 \text{ mm}$			last 5 digits	
			pitch = 7.5 mm (bent back)	
0.03	5.0 × 11.0 (13.0) × 17.5	1.2	2222 383 20303	.. 23303
0.033			2222 383 20333	.. 23333
0.036			2222 383 20363	.. 23363
0.039	6.0 × 12.0 (14.0) × 17.5	1.5	2222 383 20393	.. 23393
0.043			2222 383 20433	.. 23433
0.047			2222 383 20473	.. 23473
0.051			2222 383 20513	.. 23513
0.056			2222 383 20563	.. 23563
0.062	7.0 × 13.5 (15.5) × 17.5	2.0	2222 383 20623	.. 23623
0.068			2222 383 20683	.. 23683
0.075			2222 383 20753	.. 23753
0.082	8.5 × 15.0 (17.0) × 17.5	2.7	2222 383 20823	.. 23823
0.091			2222 383 20913	.. 23913
0.1			2222 383 20104	.. 23104
0.11			2222 383 20114	.. 23114
0.12	10.0 × 16.5 (18.5) × 17.5	3.3	2222 383 20124	.. 23124
0.13			2222 383 20134	.. 23134
0.15			2222 383 20154	.. 23154

Note

- Dimensions in brackets for bent back leads.

AC and pulse double metallized polypropylene film capacitors

MMKP 383

MMKP 383 GENERAL DATA

PITCH 22.5/27.5 mm

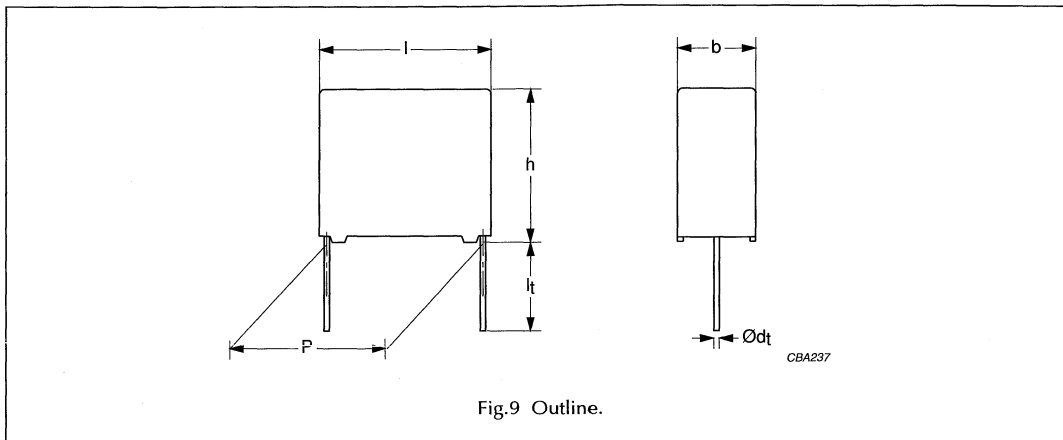


Fig.9 Outline.

Specific reference data for the 630 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
0.15 $\mu\text{F} < C \leq 0.22 \mu\text{F}$	$\leq 8 \times 10^{-4}$	$\leq 25 \times 10^{-4}$
0.22 $\mu\text{F} < C \leq 0.3 \mu\text{F}$	$\leq 8 \times 10^{-4}$	$\leq 30 \times 10^{-4}$
0.3 $\mu\text{F} < C \leq 0.47 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 40 \times 10^{-4}$
0.47 $\mu\text{F} < C \leq 0.68 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 45 \times 10^{-4}$
0.68 $\mu\text{F} < C \leq 1.0 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 50 \times 10^{-4}$
Rated voltage pulse slope (dU/dt) _R at 630 V (DC):		
P = 22.5 mm		470 V/ μs
P = 27.5 mm, for 0.3 $\mu\text{F} < C \leq 0.75 \mu\text{F}$		300 V/ μs
P = 27.5 mm, for 0.75 $\mu\text{F} < C \leq 1 \mu\text{F}$		210 V/ μs
R between leads, for C $\leq 1 \mu\text{F}$ at 500 V; 1 minute		>100000 M Ω
R between leads and case; 500 V; 1 minute		>30000 M Ω
Ionization (AC) voltage (typical value) at 50 pC peak discharge		>250 V
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s		1 000 V; 1 minute
Withstanding (DC) voltage between leads and case		2 840 V; 1 minute

Available 630 V DC versions

PACKAGING ⁽¹⁾	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 3.5 \pm 0.3 \text{ mm}$	$\pm 5\%$	2222 383 20...	preferred
	$l_t = 5.0 \pm 1.0 \text{ mm}$	$\pm 5\%$	2222 383 21...	on request
	$l_t = 25.0 \pm 2.0 \text{ mm}$	$\pm 5\%$	2222 383 24...	on request
Taped on reel	H = 18.5 mm; P ₀ = 12.7 mm	$\pm 5\%$	2222 383 22...	on request

Note

1. Taped on reel pitch = 27.5 mm is not available.

AC and pulse double metallized polypropylene film capacitors

MMKP 383

$U_{Rdc} = 630 \text{ V}$; $U_{Rac} = 220 \text{ V}$; $U_{p-p} = 630 \text{ V}$

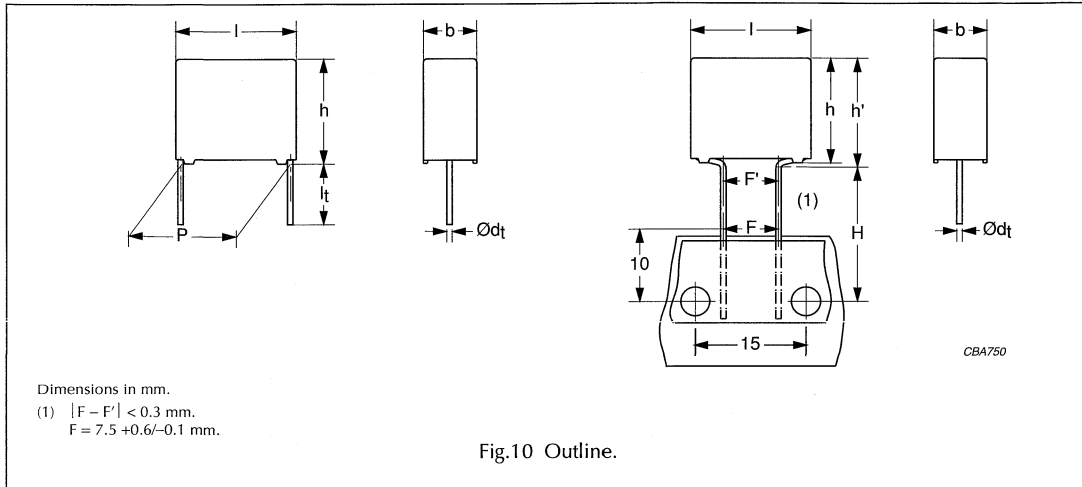
C (μF)	DIMENSIONS $b \times h \times l$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 3.5 \pm 0.3 \text{ mm}$
			C-tol = $\pm 5\%$
Pitch = $22.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.16	8.5 × 18.0 × 26.0	4.8	2222 383 20164
0.18			2222 383 20184
0.2			2222 383 20204
0.22			2222 383 20224
0.24	10.0 × 19.5 × 26.0	6.0	2222 383 20244
0.27			2222 383 20274
0.3			2222 383 20304
Pitch = $27.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.33	11.0 × 21.0 × 31.0	8.4	2222 383 20334
0.36			2222 383 20364
0.39			2222 383 20394
0.43			2222 383 20434
0.47	13.0 × 23.0 × 31.0	11.0	2222 383 20474
0.51			2222 383 20514
0.56			2222 383 20564
0.62	15.0 × 25.0 × 31.0	13.6	2222 383 20624
0.68			2222 383 20684
0.75			2222 383 20754
0.82	18.0 × 28.0 × 31.0	18.5	2222 383 20824
0.91			2222 383 20914
1			2222 383 20105

AC and pulse double metallized polypropylene film capacitors

MMKP 383

MMKP 383 GENERAL DATA

PITCH 15 mm
PITCH 7.5 mm (bent back leads)



Specific reference data for the 1000 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: $C \leq 0.062 \mu\text{F}$	$\leq 5 \times 10^{-4}$	$\leq 15 \times 10^{-4}$
Rated voltage pulse slope (dU/dt) _R at 1000 V (DC): $C \leq 0.024 \mu\text{F}$ $0.024 \mu\text{F} < C \leq 0.062 \mu\text{F}$	1700 V/μs 3300 V/μs	
R between leads, for $C \leq 1 \mu\text{F}$ at 500 V; 1 minute	>100000 MΩ	
R between leads and case; 500 V; 1 minute	>30000 MΩ	
Ionization (AC) voltage (typical value) at 50 pC peak discharge	>440 V	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	1600 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 1000 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 3.5 \pm 0.3$ mm	±5%	2222 383 30...	preferred
	$l_t = 5.0 \pm 1.0$ mm	±5%	2222 383 31...	on request
	$l_t = 25.0 \pm 2.0$ mm	±5%	2222 383 34...	on request
Taped on reel	$H = 18.5$ mm; $P_0 = 12.7$ mm	±5%	2222 383 32...	on request
Taped on reel (bent back)	$H = 16.0$ mm; $P_0 = 15.0$ mm	±5%	2222 383 33...	preferred

AC and pulse double metallized polypropylene film capacitors

MMKP 383

 $U_{Rdc} = 1000 \text{ V}; U_{Rac} = 350 \text{ V}; U_{p-p} = 1000 \text{ V}$

C (μF)	DIMENSIONS ⁽¹⁾ $b \times h (h') \times l$ (mm)	MASS (g)	CATALOGUE NUMBER	
			LOOSE IN BOX	REEL DIAMETER = 500 mm
			$l_1 = 3.5 \pm 0.3 \text{ mm}$	H = 16.0 mm; $P_0 = 15.0 \text{ mm}$
			C-tol = $\pm 5\%$	C-tol = $\pm 5\%$
Pitch = $15.0 \pm 0.4 \text{ mm}; d_1 = 0.80 \pm 0.08 \text{ mm}$			pitch = 7.5 mm (bent back)	
0.0043	5.0 × 11.0 (13.0) × 17.5	1.2	2222 383 30432	.. 33432
0.0047			2222 383 30472	.. 33472
0.0051			2222 383 30512	.. 33512
0.0056			2222 383 30562	.. 33562
0.0062			2222 383 30622	.. 33622
0.0068			2222 383 30682	.. 33682
0.0075			2222 383 30752	.. 33752
0.0082			2222 383 30822	.. 33822
0.0091			2222 383 30912	.. 33912
0.010			2222 383 30103	.. 33103
0.011			2222 383 30113	.. 33113
0.012			2222 383 30123	.. 33123
0.013			2222 383 30133	.. 33133
0.015			2222 383 30153	.. 33153
0.016			2222 383 30163	.. 33163
0.018			6.0 × 12.0 (14.0) × 17.5	1.5
0.02	2222 383 30203	.. 33203		
0.022	2222 383 30223	.. 33223		
0.024	2222 383 30243	.. 33243		
0.027	7.0 × 13.5 (15.5) × 17.5	2.0	2222 383 30273	.. 33273
0.03			2222 383 30303	.. 33303
0.033			2222 383 30333	.. 33333
0.036	8.5 × 15.0 (17.0) × 17.5	2.7	2222 383 30363	.. 33363
0.039			2222 383 30393	.. 33393
0.043			2222 383 30433	.. 33433
0.047			2222 383 30473	.. 33473
0.051	10.0 × 16.5 (18.5) × 17.5	3.3	2222 383 30513	.. 33513
0.056			2222 383 30563	.. 33563
0.062			2222 383 30623	.. 33623

Note

1. Dimensions in brackets for bent back leads.

AC and pulse double metallized polypropylene film capacitors

MMKP 383

MMKP 383 GENERAL DATA

PITCH 22.5/27.5 mm

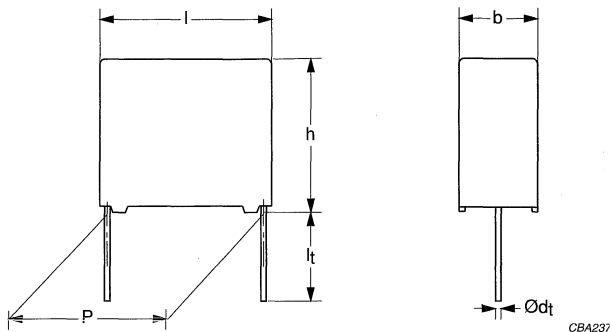


Fig.11 Outline.

Specific reference data for the 1000 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
0.062 μF < $C \leq 0.13 \mu\text{F}$	$\leq 6 \times 10^{-4}$	$\leq 20 \times 10^{-4}$
0.13 μF < $C \leq 0.22 \mu\text{F}$	$\leq 8 \times 10^{-4}$	$\leq 25 \times 10^{-4}$
0.22 μF < $C \leq 0.33 \mu\text{F}$	$\leq 8 \times 10^{-4}$	$\leq 30 \times 10^{-4}$
0.33 μF < $C \leq 0.47 \mu\text{F}$	$\leq 8 \times 10^{-4}$	$\leq 35 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 1000 V (DC):		
P = 22.5 mm		1200 V/ μs
P = 27.5 mm, for 0.13 μF < $C \leq 0.33 \mu\text{F}$		700 V/ μs
P = 27.5 mm, for 0.33 μF < $C \leq 0.47 \mu\text{F}$		470 V/ μs
R between leads, for $C \leq 1 \mu\text{F}$ at 500 V; 1 minute		>100000 M Ω
R between leads and case; 500 V; 1 minute		>30000 M Ω
Ionization (AC) voltage (typical value) at 50 pC peak discharge		>440 V
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s		1600 V; 1 minute
Withstanding (DC) voltage between leads and case		2840 V; 1 minute

Available 1000 V DC versions

PACKAGING ⁽¹⁾	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 3.5 \pm 0.3 \text{ mm}$	$\pm 5\%$	2222 383 30...	preferred
	$l_t = 5.0 \pm 1.0 \text{ mm}$	$\pm 5\%$	2222 383 31...	on request
	$l_t = 25.0 \pm 2.0 \text{ mm}$	$\pm 5\%$	2222 383 34...	on request
Taped on reel	$H = 18.5 \text{ mm}$; $P_0 = 12.7 \text{ mm}$	$\pm 5\%$	2222 383 32...	on request

Note

1. Taped on reel pitch = 27.5 mm is not available.

AC and pulse double metallized polypropylene film capacitors

MMKP 383

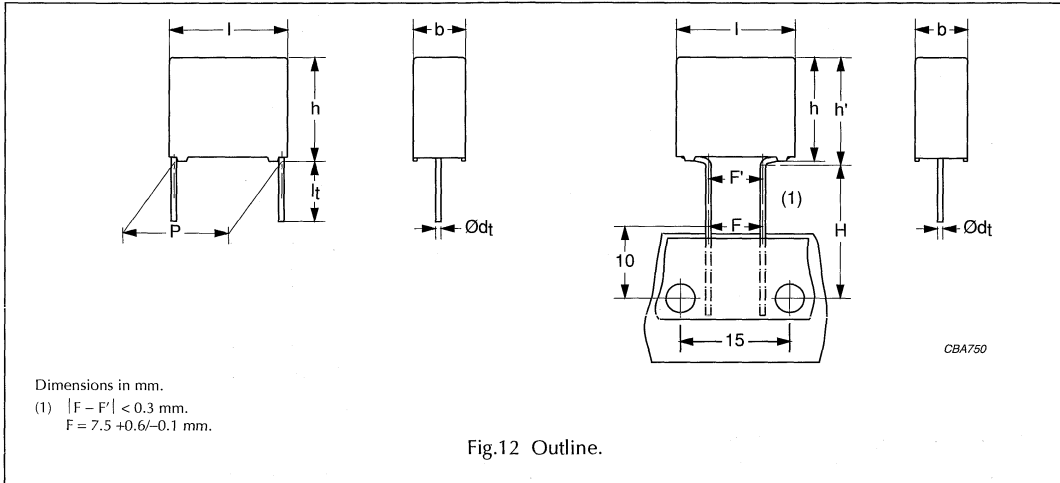
$U_{Rdc} = 1000 \text{ V}$; $U_{Rac} = 350 \text{ V}$; $U_{p-p} = 1000 \text{ V}$

C (μF)	DIMENSIONS $b \times h \times l$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 3.5 \pm 0.3 \text{ mm}$
			C-tol = $\pm 5\%$
Pitch = $22.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.068	$7.0 \times 16.5 \times 26.0$	3.5	2222 383 30683
0.075	$8.5 \times 18.0 \times 26.0$	4.8	2222 383 30753
0.082			2222 383 30823
0.091			2222 383 30913
0.1			2222 383 30104
0.11	$10.0 \times 19.5 \times 26.0$	6.0	2222 383 30114
0.12			2222 383 30124
0.13			2222 383 30134
Pitch = $27.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.15	$11.0 \times 21.0 \times 31.0$	8.4	2222 383 30154
0.16			2222 383 30164
0.18			2222 383 30184
0.2	$13.0 \times 23.0 \times 31.0$	11.0	2222 383 30204
0.22			2222 383 30224
0.24			2222 383 30244
0.27	$15.0 \times 25.0 \times 31.0$	13.6	2222 383 30274
0.3			2222 383 30304
0.33			2222 383 30334
0.36			2222 383 30364
0.39	$18.0 \times 28.0 \times 31.0$	18.5	2222 383 30394
0.43			2222 383 30434
0.47			2222 383 30474

AC and pulse double metallized polypropylene film capacitors

MMKP 383

MMKP 383 GENERAL DATA

 PITCH 15 mm
 PITCH 7.5 mm (bent back leads)


Specific reference data for the 1400 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: $C \leq 0.016 \mu\text{F}$	$\leq 5 \times 10^{-4}$	$\leq 10 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 1400 V (DC): $C \leq 0.0056 \mu\text{F}$ $0.0056 \mu\text{F} < C \leq 0.016 \mu\text{F}$	8000 V/ μs 15000 V/ μs	
R between leads, for $C \leq 1 \mu\text{F}$ at 500 V; 1 minute	$>100000 \text{ M}\Omega$	
R between leads and case; 500 V; 1 minute	$>30000 \text{ M}\Omega$	
Ionization (AC) voltage (typical value) at 20 pC peak discharge	$>500 \text{ V}$	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	2250 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 1400 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_1 = 3.5 \pm 0.3 \text{ mm}$	$\pm 5\%$	2222 383 40...	preferred
	$l_1 = 5.0 \pm 1.0 \text{ mm}$	$\pm 5\%$	2222 383 41...	on request
	$l_1 = 25.0 \pm 2.0 \text{ mm}$	$\pm 5\%$	2222 383 44...	on request
Taped on reel	$H = 18.5 \text{ mm; for } P_0 = 12.7 \text{ mm}$	$\pm 5\%$	2222 383 42...	on request
Taped on reel (bent back)	$H = 16.0 \text{ mm; for } P_0 = 15.0 \text{ mm}$	$\pm 5\%$	2222 383 43...	preferred

AC and pulse double metallized polypropylene film capacitors

MMKP 383

 $U_{Rdc} = 1400 \text{ V}; U_{Rac} = 500 \text{ V}; U_{p-p} = 1400 \text{ V}$

C (μF)	DIMENSIONS ⁽¹⁾ b × h (h') × l (mm)	MASS (g)	CATALOGUE NUMBER	
			LOOSE IN BOX	REEL DIAMETER = 500 mm
			$l_1 = 3.5 \pm 0.3 \text{ mm}$	H = 16.0 mm; P ₀ = 15.0 mm
			C-tol = $\pm 5\%$	C-tol = $\pm 5\%$
			catalogue number	last 5 digits
Pitch = $15.0 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			pitch = 7.5 mm (bent back)	
0.0022	5.0 × 11.0 (13.0) × 17.5	1.2	2222 383 40222	.. 43222
0.0024			2222 383 40242	.. 43242
0.0027			2222 383 40272	.. 43272
0.003			2222 383 40302	.. 43302
0.0033			2222 383 40332	.. 43332
0.0036			2222 383 40362	.. 43362
0.0039			2222 383 40392	.. 43392
0.0043	6.0 × 12.0 (14.0) × 17.5	1.5	2222 383 40432	.. 43432
0.0047			2222 383 40472	.. 43472
0.0051			2222 383 40512	.. 43512
0.0056			2222 383 40562	.. 43562
0.0062	7.0 × 13.5 (15.5) × 17.5	2.0	2222 383 40622	.. 43622
0.0068			2222 383 40682	.. 43682
0.0075			2222 383 40752	.. 43752
0.0082			2222 383 40822	.. 43822
0.0091	8.5 × 15.0 (17.0) × 17.5	2.7	2222 383 40912	.. 43912
0.01			2222 383 40103	.. 43103
0.011			2222 383 40113	.. 43113
0.012			2222 383 40123	.. 43123
0.013	10.0 × 16.5 (18.5) × 17.5	3.3	2222 383 40133	.. 43133
0.015			2222 383 40153	.. 43153
0.016			2222 383 40163	.. 43163

Note

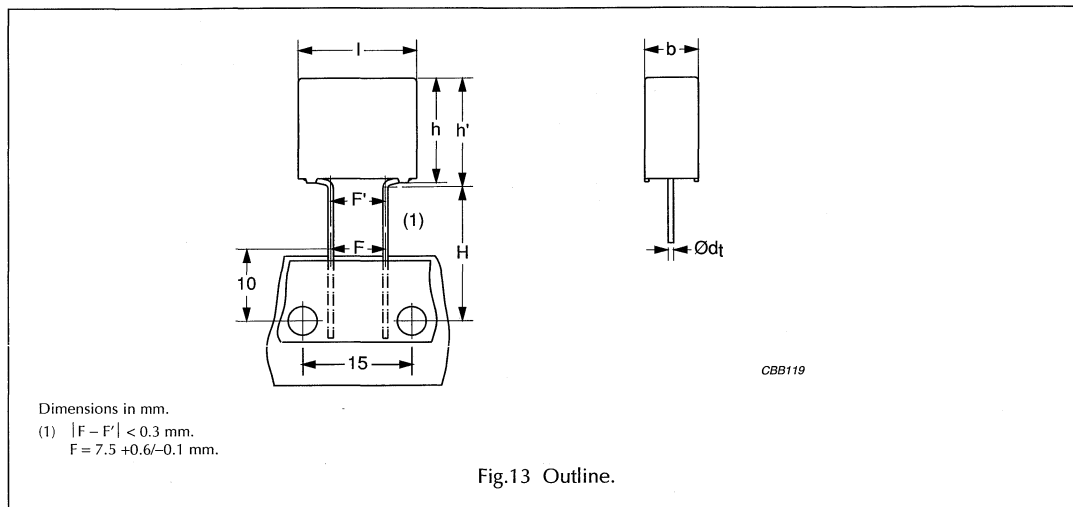
1. Dimensions in brackets for bent back leads.

AC and pulse double metallized polypropylene film capacitors

MMKP 383

MMKP 383 GENERAL DATA

PITCH 7.5 mm (bent back leads)



Specific reference data for the 1400 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: $C \leq 0.016 \mu\text{F}$	$\leq 5 \times 10^{-4}$	$\leq 10 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 1400 V (DC): $C \leq 0.0056 \mu\text{F}$ $0.0056 \mu\text{F} < C \leq 0.0082 \mu\text{F}$	8000 V/ μs 15000 V/ μs	
R between leads and case; 500 V; 1 minute	$>30000 \text{ M}\Omega$	
Ionization (AC) voltage (typical value) at 20 pC peak discharge	$>500 \text{ V}$	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	2250 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 1400 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Taped on reel (bent back)	$H = 16.0$ mm; for $P_0 = 15.0$ mm; reel diameter = 356 mm for hot asphalt encapsulation	$\pm 5\%$	2222 383 46...	on request

AC and pulse double metallized polypropylene film capacitors

MMKP 383

$U_{Rdc} = 1400 \text{ V}$; $U_{Rac} = 500 \text{ V}$; $U_{p-p} = 1400 \text{ V}$ (for hot asphalt encapsulation)

C (μF)	DIMENSIONS ⁽¹⁾ $b \times h (h') \times l$ (mm)	MASS (g)	CATALOGUE NUMBER
			REEL DIAMETER = 356 mm
			H = 16.0 mm; P ₀ = 15.0 mm
			C-tol = $\pm 5\%$
Pitch = $15.0 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$		pitch = 7.5 mm (bent back)	
0.0022	6.0 × 12.0 (14.0) × 17.5	1.5	2222 383 46222
0.0024			2222 383 46242
0.0027			2222 383 46272
0.003			2222 383 46302
0.0033			2222 383 46332
0.0036			2222 383 46362
0.0039			2222 383 46392
0.0043	7.0 × 13.5 (15.5) × 17.5	2.0	2222 383 46432
0.0047			2222 383 46472
0.0051			2222 383 46512
0.0056			2222 383 46562
0.0062			2222 383 46622
0.0068			2222 383 46682
0.0075			2222 383 46752
0.0082			2222 383 46822

Note

1. Dimensions in brackets for bent back leads.

AC and pulse double metallized polypropylene film capacitors

MMKP 383

MMKP 383 GENERAL DATA

PITCH 22.5/27.5 mm

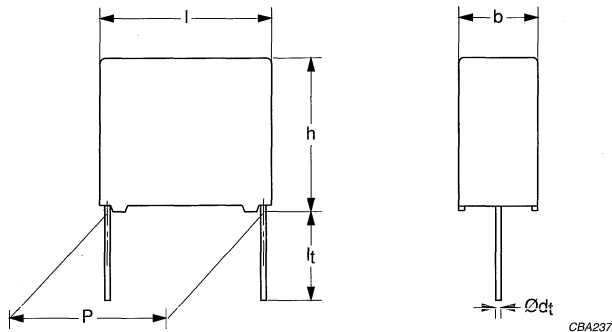


Fig.14 Outline.

Specific reference data for the 1400 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: 0.016 $\mu\text{F} < C \leq 0.039 \mu\text{F}$ 0.039 $\mu\text{F} < C \leq 0.13 \mu\text{F}$	$\leq 5 \times 10^{-4}$ $\leq 5 \times 10^{-4}$	$\leq 15 \times 10^{-4}$ $\leq 20 \times 10^{-4}$
Rated voltage pulse slope (dU/dt) _R at 1400 V (DC): P = 22.5 mm P = 27.5 mm, for 0.039 $\mu\text{F} < C \leq 0.1 \mu\text{F}$ P = 27.5 mm, for 0.1 $\mu\text{F} < C \leq 0.13 \mu\text{F}$	4000 V/ μs 2100 V/ μs 1500 V/ μs	
R between leads, for $C \leq 1 \mu\text{F}$ at 500 V; 1 minute	>100000 M Ω	
R between leads and case; 500 V; 1 minute	>30000 M Ω	
Ionization (AC) voltage (typical value) at 20 pC peak discharge	>500 V	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	2250 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 1400 V DC versions

PACKAGING ⁽¹⁾	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 3.5 \pm 0.3 \text{ mm}$	$\pm 5\%$	2222 383 40...	preferred
	$l_t = 5.0 \pm 1.0 \text{ mm}$	$\pm 5\%$	2222 383 41...	on request
	$l_t = 25.0 \pm 2.0 \text{ mm}$	$\pm 5\%$	2222 383 44...	on request
Taped on reel	H = 18.5 mm; P ₀ = 12.7 mm	$\pm 5\%$	2222 383 42...	on request

Note

1. Taped on reel pitch = 27.5 mm is not available.

AC and pulse double metallized polypropylene film capacitors

MMKP 383

 $U_{Rdc} = 1400 \text{ V}; U_{Rac} = 500 \text{ V}; U_{p-p} = 1400 \text{ V}$

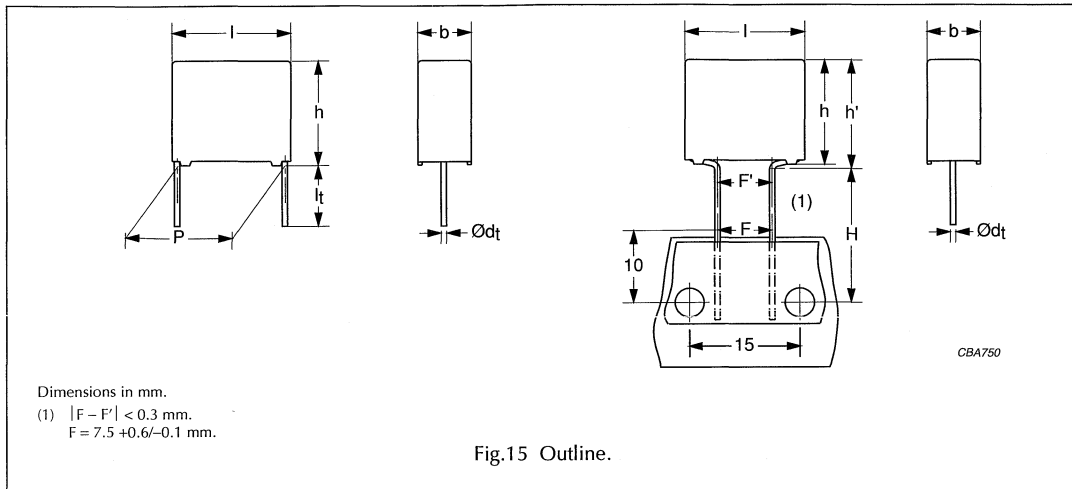
C (μF)	DIMENSIONS $b \times h \times l$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 3.5 \pm 0.3 \text{ mm}$
			C-tol = $\pm 5\%$
Pitch = $22.5 \pm 0.4 \text{ mm}; d_t = 0.80 \pm 0.08 \text{ mm}$			
0.018 0.02	7.0 × 16.5 × 26.0	3.5	2222 383 40183 2222 383 40203
0.022 0.024 0.027	8.5 × 18.0 × 26.0	4.8	2222 383 40223 2222 383 40243 2222 383 40273
0.03 0.033 0.036 0.039	10.0 × 19.5 × 26.0	6.0	2222 383 40303 2222 383 40333 2222 383 40363 2222 383 40393
Pitch = $27.5 \pm 0.4 \text{ mm}; d_t = 0.80 \pm 0.08 \text{ mm}$			
0.043 0.047 0.051 0.056	11.0 × 21.0 × 31.0	8.4	2222 383 40433 2222 383 40473 2222 383 40513 2222 383 40563
0.062 0.068 0.075	13.0 × 23.0 × 31.0	11.0	2222 383 40623 2222 383 40683 2222 383 40753
0.082 0.091 0.1	15.0 × 25.0 × 31.0	13.6	2222 383 40823 2222 383 40913 2222 383 40104
0.11 0.12 0.13	18.0 × 28.0 × 31.0	11.0	2222 383 40114 2222 383 40124 2222 383 40134

AC and pulse double metallized polypropylene film capacitors

MMKP 383

MMKP 383 GENERAL DATA

PITCH 15 mm
PITCH 7.5 mm (bent back leads)



Specific reference data for the 1600 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: $C \leq 0.015 \mu\text{F}$	$\leq 5 \times 10^{-4}$	$\leq 15 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 1600 V (DC): $C \leq 0.0056 \mu\text{F}$ $0.0056 \mu\text{F} < C \leq 0.015 \mu\text{F}$	8000 V/ μs 15000 V/ μs	
R between leads, for $C \leq 1 \mu\text{F}$ at 500 V; 1 minute	$>100000 \text{ M}\Omega$	
R between leads and case; 500 V; 1 minute	$>30000 \text{ M}\Omega$	
Ionization (AC) voltage (typical value) at 20 pC peak discharge	$>660 \text{ V}$	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	2560 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 1600 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 3.5 \pm 0.3 \text{ mm}$	$\pm 5\%$	2222 383 50...	preferred
	$l_t = 5.0 \pm 1.0 \text{ mm}$	$\pm 5\%$	2222 383 51...	on request
	$l_t = 25.0 \pm 2.0 \text{ mm}$	$\pm 5\%$	2222 383 54...	on request
Taped on reel	$H = 18.5 \text{ mm}; P_0 = 12.7 \text{ mm}$	$\pm 5\%$	2222 383 52...	on request
Taped on reel (bent back)	$H = 16.0 \text{ mm}; P_0 = 15.0 \text{ mm}$	$\pm 5\%$	2222 383 53...	preferred

AC and pulse double metallized polypropylene film capacitors

MMKP 383

$U_{Rdc} = 1600 \text{ V}$; $U_{Rac} = 550 \text{ V}$; $U_{p-p} = 1600 \text{ V}$

C (μF)	DIMENSIONS ⁽¹⁾ $b \times h (h') \times l$ (mm)	MASS (g)	CATALOGUE NUMBER	
			LOOSE IN BOX	REEL DIAMETER = 500 mm
			$l_1 = 3.5 \pm 0.3 \text{ mm}$	$H = 16.0 \text{ mm}$; $P_0 = 15.0 \text{ mm}$
			C-tol = $\pm 5\%$	C-tol = $\pm 5\%$
			catalogue number	last 5 digits
Pitch = $15.0 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			pitch = 7.5 mm (bent back)	
0.0027	$5.0 \times 11.0 (13.0) \times 17.5$	1.2	2222 383 50272	.. 53272
0.003			2222 383 50302	.. 53302
0.0033			2222 383 50332	.. 53332
0.0036			2222 383 50362	.. 53362
0.0039			2222 383 50392	.. 53392
0.0043	$6.0 \times 12.0 (14.0) \times 17.5$	1.5	2222 383 50432	.. 53432
0.0047			2222 383 50472	.. 53472
0.0051			2222 383 50512	.. 53512
0.0056			2222 383 50562	.. 53562
0.0062	$7.0 \times 13.5 (15.5) \times 17.5$	2.0	2222 383 50622	.. 53622
0.0068			2222 383 50682	.. 53682
0.0075			2222 383 50752	.. 53752
0.0082	$8.5 \times 15.0 (17.0) \times 17.5$	2.7	2222 383 50822	.. 53822
0.0091			2222 383 50912	.. 53912
0.01			2222 383 50103	.. 53103
0.011			2222 383 50113	.. 53113
0.012	$10.0 \times 16.5 (18.5) \times 17.5$	3.3	2222 383 50123	.. 53123
0.013			2222 383 50133	.. 53133
0.015			2222 383 50153	.. 53153

Note

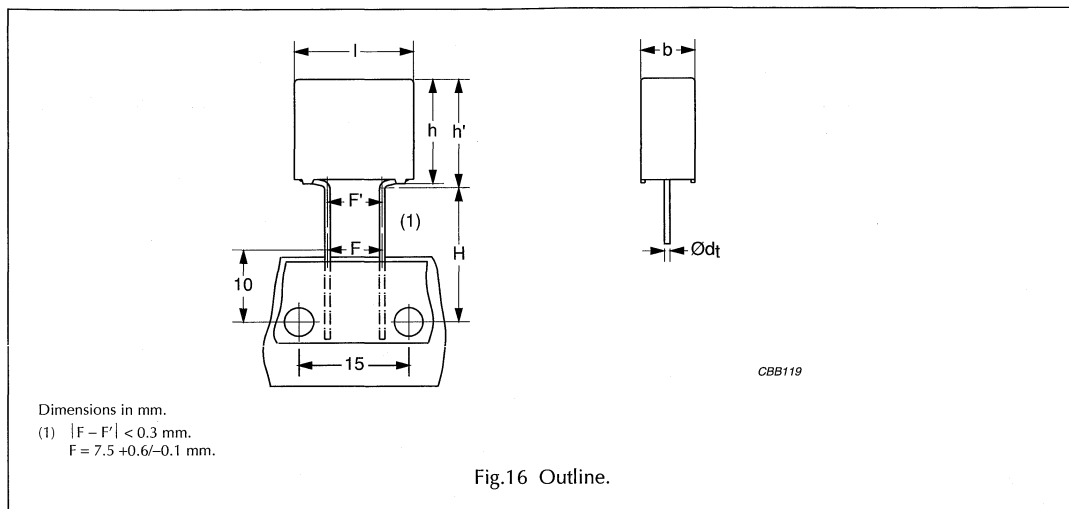
1. Dimensions in brackets for bent back leads.

AC and pulse double metallized polypropylene film capacitors

MMKP 383

MMKP 383 GENERAL DATA

PITCH 7.5 mm (bent back leads)



Specific reference data for the 1600 V DC capacitors (for hot asphalt encapsulation)

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: $C \leq 0.015 \mu\text{F}$	$\leq 5 \times 10^{-4}$	$\leq 15 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 1600 V (DC): $C \leq 0.0056 \mu\text{F}$ $0.0056 \mu\text{F} < C \leq 0.0075 \mu\text{F}$	8000 V/ μs 15000 V/ μs	
R between leads, for $C \leq 1 \mu\text{F}$ at 500 V; 1 minute	>100000 M Ω	
R between leads and case; 500 V; 1 minute	>30000 M Ω	
Ionization (AC) voltage (typical value) at 20 pC peak discharge	>660 V	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	2560 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 1600 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Taped on reel (bent back)	H = 16.0 mm; P ₀ = 15.0 mm; reel diameter = 356 mm for hot asphalt encapsulation	±5%	2222 383 56...	on request

AC and pulse double metallized polypropylene film capacitors

MMKP 383

$U_{Rdc} = 1600 \text{ V}$; $U_{Rac} = 550 \text{ V}$; $U_{p-p} = 1600 \text{ V}$ (for hot asphalt encapsulation)

C (μF)	DIMENSIONS ⁽¹⁾ $b \times h (h') \times l$ (mm)	MASS (g)	CATALOGUE NUMBER
			REEL DIAMETER = 356 mm
			H = 16.0 mm; $P_o = 15.0 \text{ mm}$
			C-tol = $\pm 5\%$
Pitch = $15.0 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$		pitch = 7.5 mm (bent back)	
0.0027	6.0 × 12.0 (14.0) × 17.5	1.5	2222 383 56272
0.003			2222 383 56302
0.0033			2222 383 56332
0.0036			2222 383 56362
0.0039			2222 383 56392
0.0043	7.0 × 13.5 (15.5) × 17.5	2.0	2222 383 56432
0.0047			2222 383 56472
0.0051			2222 383 56512
0.0056			2222 383 56562
0.0062			2222 383 56622
0.0068			2222 383 56682
0.0075			2222 383 56752

Note

1. Dimensions in brackets for bent back leads.

AC and pulse double metallized polypropylene film capacitors

MMKP 383

MMKP 383 GENERAL DATA

PITCH 22.5/27.5 mm

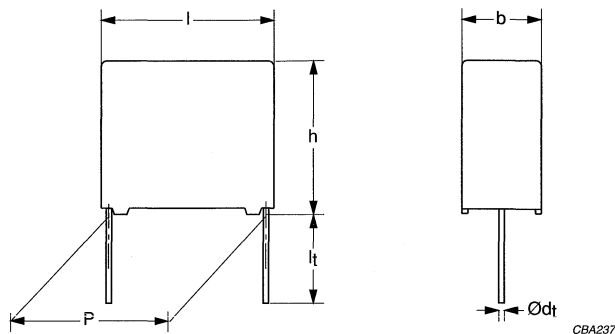


Fig.17 Outline..

Specific reference data for the 1600 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: $0.015 \mu\text{F} < C \leq 0.15 \mu\text{F}$	$\leq 5 \times 10^{-4}$	$\leq 20 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 1600 V (DC): P = 22.5 mm P = 27.5 mm, for $0.039 \mu\text{F} < C \leq 0.1 \mu\text{F}$ P = 27.5 mm; for $0.1 \mu\text{F} < C \leq 0.15 \mu\text{F}$	3100 V/ μs 1800 V/ μs 1200 V/ μs	
R between leads, for $C \leq 1 \mu\text{F}$ at 500 V; 1 minute	>100000 M Ω	
R between leads and case; 500 V; 1 minute	>30000 M Ω	
Ionization (AC) voltage (typical value) at 20 pC peak discharge	>660 V	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	2560 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 1600 V DC versions

PACKAGING ⁽¹⁾	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 3.5 \pm 0.3 \text{ mm}$	$\pm 5\%$	2222 383 50...	preferred
	$l_t = 5.0 \pm 1.0 \text{ mm}$	$\pm 5\%$	2222 383 51...	on request
	$l_t = 25.0 \pm 2.0 \text{ mm}$	$\pm 5\%$	2222 383 54...	on request
Taped on reel	$H = 18.5 \text{ mm}; P_0 = 12.7 \text{ mm}$	$\pm 5\%$	2222 383 52...	on request

Note

1. Taped on reel pitch = 27.5 mm is not available.

AC and pulse double metallized polypropylene film capacitors

MMKP 383

 $U_{Rdc} = 1600 \text{ V}; U_{Rac} = 550 \text{ V}; U_{p-p} = 1600 \text{ V}$

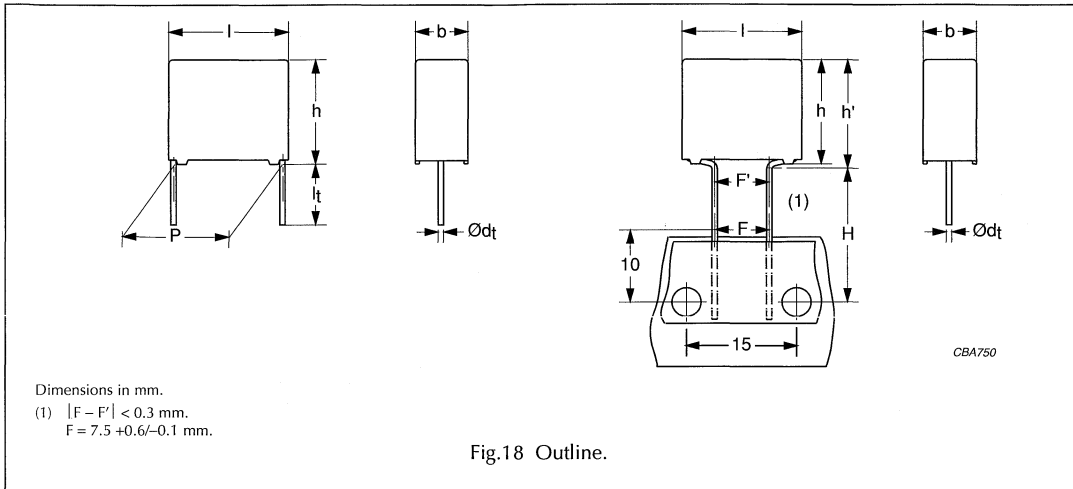
C (μF)	DIMENSIONS $b \times h \times l$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 3.5 \pm 0.3 \text{ mm}$
			C-tol = $\pm 5\%$
Pitch = $22.5 \pm 0.4 \text{ mm}; d_t = 0.80 \pm 0.08 \text{ mm}$			
0.016	7.0 × 16.5 × 26.0	3.5	2222 383 50163
0.018			2222 383 50183
0.02			2222 383 50203
0.022	8.5 × 18.0 × 26.0	4.8	2222 383 50223
0.024			2222 383 50243
0.027			2222 383 50273
0.03			2222 383 50303
0.033	10.0 × 19.5 × 26.0	6.0	2222 383 50333
0.036			2222 383 50363
0.039			2222 383 50393
Pitch = $27.5 \pm 0.4 \text{ mm}; d_t = 0.80 \pm 0.08 \text{ mm}$			
0.043	11.0 × 21.0 × 31.0	8.4	2222 383 50433
0.047			2222 383 50473
0.051			2222 383 50513
0.056			2222 383 50563
0.062	13.0 × 23.0 × 31.0	11.0	2222 383 50623
0.068			2222 383 50683
0.075			2222 383 50753
0.082	15.0 × 25.0 × 31.0	13.6	2222 383 50823
0.091			2222 383 50913
0.1			2222 383 50104
0.11	18.0 × 28.0 × 31.0	18.5	2222 383 50114
0.12			2222 383 50124
0.13			2222 383 50134
0.15			2222 383 50154

AC and pulse double metallized polypropylene film capacitors

MMKP 383

MMKP 383 GENERAL DATA

PITCH 15 mm
PITCH 7.5 mm (bent back leads)



Specific reference data for the 2000 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: $C \leq 0.01 \mu\text{F}$	$\leq 5 \times 10^{-4}$	$\leq 15 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 2000 V (DC): $C \leq 0.0036 \mu\text{F}$ $0.0036 \mu\text{F} < C \leq 0.01 \mu\text{F}$	11 000 V/ μs 20 000 V/ μs	
R between leads, for $C \leq 1 \mu\text{F}$ at 500 V; 1 minute	$> 100\,000 \text{ M}\Omega$	
R between leads and case; 500 V; 1 minute	$> 30\,000 \text{ M}\Omega$	
Ionization (AC) voltage (typical value) at 20 pC peak discharge	$> 750 \text{ V}$	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	3 200 V; 1 minute	
Withstanding (DC) voltage between leads and case	2 840 V; 1 minute	

Available 2000 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 3.5 \pm 0.3 \text{ mm}$	$\pm 5\%$	2222 383 60...	preferred
	$l_t = 5.0 \pm 1.0 \text{ mm}$	$\pm 5\%$	2222 383 61...	on request
	$l_t = 25.0 \pm 2.0 \text{ mm}$	$\pm 5\%$	2222 383 64...	on request
Taped on reel	$H = 18.5 \text{ mm}; P_0 = 12.7 \text{ mm}$	$\pm 5\%$	2222 383 62...	on request
Taped on reel (bent back)	$H = 16.0 \text{ mm}; P_0 = 15.0 \text{ mm}$	$\pm 5\%$	2222 383 63...	preferred

AC and pulse double metallized polypropylene film capacitors

MMKP 383

 $U_{Rdc} = 2000 \text{ V}; U_{Rac} = 700 \text{ V}; U_{p-p} = 2000 \text{ V}$

C (μF)	DIMENSIONS ⁽¹⁾ $b \times h (h') \times l$ (mm)	MASS (g)	CATALOGUE NUMBER	
			LOOSE IN BOX	REEL DIAMETER = 500 mm
			$l_t = 3.5 \pm 0.3 \text{ mm}$	$H = 16.0 \text{ mm}; P_0 = 15.0 \text{ mm}$
			C-tol = $\pm 5\%$	C-tol = $\pm 5\%$
			catalogue number	last 5 digits
Pitch = $15.0 \pm 0.4 \text{ mm}; d_t = 0.80 \pm 0.08 \text{ mm}$			pitch = 7.5 mm (bent back)	
0.001	5.0 × 11.0 (13.0) × 17.5	1.2	2222 383 60102	.. 63102
0.0011			2222 383 60112	.. 63112
0.0012			2222 383 60122	.. 63122
0.0013			2222 383 60132	.. 63132
0.0015			2222 383 60152	.. 63152
0.0016			2222 383 60162	.. 63162
0.0018			2222 383 60182	.. 63182
0.002			2222 383 60202	.. 63202
0.0022			2222 383 60222	.. 63222
0.0024			2222 383 60242	.. 63242
0.0027	6.0 × 12.0 (14.0) × 17.5	1.5	2222 383 60272	.. 63272
0.003			2222 383 60302	.. 63302
0.0033			2222 383 60332	.. 63332
0.0036			2222 383 60362	.. 63362
0.0039	7.0 × 13.5 (15.5) × 17.5	2.0	2222 383 60392	.. 63392
0.0043			2222 383 60432	.. 63432
0.0047			2222 383 60472	.. 63472
0.0051	8.5 × 15.0 (17.0) × 17.5	2.7	2222 383 60512	.. 63512
0.0056			2222 383 60562	.. 63562
0.0062			2222 383 60622	.. 63622
0.0068			2222 383 60682	.. 63682
0.0075	10.0 × 16.5 (18.5) × 17.5	3.3	2222 383 60752	.. 63752
0.0082			2222 383 60822	.. 63822
0.0091			2222 383 60912	.. 63912
0.01			2222 383 60103	.. 63103

Note

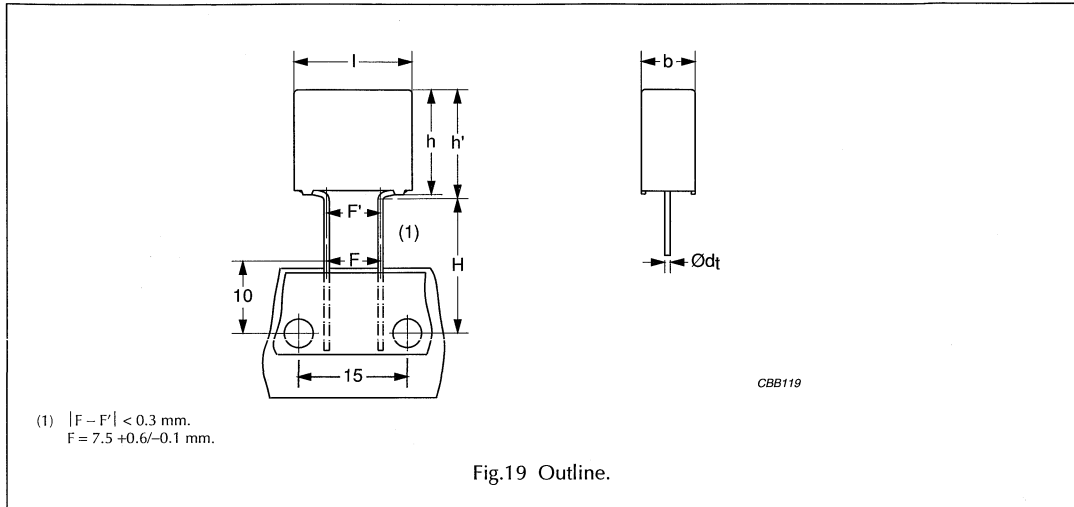
- Dimensions in brackets for bent back leads.

AC and pulse double metallized polypropylene film capacitors

MMKP 383

MMKP 383 GENERAL DATA

PITCH 7.5 mm (bent back leads)



Specific reference data for the 2000 V DC capacitors (for hot asphalt encapsulation)

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: $C \leq 0.01 \mu\text{F}$	$\leq 5 \times 10^{-4}$	$\leq 15 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 2000 V (DC): $C \leq 0.0036 \mu\text{F}$ $0.0036 \mu\text{F} < C \leq 0.0047 \mu\text{F}$	11 000 V/ μs 20 000 V/ μs	
R between leads, for $C \leq 1 \mu\text{F}$ at 500 V; 1 minute	$>100\,000 \text{ M}\Omega$	
R between leads and case; 500 V; 1 minute	$>30\,000 \text{ M}\Omega$	
Ionization (AC) voltage (typical value) at 20 pC peak discharge	$>750 \text{ V}$	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	3 200 V; 1 minute	
Withstanding (DC) voltage between leads and case	2 840 V; 1 minute	

Available 2000 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Taped on reel (bent back)	$H = 16.0 \text{ mm}$; $P_0 = 15.0 \text{ mm}$; reel diameter = 356 mm for hot asphalt encapsulation	$\pm 5\%$	2222 383 66...	on request

AC and pulse double metallized polypropylene film capacitors

MMKP 383

$U_{Rdc} = 2000 \text{ V}$; $U_{Rac} = 700 \text{ V}$; $U_{p-p} = 2000 \text{ V}$ (for hot asphalt encapsulation)

C (μF)	DIMENSIONS ⁽¹⁾ $b \times h (h') \times l$ (mm)	MASS (g)	CATALOGUE NUMBER
			REEL DIAMETER = 356 mm; H = 16.0 mm; $P_o = 15.0 \text{ mm}$
			C-tol = $\pm 5\%$
Pitch = $15.0 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$		pitch = 7.5 mm (bent back)	
0.001	$6.0 \times 12.0 (14.0) \times 17.5$	1.5	2222 383 66102
0.0011			2222 383 66112
0.0012			2222 383 66122
0.0013			2222 383 66132
0.0015			2222 383 66152
0.0016			2222 383 66162
0.0018			2222 383 66182
0.002			2222 383 66202
0.0022			2222 383 66222
0.0024			2222 383 66242
0.0027	$7.0 \times 13.5 (15.5) \times 17.5$	2.0	2222 383 66272
0.003			2222 383 66302
0.0033			2222 383 66332
0.0036			2222 383 66362
0.0039			2222 383 66392
0.0043			2222 383 66432
0.0047			2222 383 66472

Note

1. Dimensions in brackets for bent back leads.

AC and pulse double metallized polypropylene film capacitors

MMKP 383

MMKP 383 GENERAL DATA

PITCH 22.5/27.5 mm

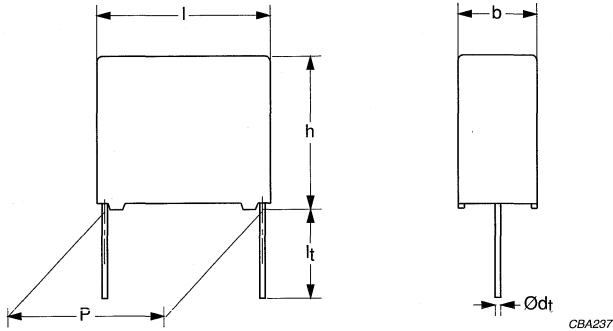


Fig.20 Outline.

Specific reference data for the 2000 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: $0.01 \mu\text{F} < C \leq 0.1 \mu\text{F}$	$\leq 5 \times 10^{-4}$	$\leq 18 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 2000 V (DC): P = 22.5 mm P = 27.5 mm, for $0.024 \mu\text{F} < C \leq 0.068 \mu\text{F}$ P = 27.5 mm, for $0.068 \mu\text{F} < C \leq 0.1 \mu\text{F}$	4400 V/ μs 2500 V/ μs 1800 V/ μs	
R between leads, for $C \leq 1 \mu\text{F}$ at 500 V; 1 minute	>100000 M Ω	
R between leads and case; 500 V; 1 minute	>30000 M Ω	
Ionization (AC) voltage (typical value) at 20 pC peak discharge	>750 V	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	3200 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 2000 V DC versions

PACKAGING ⁽¹⁾	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 3.5 \pm 0.3 \text{ mm}$	$\pm 5\%$	2222 383 60...	preferred
	$l_t = 5.0 \pm 1.0 \text{ mm}$	$\pm 5\%$	2222 383 61...	on request
	$l_t = 25.0 \pm 2.0 \text{ mm}$	$\pm 5\%$	2222 383 64...	on request
Taped on reel	$H = 18.5 \text{ mm}; P_0 = 12.7 \text{ mm}$	$\pm 5\%$	2222 383 62...	on request

Note

1. Taped on reel pitch = 27.5 mm is not available.

AC and pulse double metallized polypropylene film capacitors

MMKP 383

$U_{Rdc} = 2000 \text{ V}$; $U_{Rac} = 700 \text{ V}$; $U_{p-p} = 2000 \text{ V}$

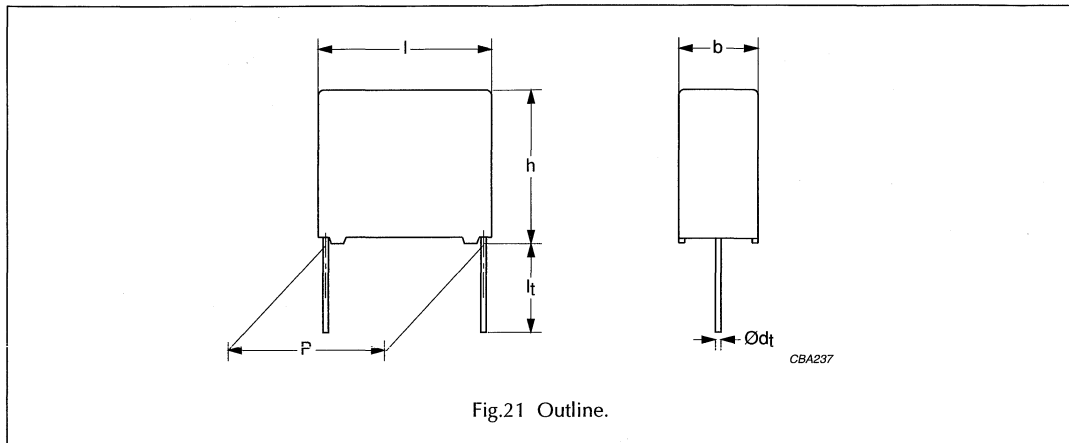
C (μF)	DIMENSIONS $b \times h \times l$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 3.5 \pm 0.3 \text{ mm}$
			C-tol = $\pm 5\%$
Pitch = $22.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.011	7.0 × 16.5 × 26.0	3.5	2222 383 60113
0.012			2222 383 60123
0.013			2222 383 60133
0.015	8.5 × 18.0 × 26.0	4.8	2222 383 60153
0.016			2222 383 60163
0.018			2222 383 60183
0.02	10.0 × 19.5 × 26.0	6.0	2222 383 60203
0.022			2222 383 60223
0.024			2222 383 60243
Pitch = $27.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.027	11.0 × 21.0 × 31.0	8.4	2222 383 60273
0.03			2222 383 60303
0.033			2222 383 60333
0.036			2222 383 60363
0.039			2222 383 60393
0.043	13.0 × 23.0 × 31.0	11.0	2222 383 60433
0.047			2222 383 60473
0.051			2222 383 60513
0.056	15.0 × 25.0 × 31.0	13.6	2222 383 60563
0.062			2222 383 60623
0.068			2222 383 60683
0.075	18.0 × 28.0 × 31.0	18.5	2222 383 60753
0.082			2222 383 60823
0.091			2222 383 60913
0.1			2222 383 60104

AC and pulse double metallized polypropylene film capacitors

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MMKP 383 GENERAL DATA

PITCH 22.5 mm



Specific reference data for the 2500 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: $C \leq 0.015 \mu\text{F}$	$\leq 5 \times 10^{-4}$	$\leq 10 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 2500 V (DC)	13 000 V/ μs	
R between leads, for $C \leq 1 \mu\text{F}$ at 500 V; 1 minute	>100 000 M Ω	
R between leads and case; 500 V; 1 minute	>30 000 M Ω	
Ionization (AC) voltage (typical value) at 20 pC peak discharge	>1 000 V	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	3 500 V; 1 minute	
Withstanding (DC) voltage between leads and case	2 840 V; 1 minute	

Available 2500 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 3.5 \pm 0.3 \text{ mm}$	$\pm 5\%$	2222 383 70...	preferred
	$l_t = 5.0 \pm 1.0 \text{ mm}$	$\pm 5\%$	2222 383 71...	on request
	$l_t = 25.0 \pm 2.0 \text{ mm}$	$\pm 5\%$	2222 383 74...	on request
Taped on reel	$H = 18.5 \text{ mm}; P_0 = 12.7 \text{ mm}$	$\pm 5\%$	2222 383 72...	on request

AC and pulse double metallized polypropylene film capacitors

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 $U_{Rdc} = 2500 \text{ V}; U_{Rac} = 900 \text{ V}; U_{p-p} = 2500 \text{ V}$

C (μF)	DIMENSIONS $b \times h \times l$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 3.5 \pm 0.3 \text{ mm}$
			C-tol = $\pm 5\%$
Pitch = $22.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.001	6.0 × 15.5 × 26.0	3.0	2222 383 70102
0.0011			2222 383 70112
0.0012			2222 383 70122
0.0013			2222 383 70132
0.0015			2222 383 70152
0.0016			2222 383 70162
0.0018			2222 383 70182
0.002			2222 383 70202
0.0022			2222 383 70222
0.0024			2222 383 70242
0.0027			2222 383 70272
0.003			2222 383 70302
0.0033			2222 383 70332
0.0036			2222 383 70362
0.0039			2222 383 70392
0.0043			2222 383 70432
0.0047	2222 383 70472		
0.0051	2222 383 70512		
0.0056	2222 383 70562		
0.0062	7.0 × 16.5 × 26.0	3.5	2222 383 70622
0.0068			2222 383 70682
0.0075			2222 383 70752
0.0082	8.5 × 18.0 × 26.0	4.8	2222 383 70822
0.0091			2222 383 70912
0.01			2222 383 70103
0.011			2222 383 70113
0.012	10.0 × 19.5 × 26.0	6.0	2222 383 70123
0.013			2222 383 70133
0.015			2222 383 70153

AC and pulse double metallized polypropylene film capacitors

MMKP 383

MMKP 383 GENERAL DATA

PITCH 27.5 mm

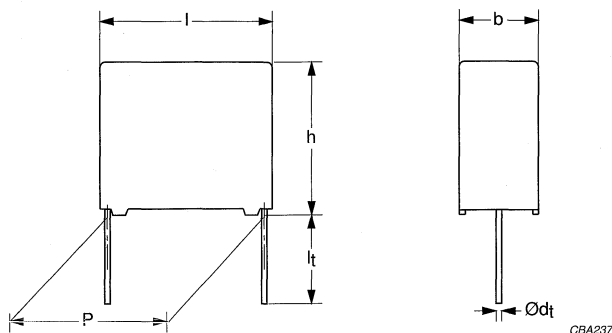


Fig.22 Outline.

Specific reference data for the 2500 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: $0.015 \mu\text{F} < C \leq 0.056 \mu\text{F}$	$\leq 5 \times 10^{-4}$	$\leq 15 \times 10^{-4}$
Rated voltage pulse slope (dU/dt) _R at 2500 V (DC): P = 27.5 mm, for $0.015 \mu\text{F} < C \leq 0.043 \mu\text{F}$ P = 27.5 mm, for $0.043 \mu\text{F} < C \leq 0.056 \mu\text{F}$	6000 V/ μs 4200 V/ μs	
R between leads, for $C \leq 1 \mu\text{F}$ at 500 V; 1 minute	>100000 M Ω	
R between leads and case; 500 V; 1 minute	>30000 M Ω	
Ionization (AC) voltage (typical value) at 20 pC peak discharge	>1000 V	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	3500 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 2500 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 3.5 \pm 0.3 \text{ mm}$	$\pm 5\%$	2222 383 70...	preferred
	$l_t = 5.0 \pm 1.0 \text{ mm}$	$\pm 5\%$	2222 383 71...	on request
	$l_t = 25.0 \pm 2.0 \text{ mm}$	$\pm 5\%$	2222 383 74...	on request

AC and pulse double metallized polypropylene film capacitors

MMKP 383

$U_{Rdc} = 2500 \text{ V}$; $U_{Rac} = 900 \text{ V}$; $U_{p-p} = 2500 \text{ V}$

C (μF)	DIMENSIONS $b \times h \times l$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 3.5 \pm 0.3 \text{ mm}$
			C-tol = $\pm 5\%$
Pitch = $27.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.016	$9.0 \times 19.0 \times 31.0$	6.0	2222 383 70163
0.018	$11.0 \times 21.0 \times 31.0$	8.4	2222 383 70183
0.02			2222 383 70203
0.022			2222 383 70223
0.024			2222 383 70243
0.027	$13.0 \times 23.0 \times 31.0$	11.0	2222 383 70273
0.03			2222 383 70303
0.033			2222 383 70333
0.036	$15.0 \times 25.0 \times 31.0$	13.6	2222 383 70363
0.039			2222 383 70393
0.043			2222 383 70433
0.047	$18.0 \times 28.0 \times 31.0$	18.5	2222 383 70473
0.051			2222 383 70513
0.056			2222 383 70563

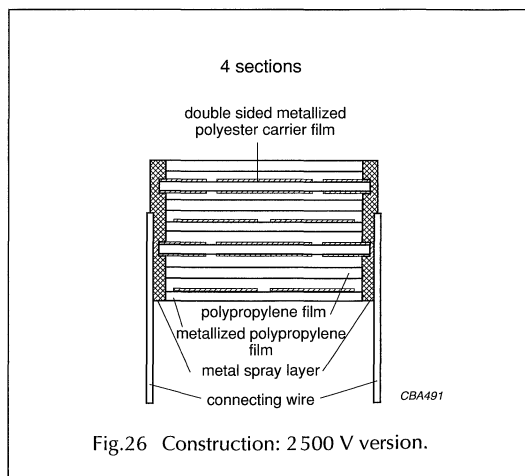
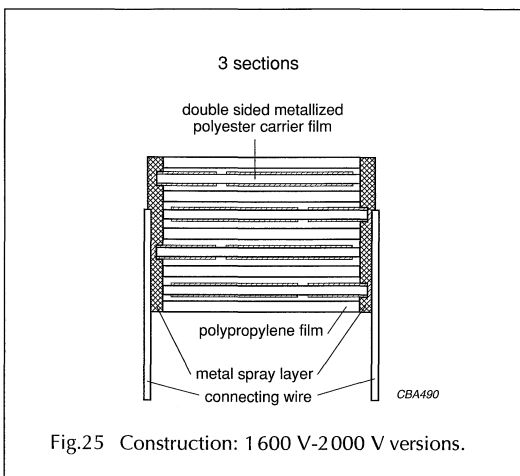
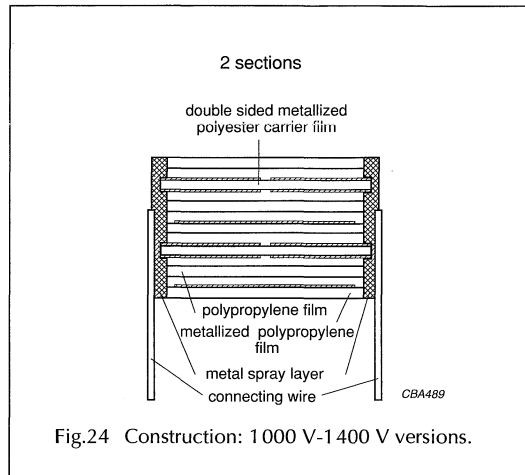
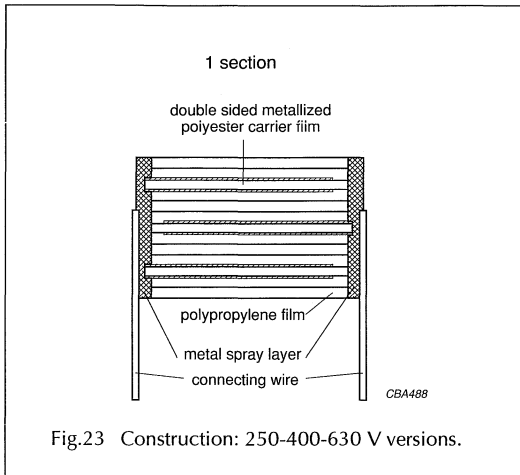
AC and pulse double metallized polypropylene film capacitors

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CONSTRUCTION

Description

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



AC and pulse double metallized polypropylene film capacitors

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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 tape specifications refer to this handbook, chapter "Packaging information".

SPECIFIC METHOD OF MOUNTING TO WITHSTAND VIBRATION AND SHOCK

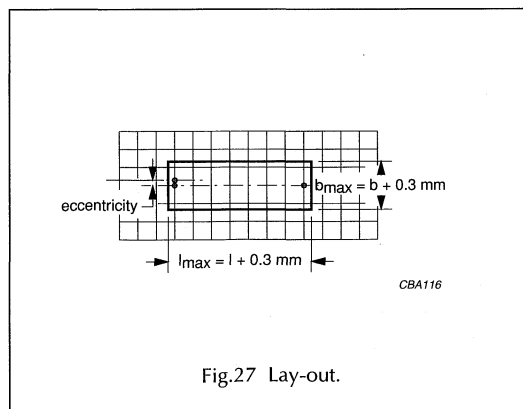
In order to withstand vibration and shock tests, it must be ensured that the stand-off pips are in good contact with the printed-circuit board:

- For original pitch = 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 Fig.27:

- Eccentricity as in Fig.27. 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 60717" as reference: $h_{\max} \leq h + 0.3 \text{ mm}$.



Storage temperature

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

RATINGS AND CHARACTERISTICS REFERENCE CONDITIONS

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 $50 \pm 2\%$.

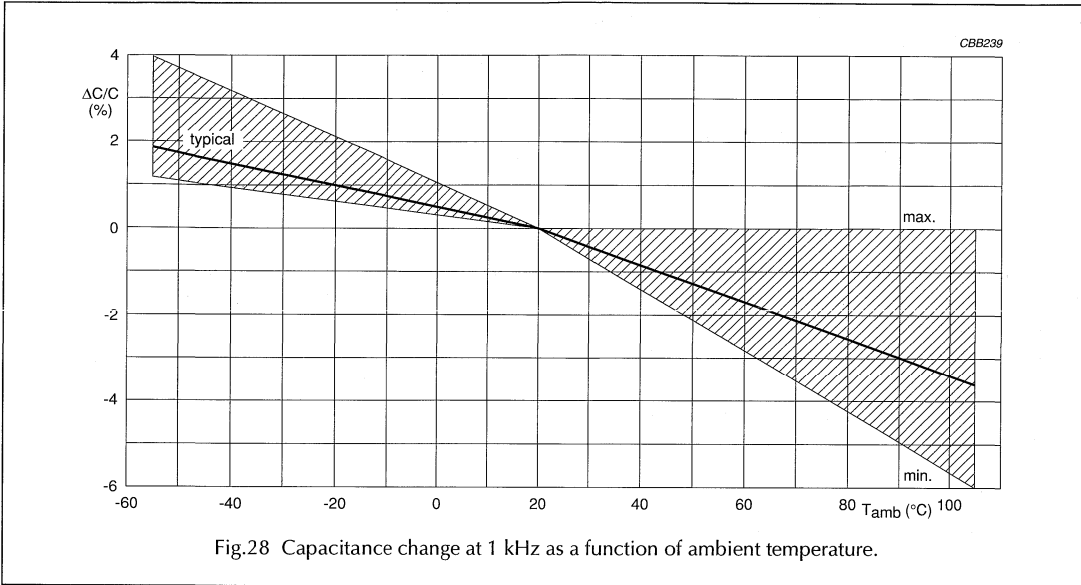
For reference testing, a conditioning period shall be applied over 96 ± 4 hours by heating the products in a circulating air oven at the rated temperature and a relative humidity not exceeding 20%.

AC and pulse double metallized polypropylene film capacitors

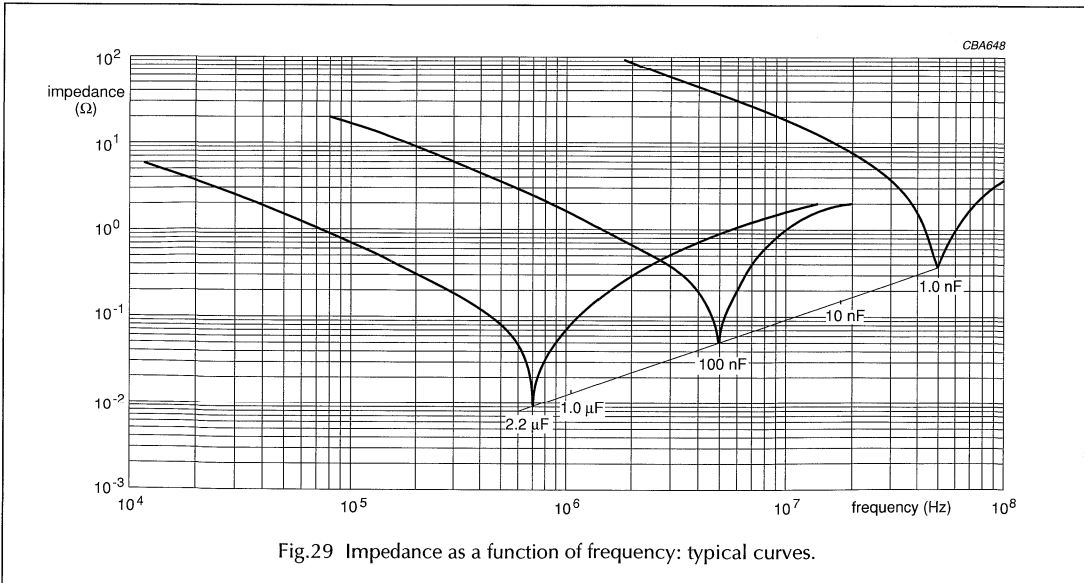
MMKP 383

CHARACTERISTICS

Capacitance



Impedance



AC and pulse double metallized polypropylene film capacitors

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Maximum DC voltage as a function of temperature

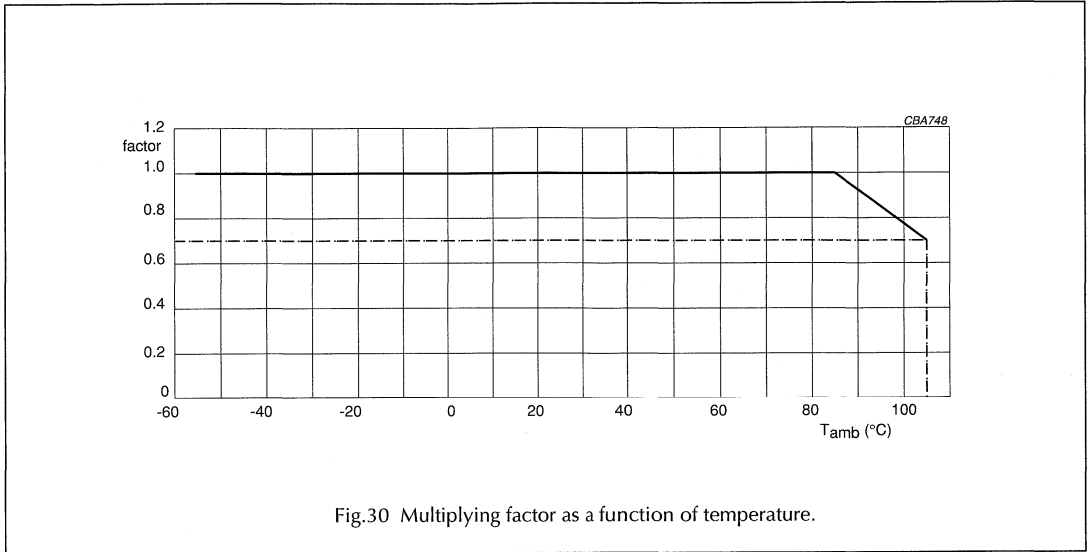
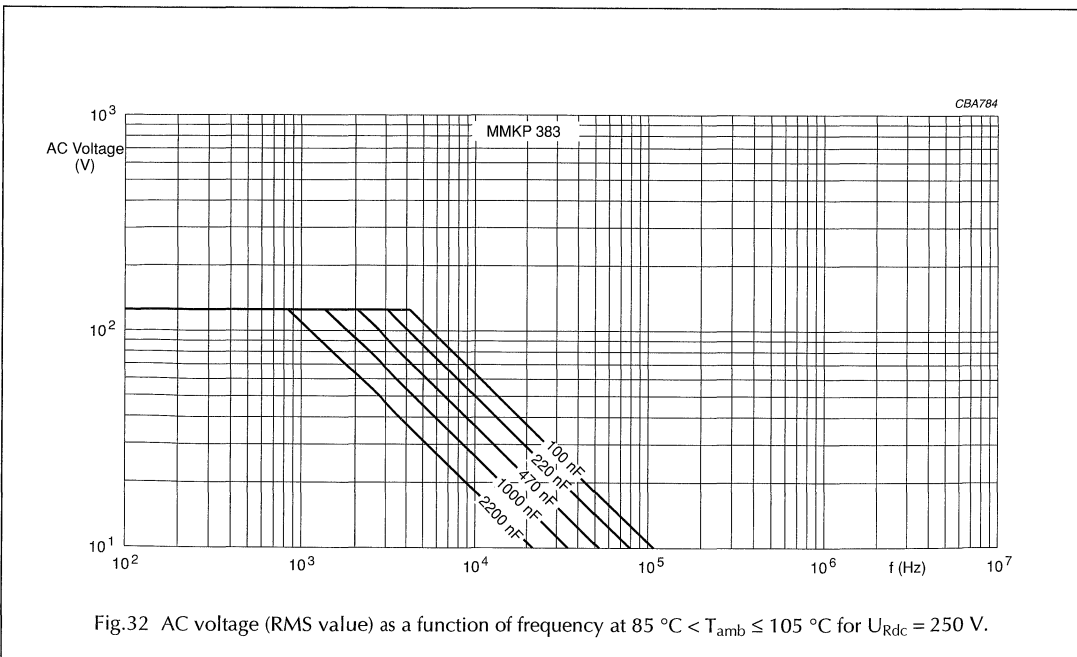
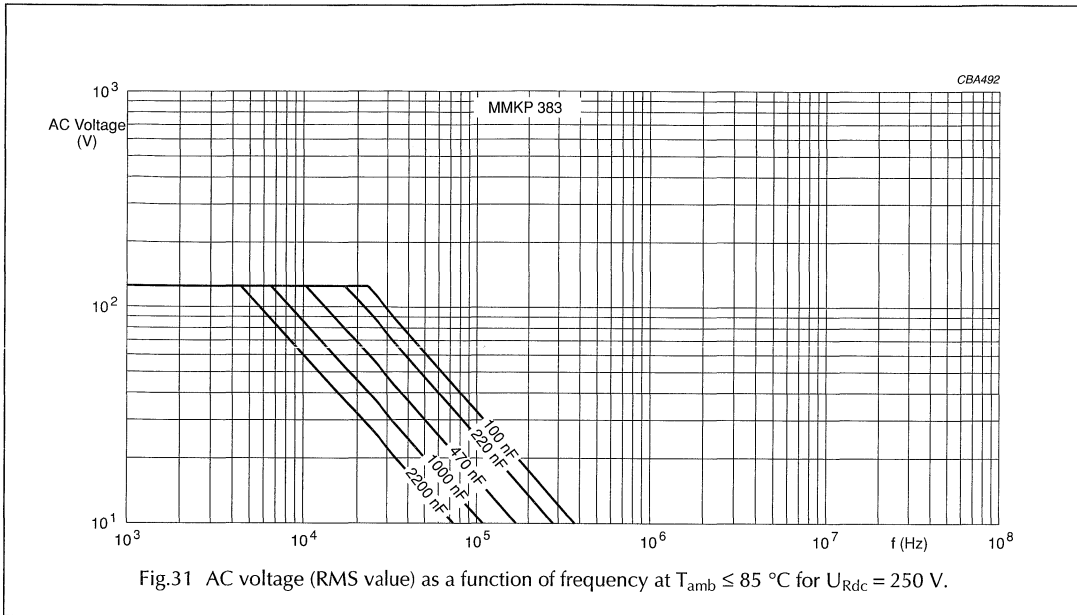


Fig.30 Multiplying factor as a function of temperature.

AC and pulse double metallized polypropylene film capacitors

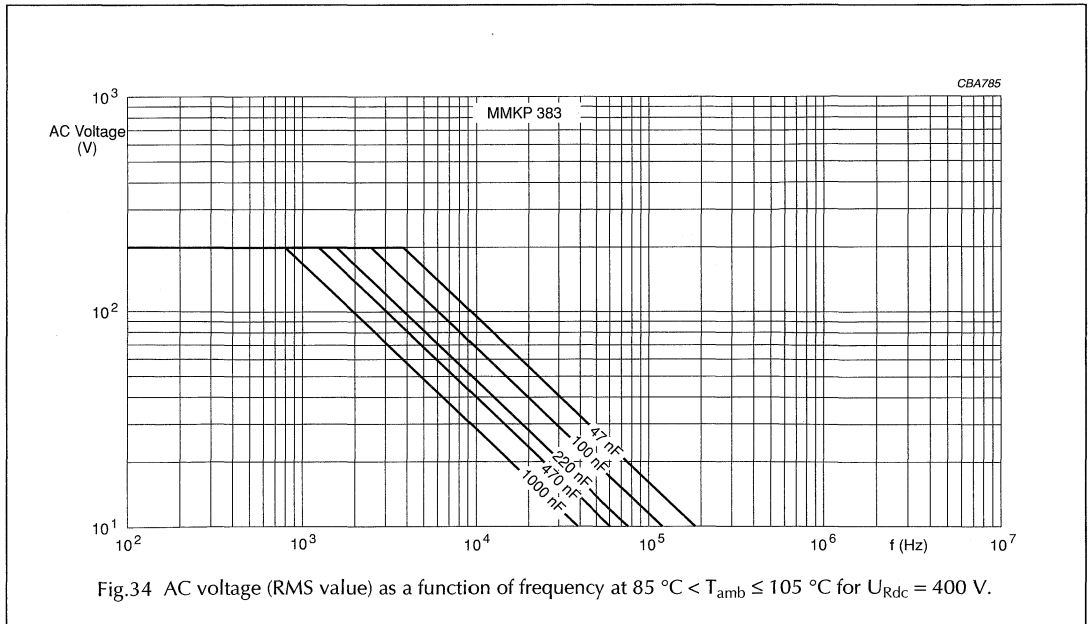
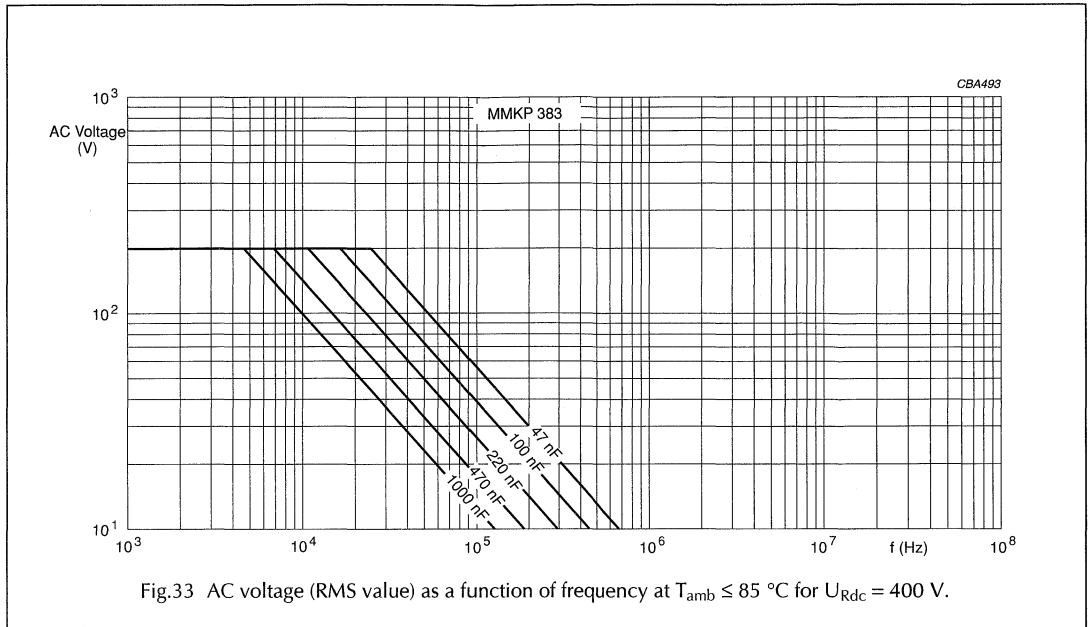
MMKP 383

Maximum RMS voltage (sinewave) as a function of frequency



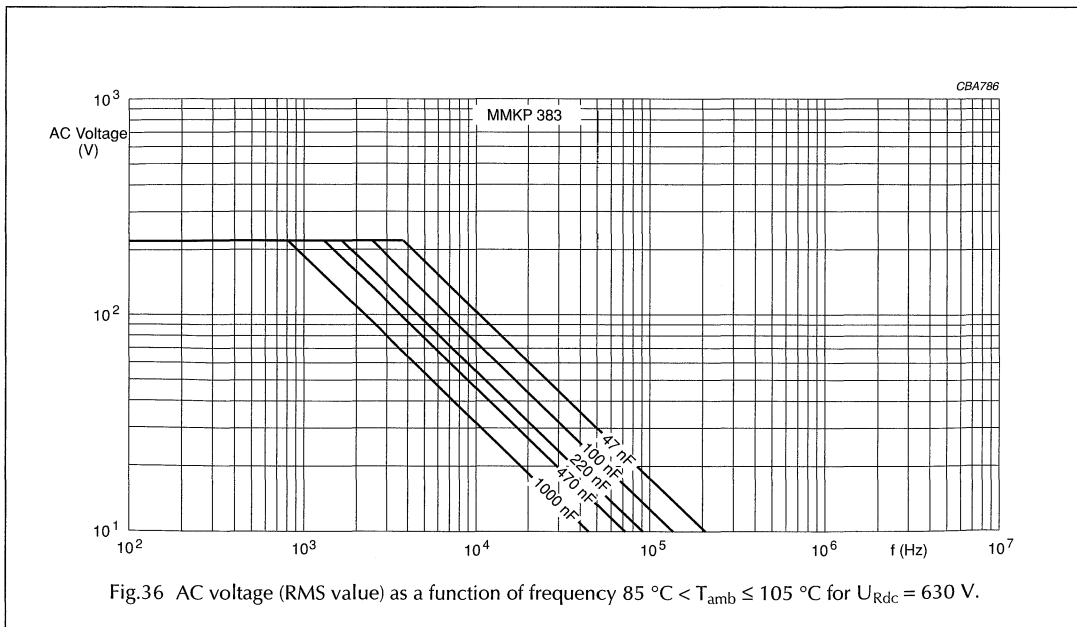
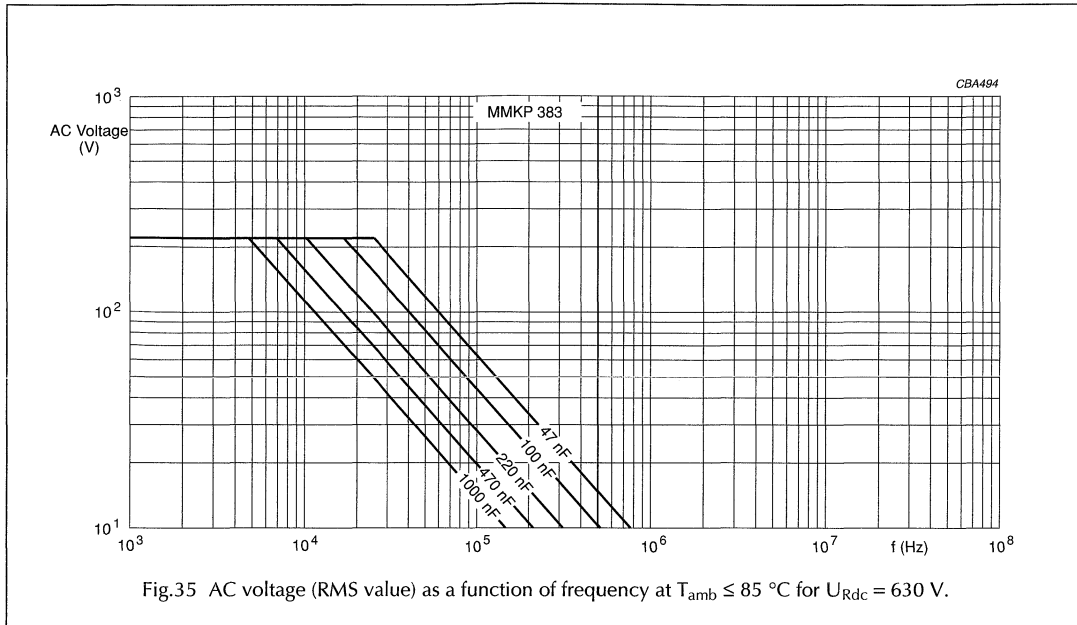
AC and pulse double metallized polypropylene film capacitors

MMKP 383



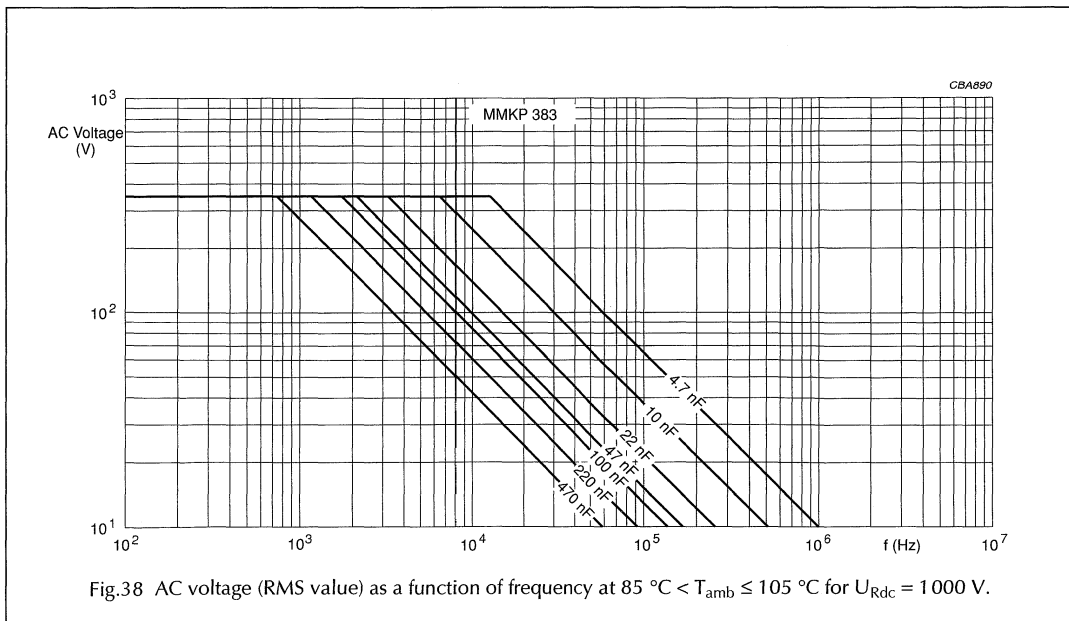
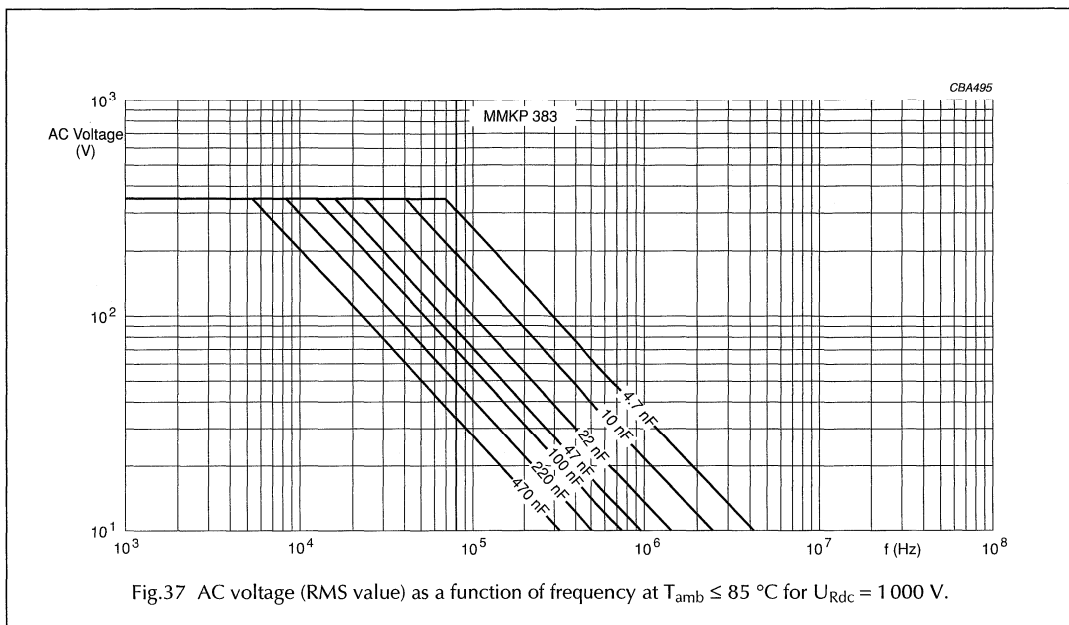
**AC and pulse double
metallized polypropylene film capacitors**

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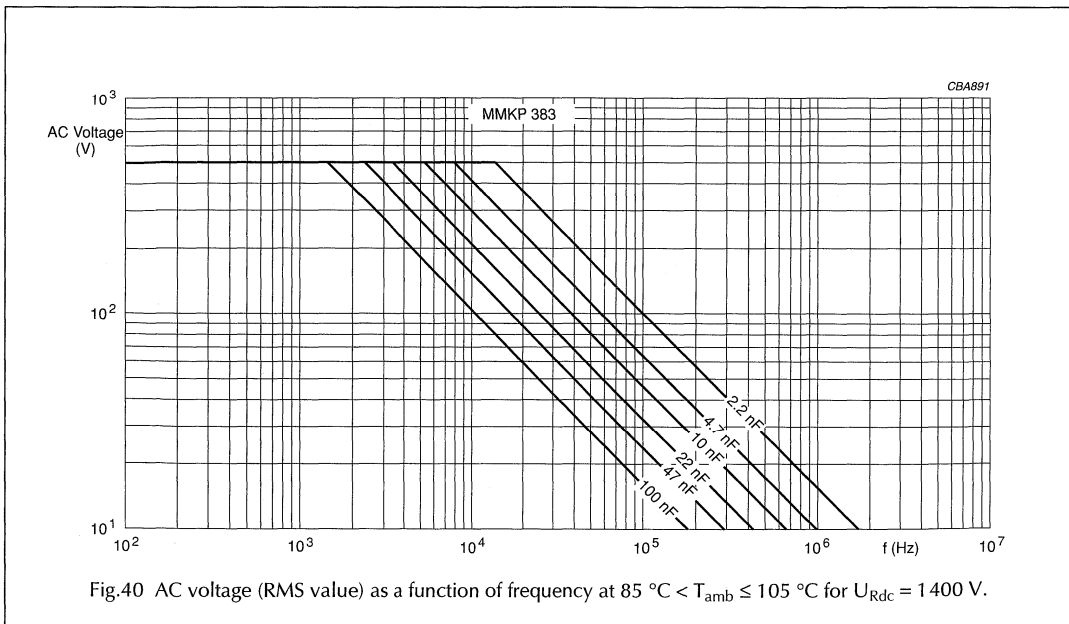
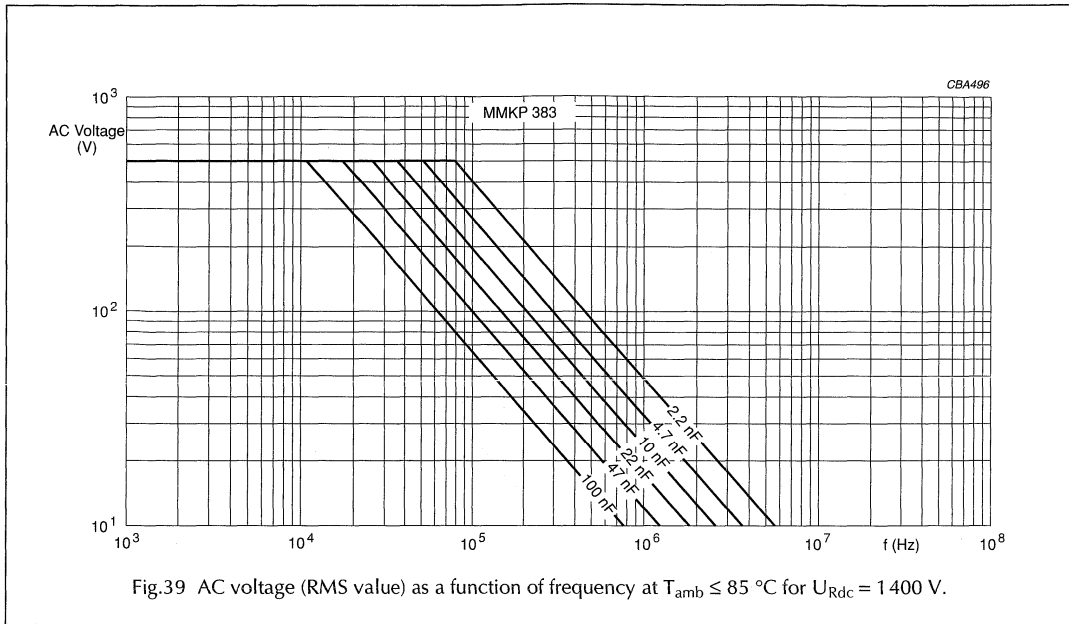
AC and pulse double metallized polypropylene film capacitors

MMKP 383



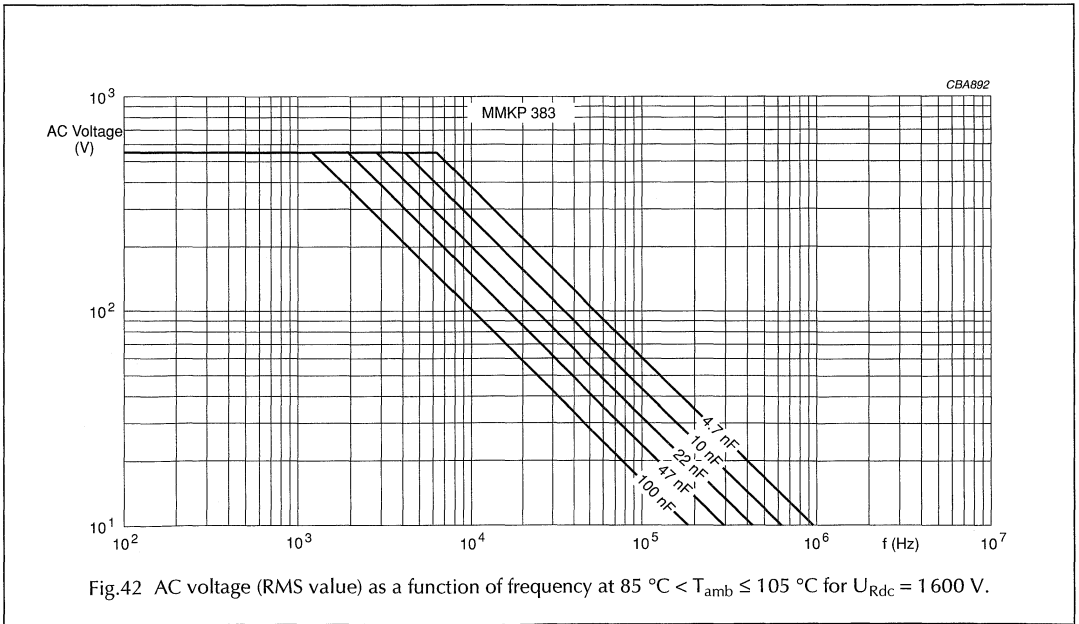
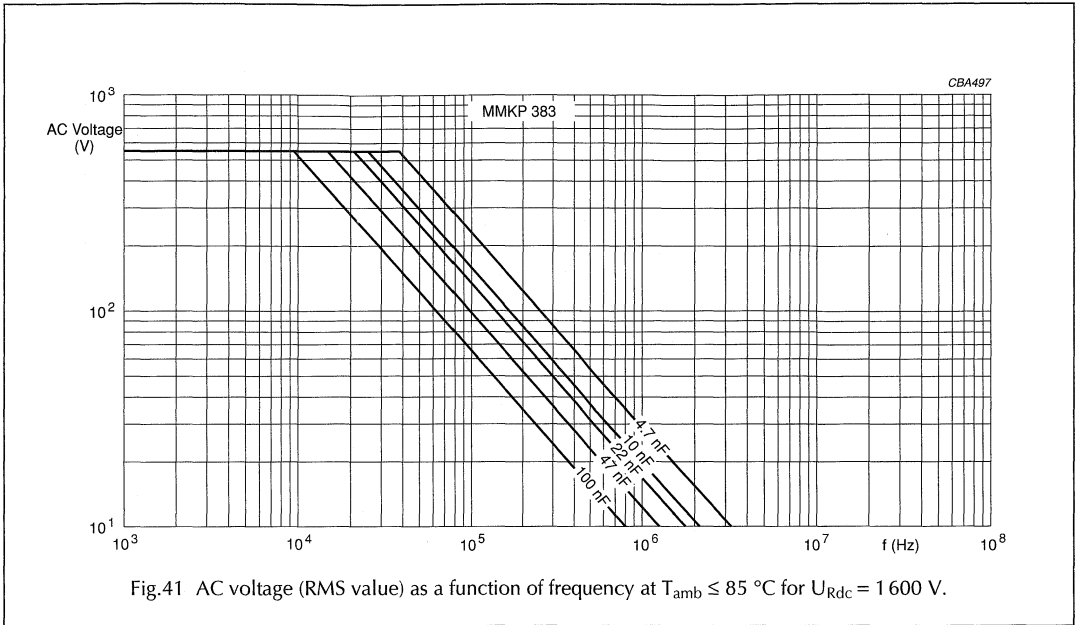
AC and pulse double metallized polypropylene film capacitors

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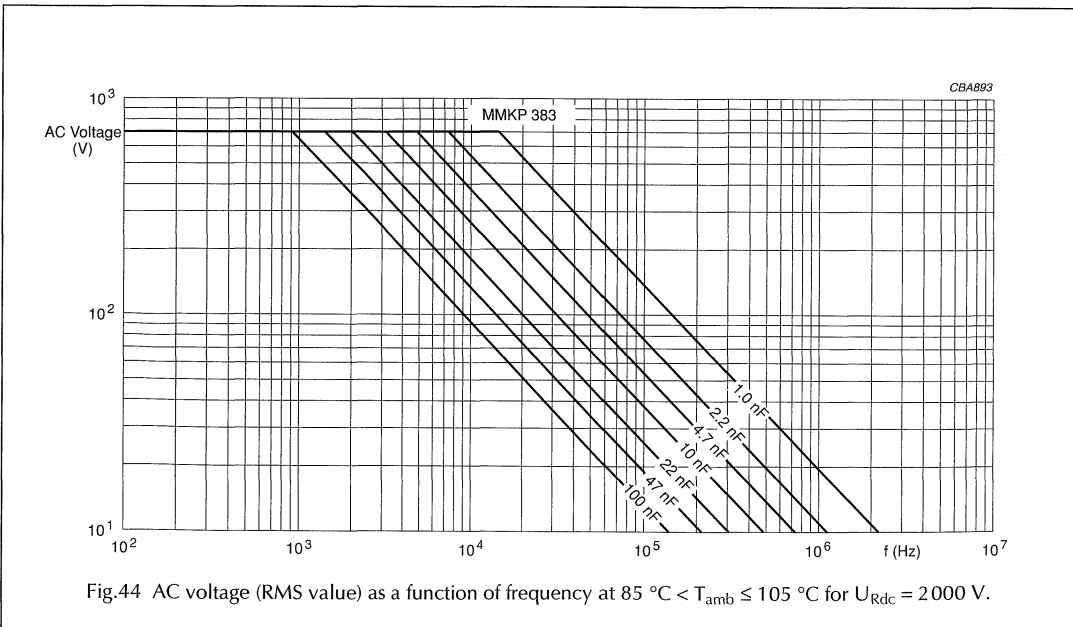
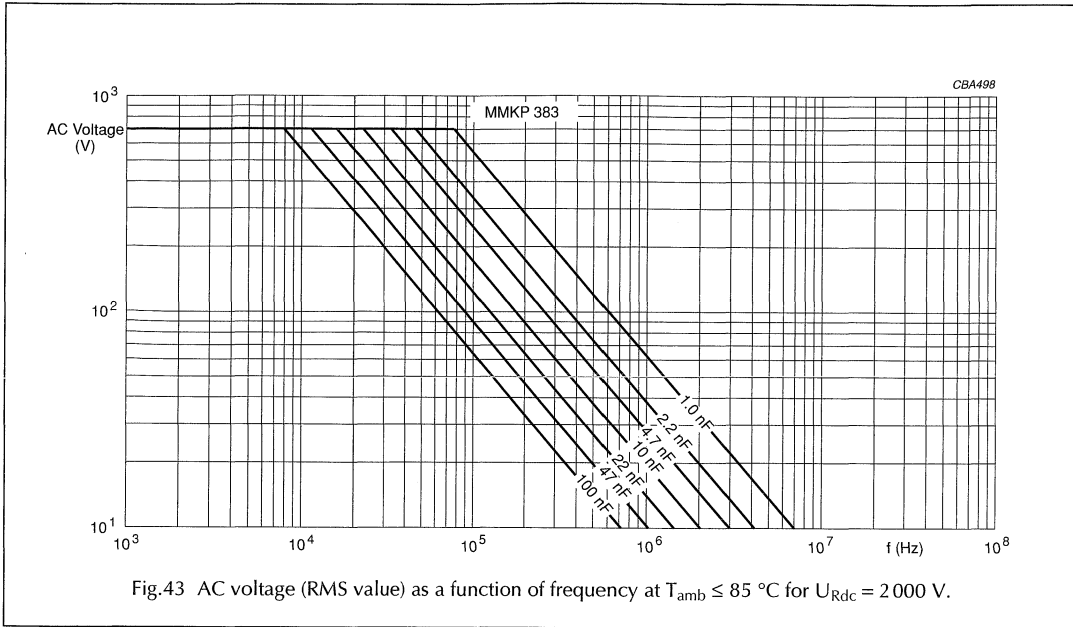
AC and pulse double metallized polypropylene film capacitors

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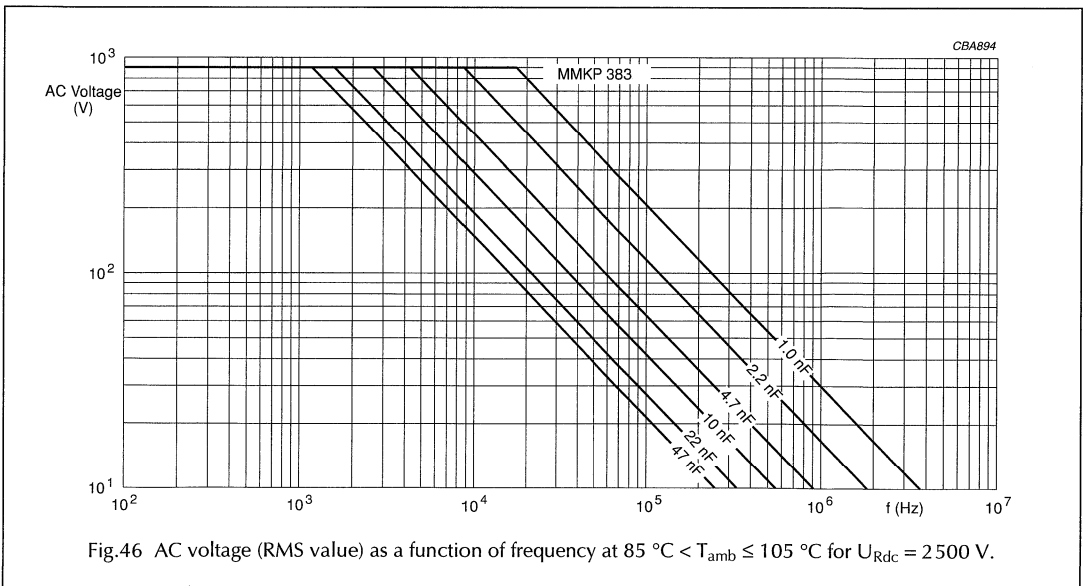
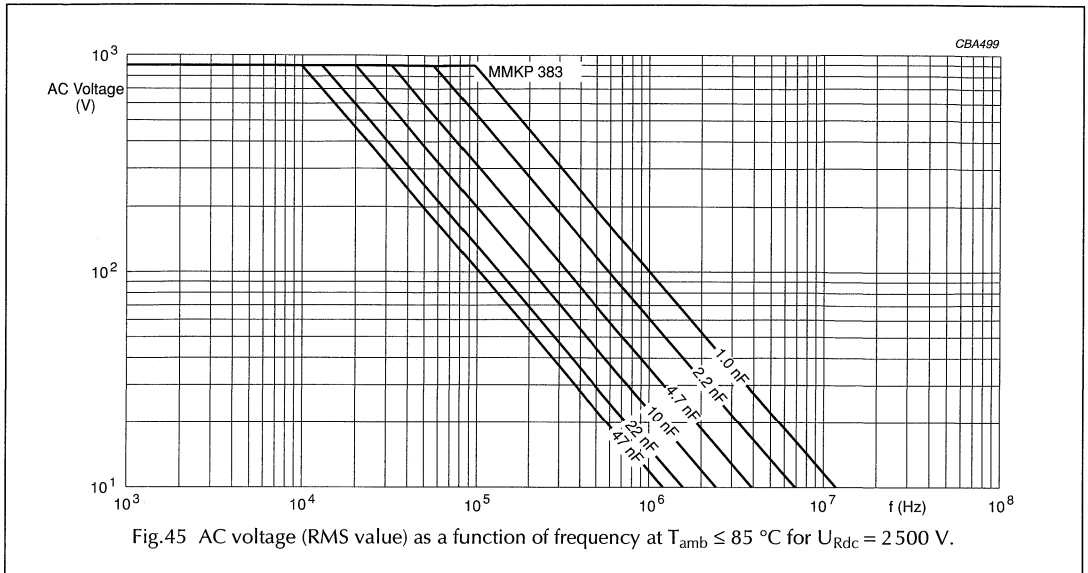
AC and pulse double metallized polypropylene film capacitors

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AC and pulse double metallized polypropylene film capacitors

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Maximum RMS current (sinewave) as a function of frequency

The maximum RMS current is defined by $I_{ac} = \omega \times C \times U_{ac}$.

U_{ac} is the maximum AC voltage depending on the ambient temperature in Figs 31 to 46.

AC and pulse double metallized polypropylene film capacitors

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Tangent of loss angle

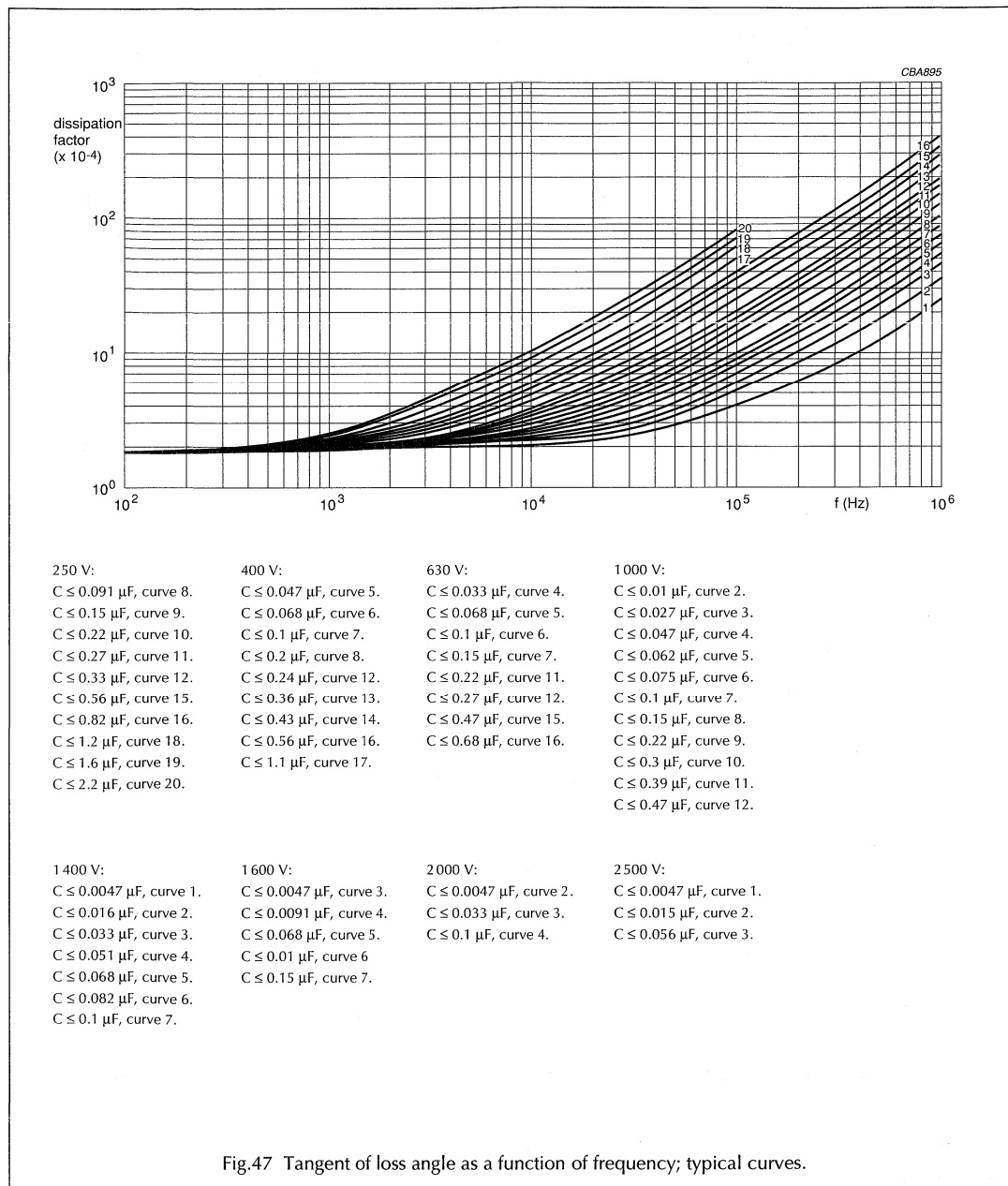
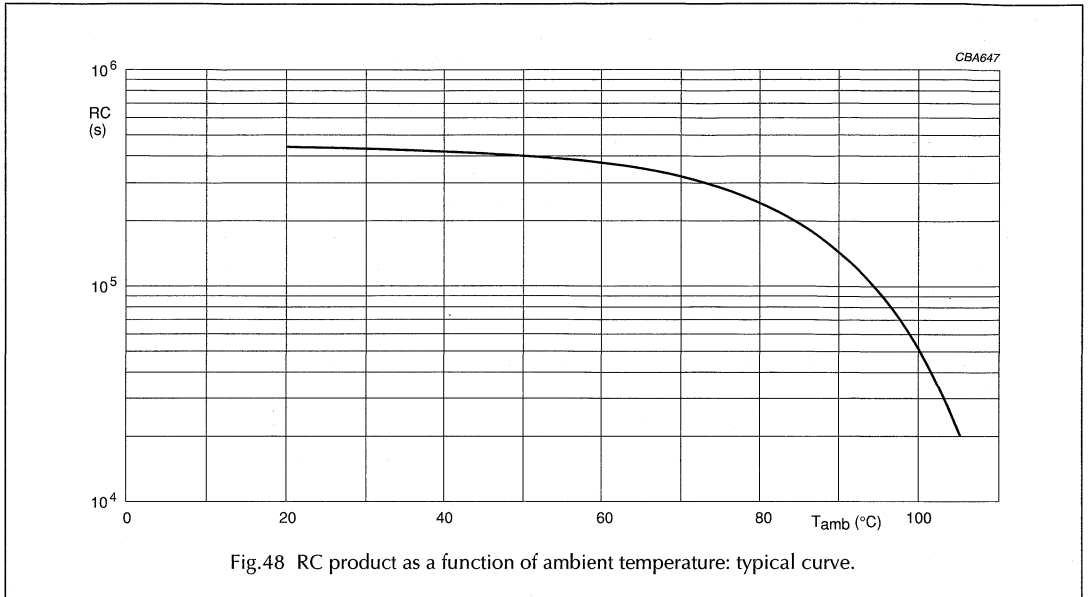


Fig.47 Tangent of loss angle as a function of frequency; typical curves.

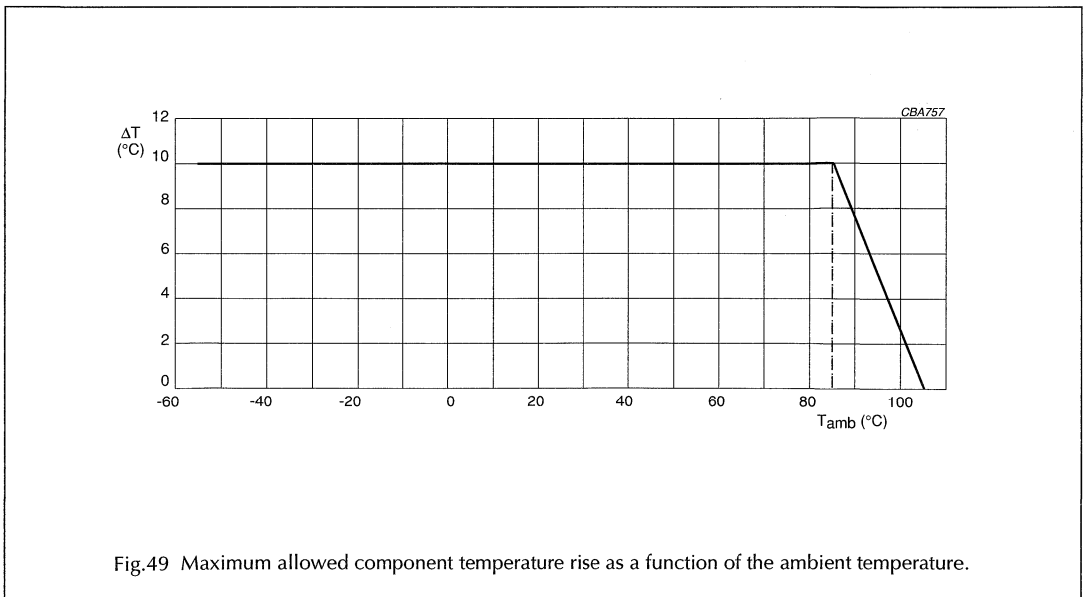
AC and pulse double metallized polypropylene film capacitors

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Insulation resistance



Maximum allowed component temperature rise (ΔT) as a function of the ambient temperature (T_{amb})



AC and pulse double metallized polypropylene film capacitors

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Heat conductivity (G) as a function of pitch and capacitor body thickness in mW/°C

Table 1 Heat conductivity

b _{max} (mm)	ORIGINAL PITCH (mm)		
	15	22.5	27.5
4.0	–	–	–
5.0	10	–	–
6.0	11	19	–
7.0	12	21	–
8.5	16	25	–
10.0	18	28	–
11.0	–	–	36
13.0	–	–	42
15.0	–	–	48
18.0	–	–	57

Power dissipation and maximum component temperature rise

The power dissipation must be limited in order not to exceed the maximum allowed component temperature rise as a function of the free air ambient temperature.

The power dissipation can be calculated according Type detail specification "HQN-384-01/001", with the typical $\tan \delta$ of the curves in Fig.47.

The component temperature rise (ΔT) can be measured (see section "Measuring the component temperature" for more details) or calculated by $\Delta T = P/G$

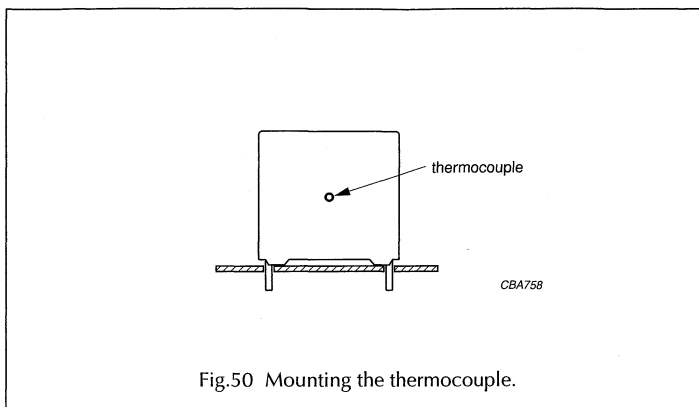
- ΔT = component temperature rise (°C).
- P = power dissipation of the component (mW).
- G = heat conductivity of the component (mW/°C).

AC and pulse double metallized polypropylene film capacitors

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Measuring the component temperature

A thermocouple must be attached to the capacitor body; see Fig.50.



The temperature is measured in unloaded (T_{amb}) and maximum loaded condition (T_c).

The temperature rise is given by $\Delta T = T_c - T_{amb}$.

To avoid radiation or convection, the capacitor should be tested in a wind-free box.

AC and pulse double metallized polypropylene film capacitors

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Application note and limiting conditions

These capacitors are not suitable for mains applications as across-the-line capacitors without additional protection, as described hereunder. These mains applications are strictly regulated in safety standards and therefore electromagnetic interference suppression capacitors conforming the standards must be used.

To select the capacitor for a certain application, the following 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 the maximum U_{p-p} to avoid the ionisation inception level.
3. The voltage pulse slope (dU/dt) shall not exceed the rated voltage pulse slope in an RC-circuit at rated voltage and without ringing. If the pulse voltage is lower than the rated DC voltage, the rated voltage pulse slope may be multiplied by U_{Rdc} and divided by the applied voltage.

For all other pulses following equation must be fulfilled:

$$2 \times \int_0^T \left(\frac{dU}{dt} \right)^2 \times dt < U_{Rdc} \times \left(\frac{dU}{dt} \right)_{rated}$$

T is the pulse duration.

4. The maximum component surface temperature rise must be lower than the limits in Fig.49.
5. Since in circuits used at voltages over 280 V peak-to-peak the risk for an intrinsically active flammability after a capacitor breakdown (short circuit) increases, it is recommended that the power to the component is limited to 100 times the values mentioned in Table 1 "Heat conductivity".
6. When using these capacitors as across-the-line capacitor in the input filter for mains applications or as series connected with an impedance to the mains the applicant must guarantee that following conditions are fulfilled in any case (spikes and surge voltages from the mains included).

VOLTAGE CONDITIONS FOR 6 ABOVE

ALLOWED VOLTAGES	$T_{amb} \leq 85 \text{ }^\circ\text{C}$	$85 \text{ }^\circ\text{C} < T_{amb} \leq 105 \text{ }^\circ\text{C}$
Maximum continuous RMS voltage	U_{Rac}	U_{Rac}
Maximum temporary RMS -overvoltage (<24 hours)	$1.25 \times U_{Rac}$	$1.25 \times U_{Rac}$
Maximum peak voltage ($V_{o,p}$) (<2 s)	$1.6 \times U_{Rdc}$	$1.1 \times U_{Rdc}$

AC and pulse double metallized polypropylene film capacitors

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Example

$C = 4 \text{ n7} - 1600 \text{ V}$ used for the voltage signal shown in Fig.51.

$$U_{p-p} = 1000 \text{ V}; U_p = 900 \text{ V}; T_1 = 12 \mu\text{s}; T_2 = 64 \mu\text{s}; T_3 = 4 \mu\text{s}$$

The ambient temperature is $80 \text{ }^\circ\text{C}$. In case of failure, the oscillation is blocked.

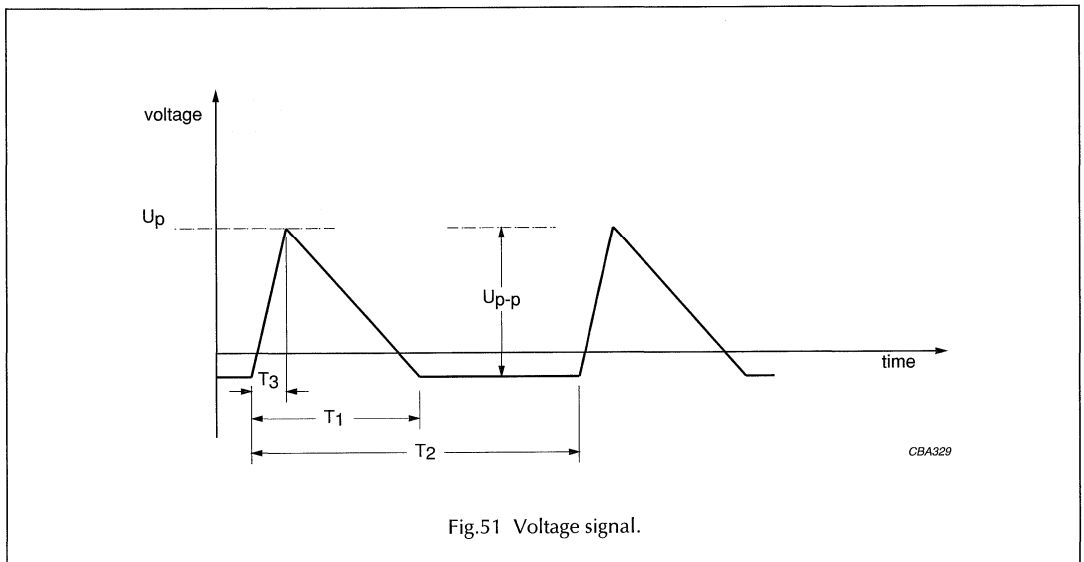
Checking the conditions:

1. The peak voltage $U_p = 900 \text{ V}$ is lower than 1600 V (DC).
2. The peak-to-peak voltage 1000 V is lower than $2 \times \sqrt{2} \times 550 \text{ V(AC)} = 1600 U_{p-p}$.
3. The voltage pulse slope $dU/dt = 1000 \text{ V}/4 \mu\text{s} = 250 \text{ V}/\mu\text{s}$.
This is lower than $8000 \text{ V}/\mu\text{s}$ (see specific reference data for each version).
4. The dissipated power is 35 mW as calculated with Fourier terms and typical tangent of loss angle.

$$\text{The temperature rise for } b_{\text{max}} = 6.0 \text{ and pitch} = 15 \text{ mm will be } \frac{35 \text{ mW}}{11 \text{ mW}/^\circ\text{C}} = 3.2 \text{ }^\circ\text{C}.$$

This is lower than $10 \text{ }^\circ\text{C}$ temperature rise at $80 \text{ }^\circ\text{C}$; see Fig.49.

5. Oscillation is blocked.
6. Not applicable.



AC and pulse double metallized polypropylene film capacitors

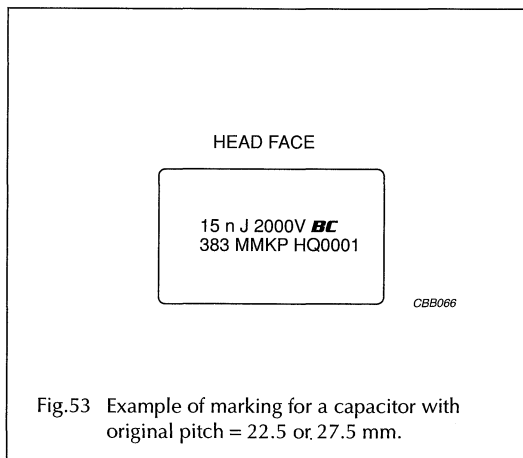
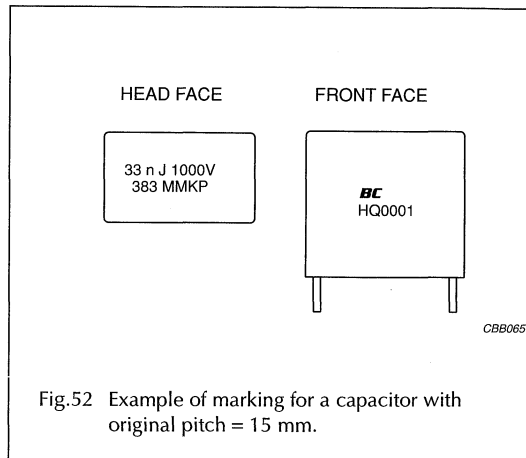
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MARKING

Product marking

The capacitors are marked on the top for original pitch ≥ 22.5 mm (see Fig.53) or on the top and one side for original pitch = 15 mm (see Fig.52), with the following information:

1. Rated capacitance code in accordance with "IEC 60062"
2. Tolerance on rated capacitance: J = $\pm 5\%$
3. Rated (DC) voltage (e.g. 1 000 V)
4. Code for dielectric material (MMKP)
5. Code for factory of origin (HQ)
6. Manufacturer's type designation (383)
7. Manufacturer
8. Year and week of manufacture (e.g. 0001).



AC and pulse double metallized polypropylene film capacitors

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QUICK REFERENCE TEST REQUIREMENTS

TEST	PROCEDURE (quick reference)	REQUIREMENTS
Robustness of leads		
Tensile strength: "IEC 60068-2-21"	load 10 N; 10 s	no visible damage legible marking $ \Delta C/C \leq 1\%$ $\Delta \tan \delta \leq 5 \times 10^{-4}$ ($C \leq 100$ nF) $\Delta \tan \delta \leq 10 \times 10^{-4}$ (100 nF < $C \leq 470$ nF) $\Delta \tan \delta \leq 15 \times 10^{-4}$ ($C > 470$ nF)
Bending: "IEC 60068-2-21"	load 5 N; $4 \times 90^\circ$	
Resistance to soldering heat: "IEC 60068-2-20"	solder bath: 260 °C; 10 s	
Component solvent resistance	isopropyl alcohol; 23 °C; 5 minutes	
Robustness of component		
Vibration: "IEC 60068-2-6"	10 Hz to 55 Hz; amplitude 0.75 mm or acceleration 98 m/s ² ; 6 hours	$ \Delta C/C \leq 1\%$ $\Delta \tan \delta \leq 5 \times 10^{-4}$ ($C \leq 100$ nF) $\Delta \tan \delta \leq 10 \times 10^{-4}$ (100 nF < $C \leq 470$ nF) $\Delta \tan \delta \leq 15 \times 10^{-4}$ ($C > 470$ nF)
Shock: "IEC 60068-2-27"	half sinewave; 490 m/s ² ; 11 ms	
Climatic sequence		
Dry heat: "IEC 60068-2-2"	16 hours; +105 °C	$ \Delta C/C \leq 2\%$ (original pitch = 22.5 or 27.5 mm) $ \Delta C/C \leq 3\%$ (original pitch = 15 mm) $\Delta \tan \delta \leq 5 \times 10^{-4}$ ($C \leq 100$ nF) $\Delta \tan \delta \leq 10 \times 10^{-4}$ (100 nF < $C \leq 470$ nF) $\Delta \tan \delta \leq 15 \times 10^{-4}$ ($C > 470$ nF) $R_{ins} \geq 50\%$ of specified value
Damp heat, cyclic, test Db, first cycle: "IEC 60068-2-30"		
Cold: "IEC 60068-2-1"	2 hours; -55 °C	
Damp heat, cyclic, test Db, remaining cycles: "IEC 60068-2-30"		
Other applicable tests		
Damp heat, steady state: "IEC 60068-2-3"	56 days; 40 °C; 90 to 95% RH	$ \Delta C/C \leq 1\%$ $\Delta \tan \delta \leq 5 \times 10^{-4}$ ($C \leq 100$ nF) $\Delta \tan \delta \leq 10 \times 10^{-4}$ (100 nF < $C \leq 470$ nF) $\Delta \tan \delta \leq 15 \times 10^{-4}$ ($C > 470$ nF) $R_{ins} \geq 50\%$ of specified value
Endurance (AC): "IEC 60384-17"	2000 hours; $1.25 \times U_{Rac}$ (RMS); 50 Hz; 105 °C	
		$ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 5 \times 10^{-4}$ ($C \leq 100$ nF) $\Delta \tan \delta \leq 10 \times 10^{-4}$ (100 nF < $C \leq 470$ nF) $\Delta \tan \delta \leq 15 \times 10^{-4}$ ($C > 470$ nF) $R_{ins} \geq 50\%$ of specified value

AC and pulse double metallized polypropylene film capacitors

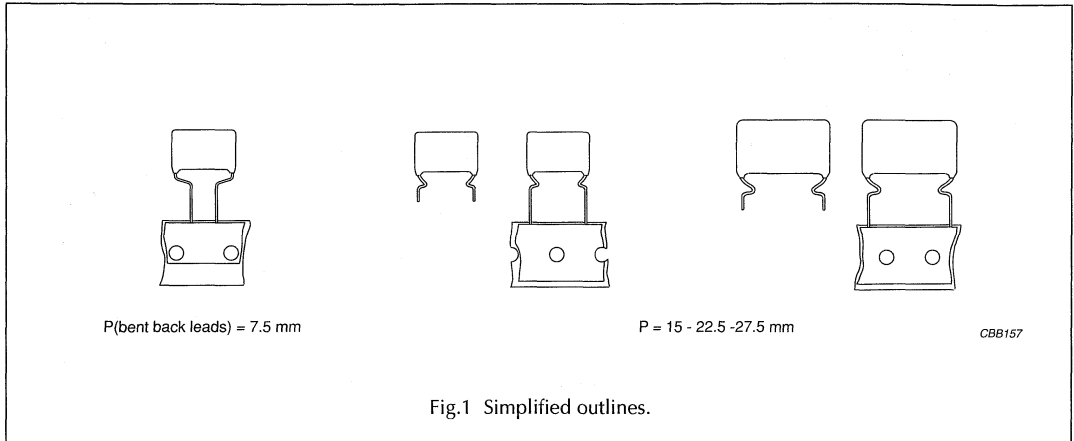
MMKP 383

TEST	PROCEDURE (quick reference)	REQUIREMENTS
Heat storage: "IEC 60384-17"	2 000 hours; 105 °C	$ \Delta C/C \leq 1\%$ (original pitch = 22.5 or 27.5 mm) $ \Delta C/C \leq 2\%$ (original pitch = 15 mm) $\Delta \tan \delta \leq 5 \times 10^{-4}$ ($C \leq 100$ nF) $\Delta \tan \delta \leq 10 \times 10^{-4}$ (100 nF < $C \leq 470$ nF) $\Delta \tan \delta \leq 15 \times 10^{-4}$ ($C > 470$ nF)
Resistance to soldering heat with preheating: "IEC 60384-17"	body temperature: 105 °C; bath temperature: 260 °C; dwell time: 10 s	$ \Delta C/C \leq 1\%$ (original pitch = 22.5 or 27.5 mm) $ \Delta C/C \leq 2\%$ (original pitch = 15 mm) $\Delta \tan \delta \leq 5 \times 10^{-4}$ ($C \leq 100$ nF) $\Delta \tan \delta \leq 10 \times 10^{-4}$ (100 nF < $C \leq 470$ nF) $\Delta \tan \delta \leq 15 \times 10^{-4}$ ($C > 470$ nF)
Passive flammability: "IEC 60384-1"	class B	no burning
Endurance (DC): "IEC 60384-17"	2 000 hours; $1.25 \times U_{Rdc}$; 85 °C $0.875 \times U_{Rdc}$; 105 °C	$ \Delta C/C \leq 3\%$ for 250 V $ \Delta C/C \leq 2\%$ for 400 to 2500 V $\Delta \tan \delta \leq 5 \times 10^{-4}$ ($C \leq 100$ nF) $\Delta \tan \delta \leq 10 \times 10^{-4}$ (100 nF < $C \leq 470$ nF) $\Delta \tan \delta \leq 15 \times 10^{-4}$ ($C > 470$ nF) $R_{ins} \geq 50\%$ of specified value
Wax potting for: 2222 383 46...; 2222 383 56... and 2222 383 66... only	60 ± 5 seconds at 165 ± 3 °C	$ \Delta C/C \leq 2\%$ $\Delta \tan \delta \leq 5 \times 10^{-4}$ ($C \leq 100$ nF) $R_{ins} \geq 50\%$ of specified value

AC and pulse double metallized polypropylene film capacitors

MMKP 483

MMKP RADIAL EPOXY LACQUERED TYPE

 PITCH 15/22.5/27.5 mm
 PITCH 7.5 mm (bent back leads)


FEATURES

- 7.5 mm bent back pitch
- 15 to 27.5 mm lead pitch
- Low contact resistance
- Low loss dielectric
- Supplied loose in box (including lock lead versions) and taped on reel.

APPLICATIONS

- Where steep pulses occur e.g. SMPS (switch mode power supplies)
- Motor control circuits
- S - correction
- Electronic lighting e.g. Ballast
- The 1400 V, 1600 V and 2000 V series may be used in flyback circuits in television receivers

DETAIL SPECIFICATION

For more detailed data and test requirements see "Type detail specification HQN-384-17/108".

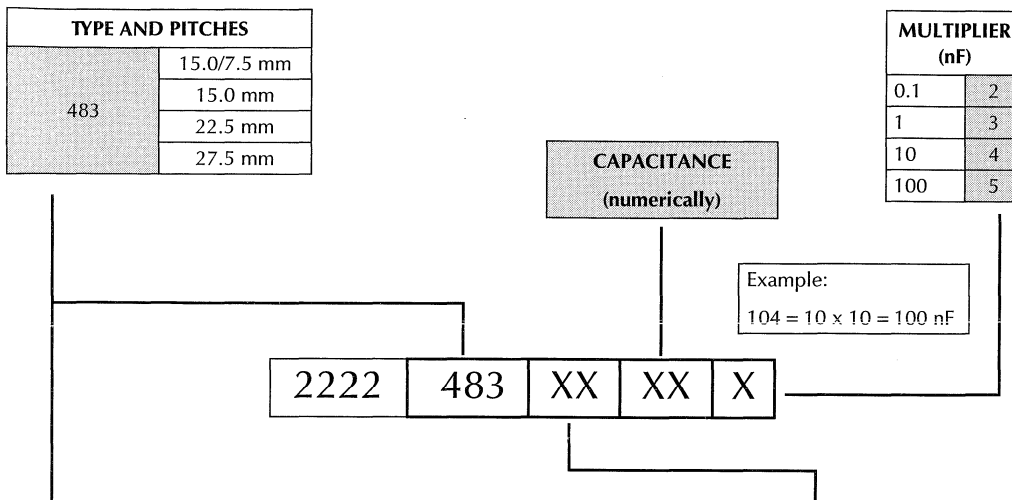
QUICK REFERENCE DATA

DESCRIPTION	VALUE
Capacitance range (E24 series)	0.001 to 2.2 μ F
Capacitance tolerance	\pm 5%; \pm 3%
Rated (DC) voltage	250 V; 400 V; 630 V; 1000 V; 1400 V; 1600 V; 2000 V
Rated (AC) voltage	125 V; 200 V; 220 V; 350 V; 425 V; 460 V; 530 V
Rated peak-to-peak voltage	350 V; 560 V; 630 V; 1000 V; 1200 V; 1300 V; 1500 V
Climatic category	55/105/56
Rated temperature (DC)	85 °C
Rated temperature (AC)	105 °C
Maximum application temperature	105 °C
Reference specification	IEC 60384-17
Performance grade	grade 1 (long life)
Stability grade	grade 2
Materials	qualified in accordance with UL94 V-0

AC and pulse double metallized polypropylene film capacitors

MMKP 483

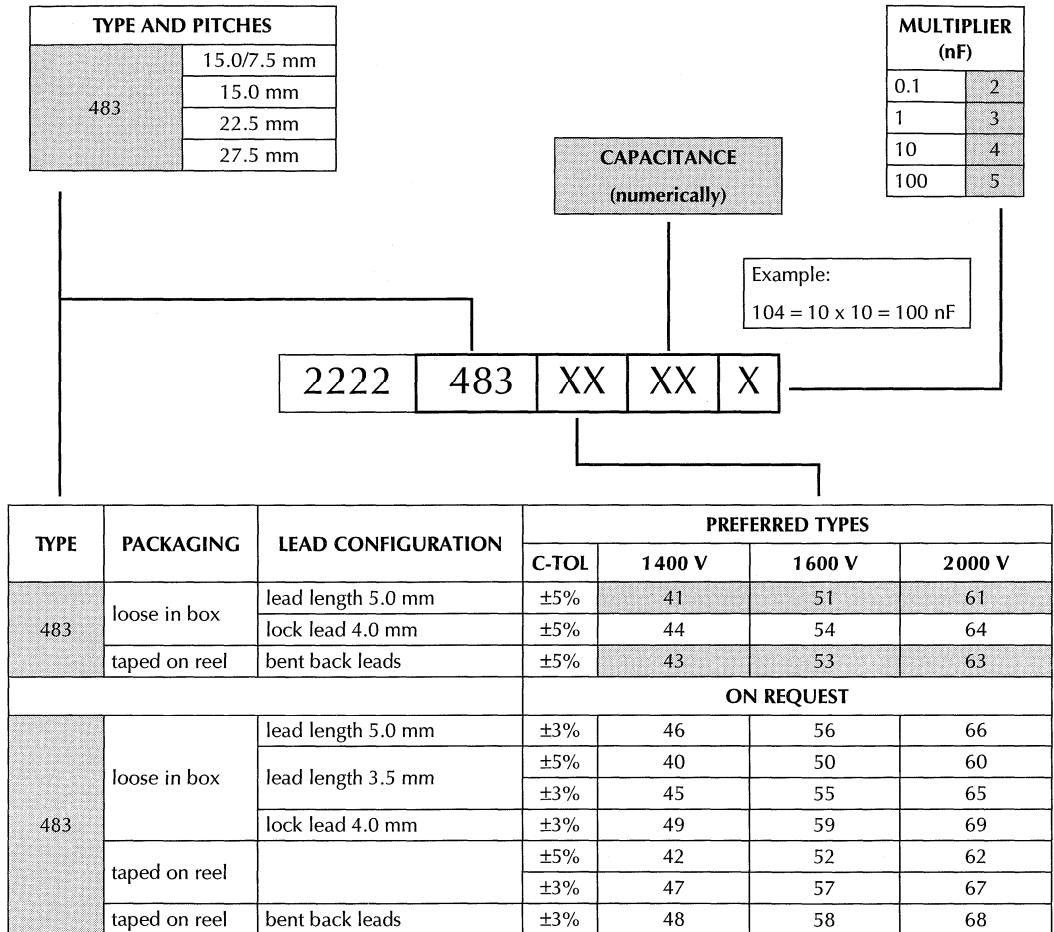
COMPOSITION OF CATALOGUE NUMBER



TYPE	PACKAGING	LEAD CONFIGURATION	PREFERRED TYPES				
			C-TOL	250 V	400 V	630 V	1000 V
483	loose in box	lead length 5.0 mm	±5%	01	11	21	31
		lock lead 4.0 mm	±5%	04	14	24	34
	taped on reel	bent back leads	±5%	03	13	23	33
			ON REQUEST				
483	loose in box	lead length 5.0 mm	±3%	-	-	-	36
			±5%	00	10	20	30
		lead length 3.5 mm	±3%	-	-	-	35
			±3%	-	-	-	39
	taped on reel		±5%	02	12	22	32
			±3%	-	-	-	37
taped on reel	bent back leads	±3%	-	-	-	38	

AC and pulse double metallized polypropylene film capacitors

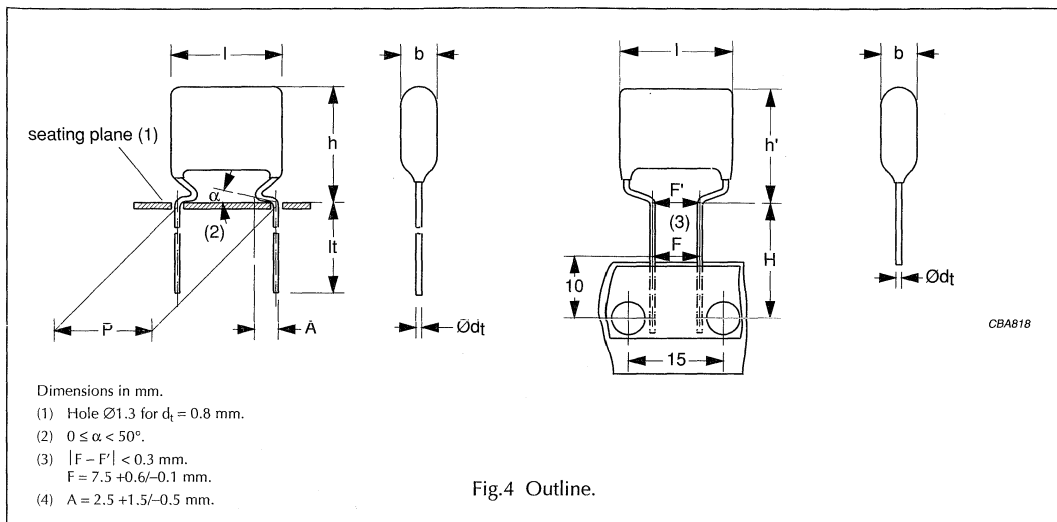
MMKP 483



AC and pulse double metallized polypropylene film capacitors

MMKP 483

MMKP 483 GENERAL DATA

 PITCH 15 mm
 PITCH 7.5 mm (bent back leads)


Specific reference data for the 250 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
$C \leq 0.15 \mu\text{F}$	$\leq 5 \times 10^{-4}$	$\leq 20 \times 10^{-4}$
$0.15 \mu\text{F} < C \leq 0.39 \mu\text{F}$	$\leq 5 \times 10^{-4}$	$\leq 25 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 250 V (DC):		
$C \leq 0.16 \mu\text{F}$	450 V/ μs	
$0.16 \mu\text{F} < C \leq 0.39 \mu\text{F}$	900 V/ μs	
R between leads, for $C \leq 1 \mu\text{F}$ at 100 V; 1 minute	$>100000 \text{ M}\Omega$	
R between leads and case; 100 V; 1 minute	$>30000 \text{ M}\Omega$	
Ionization (AC) voltage (typical value) at 50 pC peak discharge	$>220 \text{ V}$	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	400 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 250 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 5.0 \pm 1.0$ mm	$\pm 5\%$	2222 483 01...	preferred
	$l_t = 3.5 \pm 0.5$ mm	$\pm 5\%$	2222 483 00...	on request
Taped on reel	$H = 16.0$ mm; $P_0 = 12.7$ mm	$\pm 5\%$	2222 483 02...	on request
Taped on reel (bent back)	$H = 16.0$ mm; $P_0 = 15.0$ mm	$\pm 5\%$	2222 483 03...	preferred

AC and pulse double metallized polypropylene film capacitors

MMKP 483

 $U_{Rdc} = 250 \text{ V}; U_{Rac} = 125 \text{ V}; U_{p-p} = 350 \text{ V}$

C (μF)	DIMENSIONS ⁽¹⁾ $b_{\text{max}} \times h \text{ (h')}_{\text{max}} \times l_{\text{max}}$ (mm)	MASS (g)	CATALOGUE NUMBER	
			LOOSE IN BOX	REEL DIAMETER = 500 mm
			$l_t = 5.0 \pm 1.0 \text{ mm}$	H = 16.0 mm; P ₀ = 15.0 mm
			C-tol = $\pm 5\%$	C-tol = $\pm 5\%$
			catalogue number	last 5 digits
Pitch = 15.0 \pm 0.4 mm; $d_t = 0.80 \pm 0.08 \text{ mm}$			pitch = 7.5 mm (bent back)	
0.082	6.0 \times 15.0 (16.5) \times 18.0	1.3	2222 483 01823	.. 03823
0.091			2222 483 01913	.. 03913
0.1			2222 483 01104	.. 03104
0.11	6.5 \times 15.5 (17.0) \times 18.0	1.4	2222 483 01114	.. 03114
0.12			2222 483 01124	.. 03124
0.13			2222 483 01134	.. 03134
0.15	7.0 \times 16.0 (17.5) \times 18.0	1.5	2222 483 01154	.. 03154
0.16			2222 483 01164	.. 03164
0.18	7.5 \times 16.5 (18.0) \times 18.0	1.6	2222 483 01184	.. 03184
0.2	8.0 \times 17.0 (18.5) \times 18.0	1.7	2222 483 01204	.. 03204
0.22			2222 483 01224	.. 03224
0.24	8.5 \times 17.5 (19.0) \times 18.0	1.8	2222 483 01244	.. 03244
0.27	9.0 \times 18.0 (19.5) \times 18.0	1.9	2222 483 01274	.. 03274
0.3	9.5 \times 18.5 (20.0) \times 18.0	2.0	2222 483 01304	.. 03304
0.33	10.0 \times 19.0 (20.5) \times 18.0	2.1	2222 483 01334	.. 03334
0.36			2222 483 01364	.. 03364
0.39	10.5 \times 19.5 (21.0) \times 18.0	2.2	2222 483 01394	.. 03394

Note

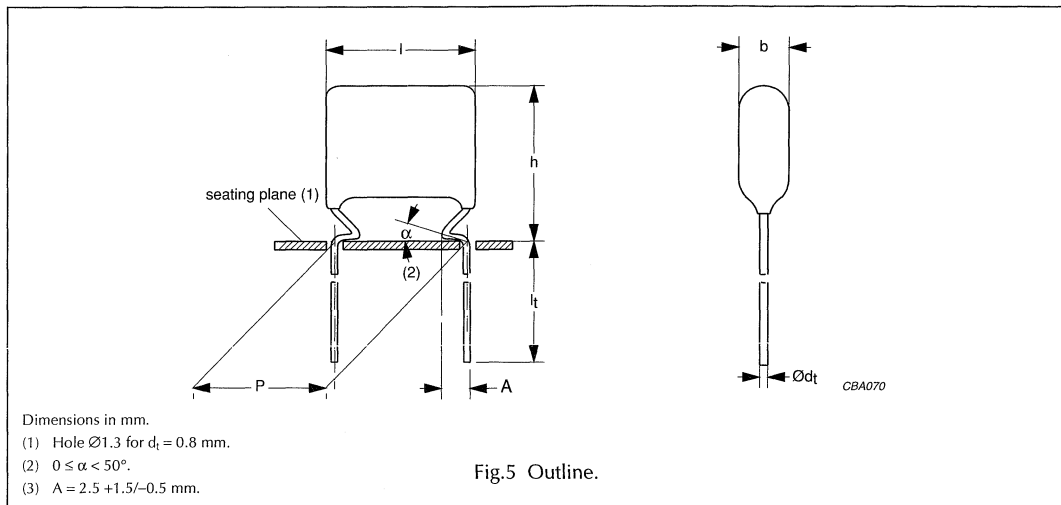
- Dimensions in brackets for bent back leads.

AC and pulse double metallized polypropylene film capacitors

MMKP 483

MMKP 483 GENERAL DATA

PITCH 22.5/27.5 mm



Specific reference data for the 250 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
$0.39 \mu\text{F} < C \leq 0.56 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 45 \times 10^{-4}$
$0.56 \mu\text{F} < C \leq 0.82 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 50 \times 10^{-4}$
$0.82 \mu\text{F} < C \leq 1.2 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 65 \times 10^{-4}$
$1.2 \mu\text{F} < C \leq 1.8 \mu\text{F}$	$\leq 15 \times 10^{-4}$	$\leq 75 \times 10^{-4}$
$1.8 \mu\text{F} < C \leq 2.2 \mu\text{F}$	$\leq 15 \times 10^{-4}$	$\leq 85 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 250 V (DC):		
P = 22.5 mm	290 V/ μs	
P = 27.5 mm	190 V/ μs	
R between leads, for $C \leq 1 \mu\text{F}$ at 100 V; 1 minute	$> 100000 \text{ M}\Omega$	
RC between leads, for $C > 1 \mu\text{F}$ at 100 V; 1 minute	$> 100000 \text{ s}$	
R between leads and case; 100 V; 1 minute	$> 30000 \text{ M}\Omega$	
Ionization (AC) voltage (typical value) at 50 pC peak discharge	$> 220 \text{ V}$	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	400 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 250 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 5.0 \pm 1.0 \text{ mm}$	$\pm 5\%$	2222 483 01...	preferred
	$l_t = 3.5 \pm 0.5 \text{ mm}$	$\pm 5\%$	2222 483 00...	on request

AC and pulse double metallized polypropylene film capacitors

MMKP 483

$U_{Rdc} = 250 \text{ V}$; $U_{Rac} = 125 \text{ V}$; $U_{p-p} = 350 \text{ V}$

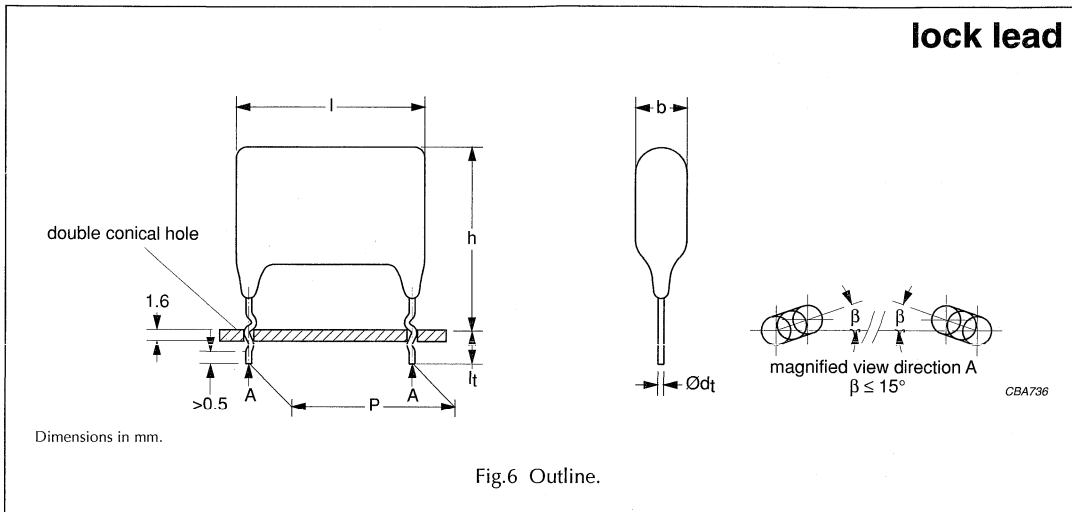
C (μF)	DIMENSIONS $b_{\max} \times h_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 5.0 \pm 1.0 \text{ mm}$
			C-tol = $\pm 5\%$
Pitch = $22.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.43	$8.0 \times 21.0 \times 26.0$	2.4	2222 483 01434
0.47	$8.5 \times 21.5 \times 26.0$	2.5	2222 483 01474
0.51			2222 483 01514
0.56	$9.0 \times 22.0 \times 26.0$	2.6	2222 483 01564
0.62	$9.5 \times 22.5 \times 26.0$	2.8	2222 483 01624
0.68	$10.0 \times 23.0 \times 26.0$	3.0	2222 483 01684
0.75	$10.5 \times 23.5 \times 26.0$	3.2	2222 483 01754
0.82	$11.0 \times 24.0 \times 26.0$	3.5	2222 483 01824
Pitch = $27.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.91	$10.0 \times 23.0 \times 31.0$	5.0	2222 483 01914
1.0	$10.5 \times 23.5 \times 31.0$	5.0	2222 483 01105
1.1	$11.0 \times 24.0 \times 31.0$	5.5	2222 483 01115
1.2	$11.5 \times 24.5 \times 31.0$	5.5	2222 483 01125
1.3	$12.0 \times 25.0 \times 31.0$	6.0	2222 483 01135
1.5	$13.0 \times 26.0 \times 31.0$	6.5	2222 483 01155
1.6	$13.5 \times 26.5 \times 31.0$	7.0	2222 483 01165
1.8	$14.0 \times 27.0 \times 31.0$	7.0	2222 483 01185
2.0	$15.0 \times 28.0 \times 31.0$	8.0	2222 483 01205
2.2	$15.5 \times 28.5 \times 31.0$	8.5	2222 483 01225

AC and pulse double metallized polypropylene film capacitors

MMKP 483

MMKP 483 GENERAL DATA

PITCH 15 mm (lock lead)



Specific reference data for the 250 V DC capacitors (lock lead)

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
C ≤ 0.15 μF	≤ 5 × 10 ⁻⁴	≤ 20 × 10 ⁻⁴
0.15 μF < C ≤ 0.39 μF	≤ 5 × 10 ⁻⁴	≤ 25 × 10 ⁻⁴
Rated voltage pulse slope (dU/dt) _R at 250 V (DC):		
C ≤ 0.16 μF	450 V/μs	
0.16 μF < C ≤ 0.39 μF	900 V/μs	
R between leads, for C ≤ 1 μF at 100 V; 1 minute	>100 000 MΩ	
R between leads and case; 100 V; 1 minute	>30 000 MΩ	
Ionization (AC) voltage (typical value) at 50 pC peak discharge	>220 V	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	400 V; 1 minute	
Withstanding (DC) voltage between leads and case	2 840 V; 1 minute	

Available 250 V DC versions (lock lead)

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	l _t = 4.0 +1.0/-0.5 mm	±5%	2222 483 04...	preferred

AC and pulse double metallized polypropylene film capacitors

MMKP 483

$U_{Rdc} = 250 \text{ V}$; $U_{Rac} = 125 \text{ V}$; $U_{p-p} = 350 \text{ V}$ (lock lead)

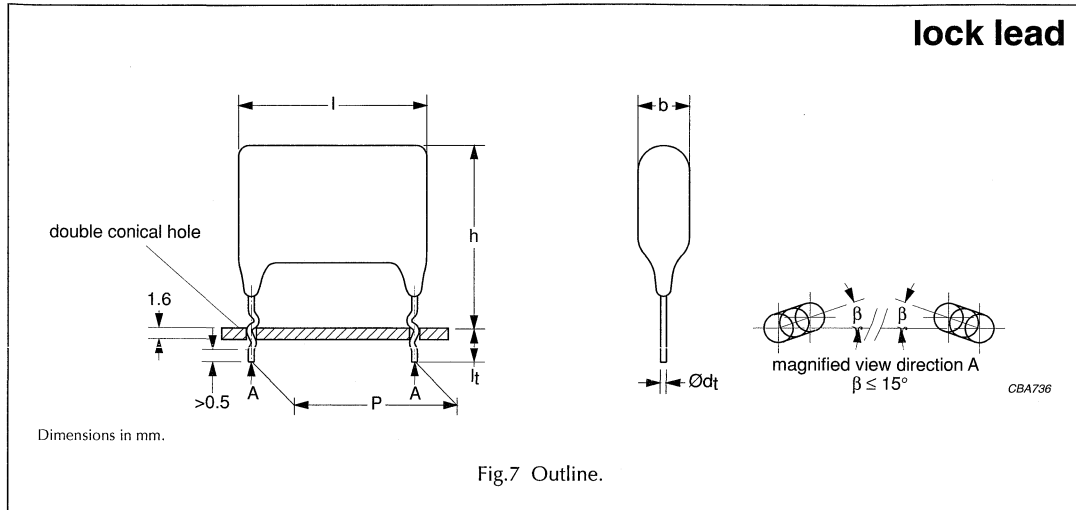
C (μF)	DIMENSIONS $b_{\max} \times h_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 4.0 +1.0/-0.5 \text{ mm}$
			C-tol = $\pm 5\%$
Pitch = $15.0 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.082	$6.0 \times 18.0 \times 18.0$	1.3	2222 483 04823
0.091			2222 483 04913
0.1			2222 483 04104
0.11	$6.5 \times 18.5 \times 18.0$	1.4	2222 483 04114
0.12			2222 483 04124
0.13			2222 483 04134
0.15	$7.0 \times 19.0 \times 18.0$	1.5	2222 483 04154
0.16			2222 483 04164
0.18			2222 483 04184
0.2	$8.0 \times 20.0 \times 18.0$	1.7	2222 483 04204
0.22			2222 483 04224
0.24			2222 483 04244
0.27	$9.0 \times 21.0 \times 18.0$	1.9	2222 483 04274
0.3			2222 483 04304
0.33			2222 483 04334
0.36	$10.0 \times 22.0 \times 18.0$	2.1	2222 483 04364
0.39			2222 483 04394

AC and pulse double metallized polypropylene film capacitors

MMKP 483

MMKP 483 GENERAL DATA

PITCH 22.5/27.5 mm (lock lead)



Specific reference data for the 250 V DC capacitors (lock lead)

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
0.39 $\mu\text{F} < C \leq 0.56 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 45 \times 10^{-4}$
0.56 $\mu\text{F} < C \leq 0.82 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 50 \times 10^{-4}$
0.82 $\mu\text{F} < C \leq 1.2 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 65 \times 10^{-4}$
1.2 $\mu\text{F} < C \leq 1.8 \mu\text{F}$	$\leq 15 \times 10^{-4}$	$\leq 75 \times 10^{-4}$
1.8 $\mu\text{F} < C \leq 2.2 \mu\text{F}$	$\leq 15 \times 10^{-4}$	$\leq 85 \times 10^{-4}$
Rated voltage pulse slope (dU/dt) _R at 250 V (DC):		
P = 22.5 mm	290 V/ μs	
P = 27.5 mm	190 V/ μs	
R between leads, for $C \leq 1 \mu\text{F}$ at 100 V; 1 minute	>100000 M Ω	
RC between leads, for $C > 1 \mu\text{F}$ at 100 V; 1 minute	>100000 s	
R between leads and case; 100 V; 1 minute	>30000 M Ω	
Ionization (AC) voltage (typical value) at 50 pC peak discharge	>220 V	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	400 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 250 V DC versions (lock lead)

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 4.0 + 1.0/-0.5$ mm	$\pm 5\%$	2222 483 04...	preferred

AC and pulse double metallized polypropylene film capacitors

MMKP 483

$U_{Rdc} = 250 \text{ V}$; $U_{Rac} = 125 \text{ V}$; $U_{p-p} = 350 \text{ V}$ (lock lead)

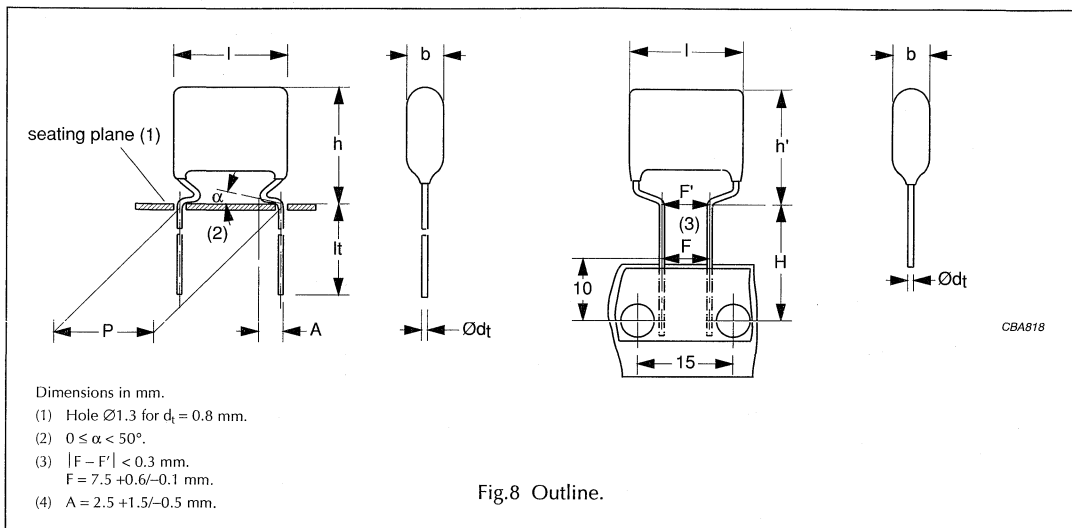
C (μF)	DIMENSIONS $b_{\max} \times h_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 4.0 +1.0/-0.5 \text{ mm}$
			C-tol = $\pm 5\%$
Pitch = $22.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.43	$8.0 \times 24.0 \times 26.0$	2.4	2222 483 04434
0.47	$8.5 \times 24.5 \times 26.0$	2.5	2222 483 04474
0.51			2222 483 04514
0.56	$9.0 \times 25.0 \times 26.0$	2.6	2222 483 04564
0.62	$9.5 \times 25.5 \times 26.0$	2.8	2222 483 04624
0.68	$10.0 \times 26.0 \times 26.0$	3.0	2222 483 04684
0.75	$10.5 \times 26.5 \times 26.0$	3.2	2222 483 04754
0.82	$11.0 \times 27.0 \times 26.0$	3.5	2222 483 04824
Pitch = $27.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.91	$10.0 \times 26.0 \times 31.0$	5.0	2222 483 04914
1.0	$10.5 \times 26.5 \times 31.0$	5.0	2222 483 04105
1.1	$11.0 \times 27.0 \times 31.0$	5.5	2222 483 04115
1.2	$11.5 \times 27.5 \times 31.0$	5.5	2222 483 04125
1.3	$12.0 \times 28.0 \times 31.0$	6.0	2222 483 04135
1.5	$13.0 \times 29.0 \times 31.0$	6.5	2222 483 04155
1.6	$13.5 \times 29.5 \times 31.0$	7.0	2222 483 04165
1.8	$14.0 \times 30.0 \times 31.0$	7.0	2222 483 04185
2.0	$15.0 \times 31.0 \times 31.0$	8.0	2222 483 04205
2.2	$15.5 \times 31.5 \times 31.0$	8.5	2222 483 04225

AC and pulse double metallized polypropylene film capacitors

MMKP 483

MMKP 483 GENERAL DATA

PITCH 15 mm
PITCH 7.5 mm (bent back leads)



Specific reference data for the 400 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: $C \leq 0.22 \mu\text{F}$	$\leq 5 \times 10^{-4}$	$\leq 20 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 400 V (DC) $C \leq 0.082 \mu\text{F}$ $0.082 \mu\text{F} < C \leq 0.22 \mu\text{F}$	600 V/ μs 1 200 V/ μs	
R between leads, for $C \leq 1 \mu\text{F}$ at 100 V; 1 minute	$> 100\,000 \text{ M}\Omega$	
R between leads and case; 100 V; 1 minute	$> 30\,000 \text{ M}\Omega$	
Ionization (AC) voltage (typical value) at 50 pC peak discharge	$> 220 \text{ V}$	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	640 V; 1 minute	
Withstanding (DC) voltage between leads and case	2 840 V; 1 minute	

Available 400 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 5.0 \pm 1.0 \text{ mm}$	$\pm 5\%$	2222 483 11...	preferred
	$l_t = 3.5 \pm 0.5 \text{ mm}$	$\pm 5\%$	2222 483 10...	on request
Taped on reel	$H = 16.0 \text{ mm}; P_0 = 12.7 \text{ mm}$	$\pm 5\%$	2222 483 12...	on request
Taped on reel (bent back)	$H = 16.0 \text{ mm}; P_0 = 15.0 \text{ mm}$	$\pm 5\%$	2222 483 13...	preferred

AC and pulse double metallized polypropylene film capacitors

MMKP 483

 $U_{Rdc} = 400 \text{ V}; U_{Rac} = 200 \text{ V}; U_{p-p} = 560 \text{ V}$

C (μF)	DIMENSIONS ⁽¹⁾ $b_{\max} \times h (h')_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER	
			LOOSE IN BOX	REEL DIAMETER = 500 mm
			$l_1 = 5.0 \pm 1.0 \text{ mm}$	H = 16.0 mm; $P_0 = 15.0 \text{ mm}$
			C-tol = $\pm 5\%$	C-tol = $\pm 5\%$
			catalogue number	last 5 digits
Pitch = $15.0 \pm 0.4 \text{ mm}; d_1 = 0.80 \pm 0.08 \text{ mm}$			pitch = 7.5 mm (bent back)	
0.047			2222 483 11473	.. 13473
0.051	6.0 × 15.0 (16.5) × 18.0	1.3	2222 483 11513	.. 13513
0.056			2222 483 11563	.. 13563
0.062	6.5 × 15.5 (17.0) × 18.0	1.4	2222 483 11623	.. 13623
0.068			2222 483 11683	.. 13683
0.075	7.0 × 16.0 (17.5) × 18.0	1.5	2222 483 11753	.. 13753
0.082			2222 483 11823	.. 13823
0.091	7.5 × 16.5 (18.0) × 18.0	1.6	2222 483 11913	.. 13913
0.1			2222 483 11104	.. 13104
0.11	8.0 × 17.0 (18.5) × 18.0	1.7	2222 483 11114	.. 13114
0.12	8.5 × 17.5 (19.0) × 18.0	1.8	2222 483 11124	.. 13124
0.13			2222 483 11134	.. 13134
0.15	9.0 × 18.0 (19.5) × 18.0	1.9	2222 483 11154	.. 13154
0.16	9.5 × 18.5 (20.0) × 18.0	2.0	2222 483 11164	.. 13164
0.18	10.0 × 19.0 (20.5) × 18.0	2.1	2222 483 11184	.. 13184
0.2	10.5 × 19.5 (21.0) × 18.0	2.2	2222 483 11204	.. 13204
0.22			2222 483 11224	.. 13224

Note

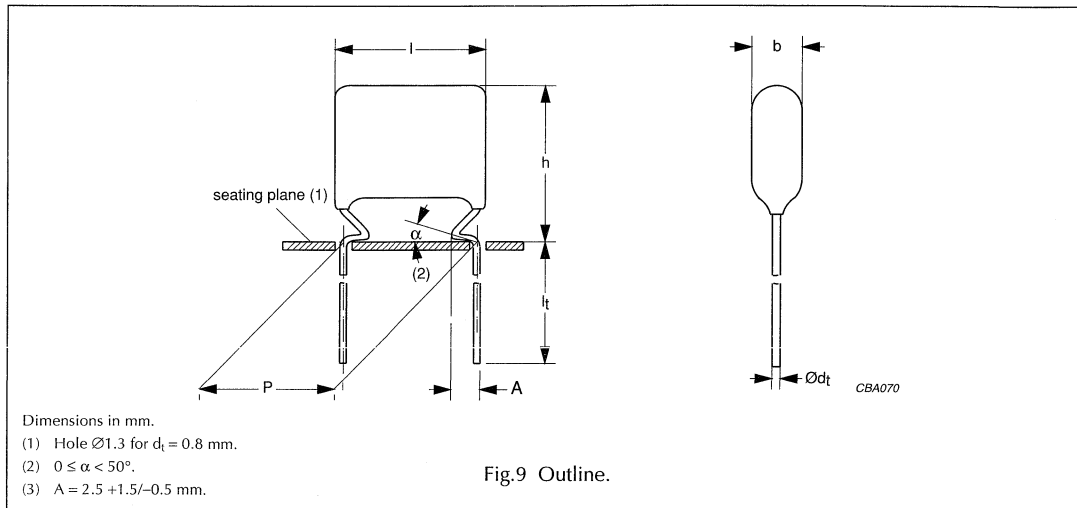
1. Dimensions in brackets for bent back leads.

AC and pulse double metallized polypropylene film capacitors

MMKP 483

MMKP 483 GENERAL DATA

PITCH 22.5/27.5 mm



Specific reference data for the 400 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
$0.22 \mu\text{F} < C \leq 0.33 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 35 \times 10^{-4}$
$0.33 \mu\text{F} < C \leq 0.43 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 40 \times 10^{-4}$
$0.43 \mu\text{F} < C \leq 0.68 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 50 \times 10^{-4}$
$0.68 \mu\text{F} < C \leq 0.82 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 55 \times 10^{-4}$
$0.82 \mu\text{F} < C \leq 1.2 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 60 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 400 V (DC):		
$P = 22.5$ mm	410 V/ μs	
$P = 27.5$ mm	260 V/ μs	
R between leads, for $C \leq 1 \mu\text{F}$ at 100 V; 1 minute	$>100\,000 \text{ M}\Omega$	
RC between leads, for $C > 1 \mu\text{F}$ at 100 V; 1 minute	$>100\,000 \text{ s}$	
R between leads and case; 100 V; 1 minute	$>30\,000 \text{ M}\Omega$	
Ionization (AC) voltage (typical value) at 50 pC peak discharge	$>220 \text{ V}$	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	640 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 400 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 5.0 \pm 1.0$ mm	$\pm 5\%$	2222 483 11...	preferred
	$l_t = 3.5 \pm 0.5$ mm	$\pm 5\%$	2222 483 10...	on request

AC and pulse double metallized polypropylene film capacitors

MMKP 483

 $U_{Rdc} = 400 \text{ V}; U_{Rac} = 200 \text{ V}; U_{p-p} = 560 \text{ V}$

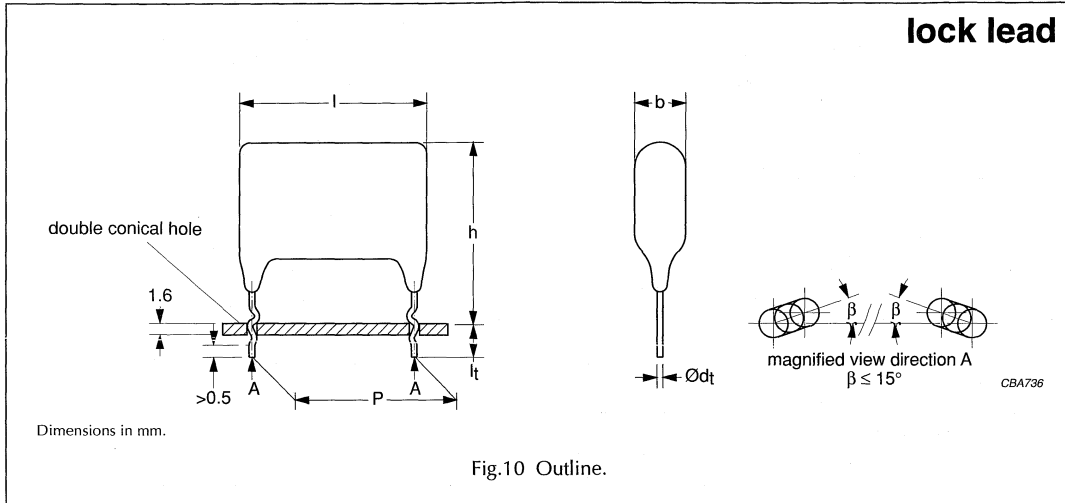
C (μF)	DIMENSIONS $b_{\max} \times h_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 5.0 \pm 1.0 \text{ mm}$
			C-tol = $\pm 5\%$
Pitch = $22.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.24	$8.5 \times 21.5 \times 26.0$	2.5	2222 483 11244
0.27			2222 483 11274
0.3	$9.0 \times 22.0 \times 26.0$	2.6	2222 483 11304
0.33	$9.5 \times 22.5 \times 26.0$	2.8	2222 483 11334
0.36			2222 483 11364
0.39	$10.0 \times 23.0 \times 26.0$	3.0	2222 483 11394
0.43	$10.5 \times 23.5 \times 26.0$	3.2	2222 483 11434
Pitch = $27.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.47	$10.0 \times 23.0 \times 31.0$	5.0	2222 483 11474
0.51	$10.5 \times 23.5 \times 31.0$	5.0	2222 483 11514
0.56	$11.0 \times 24.0 \times 31.0$	5.5	2222 483 11564
0.62	$11.5 \times 24.5 \times 31.0$	5.5	2222 483 11624
0.68	$12.0 \times 25.0 \times 31.0$	6.0	2222 483 11684
0.75	$12.5 \times 25.5 \times 31.0$	6.5	2222 483 11754
0.82	$13.0 \times 26.0 \times 31.0$	6.5	2222 483 11824
0.91	$13.5 \times 26.5 \times 31.0$	7.0	2222 483 11914
1	$14.0 \times 27.0 \times 31.0$	7.0	2222 483 11105
1.1	$15.0 \times 28.0 \times 31.0$	8.0	2222 483 11115
1.2	$15.5 \times 28.5 \times 31.0$	8.5	2222 483 11125

AC and pulse double metallized polypropylene film capacitors

MMKP 483

MMKP 483 GENERAL DATA

PITCH 15 mm (lock lead)



Specific reference data for the 400 V DC capacitors (lock lead)

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: $C \leq 0.22 \mu\text{F}$	$\leq 5 \times 10^{-4}$	$\leq 20 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 400 V (DC) $C \leq 0.082 \mu\text{F}$ $0.082 \mu\text{F} < C \leq 0.22 \mu\text{F}$	600 V/ μs 1 200 V/ μs	
R between leads, for $C \leq 1 \mu\text{F}$ at 100 V; 1 minute	>100 000 M Ω	
R between leads and case; 100 V; 1 minute	>30 000 M Ω	
Ionization (AC) voltage (typical value) at 50 pC peak discharge	>220 V	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	640 V; 1 minute	
Withstanding (DC) voltage between leads and case	2 840 V; 1 minute	

Available 400 V DC versions (lock lead)

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 4.0 +1.0/-0.5 \text{ mm}$	$\pm 5\%$	2222 483 14...	preferred

AC and pulse double metallized polypropylene film capacitors

MMKP 483

$U_{Rdc} = 400 \text{ V}$; $U_{Rac} = 200 \text{ V}$; $U_{p-p} = 560 \text{ V}$ (lock lead)

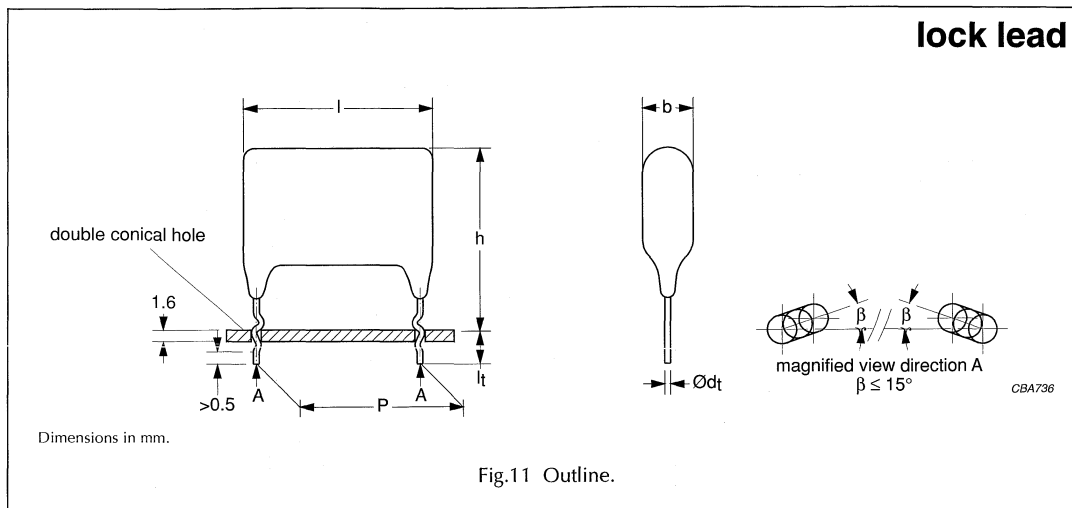
C (μF)	DIMENSIONS $b_{\max} \times h_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 4.0 +1.0/-0.5 \text{ mm}$
			C-tol = $\pm 5\%$
Pitch = $15.0 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.047	6.0 × 18.0 × 18.0	1.3	2222 483 14473
0.051			2222 483 14513
0.056			2222 483 14563
0.062	6.5 × 18.5 × 18.0	1.4	2222 483 14623
0.068			2222 483 14683
0.075	7.0 × 19.0 × 18.0	1.5	2222 483 14753
0.082			2222 483 14823
0.091	7.5 × 19.5 × 18.0	1.6	2222 483 14913
0.1			2222 483 14104
0.11	8.0 × 20.0 × 18.0	1.7	2222 483 14114
0.12	8.5 × 20.5 × 18.0	1.8	2222 483 14124
0.13			2222 483 14134
0.15	9.0 × 21.0 × 18.0	1.9	2222 483 14154
0.16	9.5 × 21.5 × 18.0	2.0	2222 483 14164
0.18	10.0 × 22.0 × 18.0	2.1	2222 483 14184
0.2	10.5 × 22.5 × 18.0	2.2	2222 483 14204
0.22			2222 483 14224

AC and pulse double metallized polypropylene film capacitors

MMKP 483

MMKP 483 GENERAL DATA

PITCH 22.5/27.5 mm (lock lead)



Specific reference data for the 400 V DC capacitors (lock lead)

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
0.22 μF < C ≤ 0.33 μF	≤ 10 × 10 ⁻⁴	≤ 35 × 10 ⁻⁴
0.33 μF < C ≤ 0.43 μF	≤ 10 × 10 ⁻⁴	≤ 40 × 10 ⁻⁴
0.43 μF < C ≤ 0.68 μF	≤ 10 × 10 ⁻⁴	≤ 50 × 10 ⁻⁴
0.68 μF < C ≤ 0.82 μF	≤ 10 × 10 ⁻⁴	≤ 55 × 10 ⁻⁴
0.82 μF < C ≤ 1.2 μF	≤ 10 × 10 ⁻⁴	≤ 60 × 10 ⁻⁴
Rated voltage pulse slope (dU/dt) _R at 400 V (DC):		
P = 22.5 mm	410 V/μs	
P = 27.5 mm	260 V/μs	
R between leads, for C ≤ 1 μF at 100 V; 1 minute	> 100 000 MΩ	
RC between leads, for C > 1 μF at 100 V; 1 minute	> 100 000 s	
R between leads and case; 100 V; 1 minute	> 30 000 MΩ	
Ionization (AC) voltage (typical value) at 50 pC peak discharge	> 220 V	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	640 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 400 V DC versions (lock lead)

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	l _t = 4.0 +1.0/-0.5 mm	±5%	2222 483 14...	preferred

AC and pulse double metallized polypropylene film capacitors

MMKP 483

$U_{Rdc} = 400 \text{ V}$; $U_{Rac} = 200 \text{ V}$; $U_{p-p} = 560 \text{ V}$ (lock lead)

C (μF)	DIMENSIONS $b_{\max} \times h_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 4.0 +1.0/-0.5 \text{ mm}$
			C-tol = $\pm 5\%$
Pitch = $22.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.24	8.5 × 24.5 × 26.0	2.5	2222 483 14244
0.27			2222 483 14274
0.3	9.0 × 25.0 × 26.0	2.6	2222 483 14304
0.33	9.5 × 25.5 × 26.0	2.8	2222 483 14334
0.36	10.0 × 26.0 × 26.0	3.0	2222 483 14364
0.39			2222 483 14394
0.43	10.5 × 26.5 × 26.0	3.2	2222 483 14434
Pitch = $27.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.47	10.0 × 26.0 × 31.0	5.0	2222 483 14474
0.51	10.5 × 26.5 × 31.0	5.0	2222 483 14514
0.56	11.0 × 27.0 × 31.0	5.5	2222 483 14564
0.62	11.5 × 27.5 × 31.0	5.5	2222 483 14624
0.68	12.0 × 28.0 × 31.0	6.0	2222 483 14684
0.75	12.5 × 28.5 × 31.0	6.5	2222 483 14754
0.82	13.0 × 29.0 × 31.0	6.5	2222 483 14824
0.91	13.5 × 29.5 × 31.0	7.0	2222 483 14914
1	14.0 × 30.0 × 31.0	7.0	2222 483 14105
1.1	15.0 × 31.0 × 31.0	8.0	2222 483 14115
1.2	15.5 × 31.5 × 31.0	8.5	2222 483 14125

AC and pulse double metallized polypropylene film capacitors

MMKP 483

MMKP 483 GENERAL DATA

PITCH 15 mm
PITCH 7.5 mm (bent back leads)

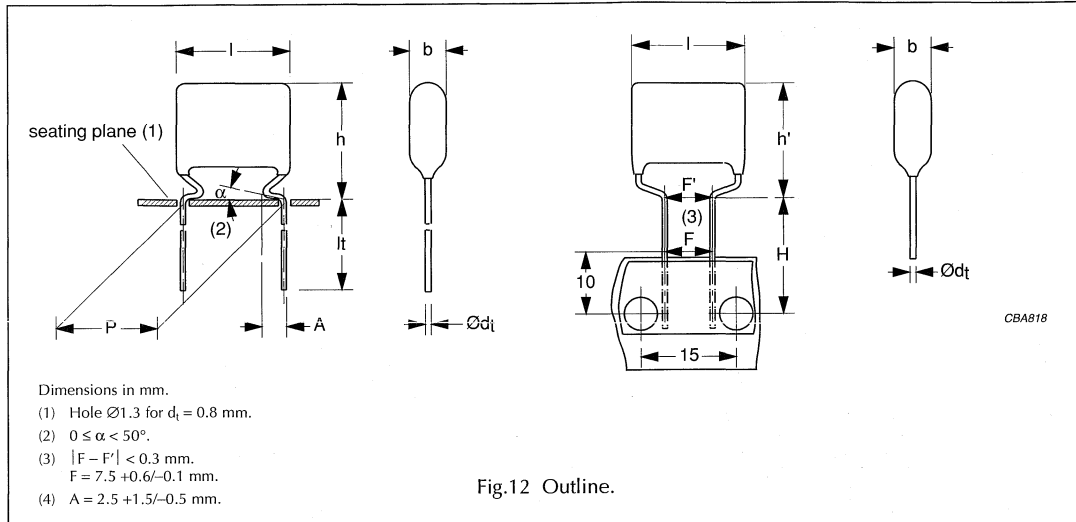


Fig.12 Outline.

Specific reference data for the 630 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: $C \leq 0.15 \mu\text{F}$	$\leq 5 \times 10^{-4}$	$\leq 15 \times 10^{-4}$
Rated voltage pulse slope (dU/dt) _R at 630 V (DC) $C \leq 0.051 \mu\text{F}$ $0.051 \mu\text{F} < C \leq 0.15 \mu\text{F}$	700 V/ μs 1400 V/ μs	
R between leads, for $C \leq 1 \mu\text{F}$ at 500 V; 1 minute	>100000 M Ω	
R between leads and case; 500 V; 1 minute	>30000 M Ω	
Ionization (AC) voltage (typical value) at 50 pC peak discharge	>220 V	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	1000 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 630 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_1 = 5.0 \pm 1.0$ mm	$\pm 5\%$	2222 483 21...	preferred
	$l_1 = 3.5 \pm 0.5$ mm	$\pm 5\%$	2222 483 20...	on request
Taped on reel	$H = 16.0$ mm; $P_0 = 12.7$ mm	$\pm 5\%$	2222 483 22...	on request
Taped on reel (bent back)	$H = 16.0$ mm; $P_0 = 15.0$ mm	$\pm 5\%$	2222 483 23...	preferred

AC and pulse double metallized polypropylene film capacitors

MMKP 483

$U_{Rdc} = 630 \text{ V}$; $U_{Rac} = 220 \text{ V}$; $U_{p-p} = 630 \text{ V}$

C (μF)	DIMENSIONS ⁽¹⁾ $b_{\text{max}} \times h$ (h') _{max} \times l_{max} (mm)	MASS (g)	CATALOGUE NUMBER	
			LOOSE IN BOX	REEL DIAMETER = 500 mm
			$l_1 = 5.0 \pm 1.0 \text{ mm}$	H = 16.0 mm; $P_0 = 15.0 \text{ mm}$
			C-tol = $\pm 5\%$	C-tol = $\pm 5\%$
catalogue number			last 5 digits	
Pitch = $15.0 \pm 0.4 \text{ mm}$; $d_1 = 0.80 \pm 0.08 \text{ mm}$			pitch = 7.5 mm (bent back)	
0.03 0.033	6.0×15.0 (16.5) \times 18.0	1.3	2222 483 21303	.. 23303
0.036 0.039 0.043	6.5×15.5 (17.0) \times 18.0	1.4	2222 483 21363	.. 23363
0.047 0.051	7.0×16.0 (17.5) \times 18.0	1.5	2222 483 21393	.. 23393
0.056 0.062	7.5×16.5 (18.0) \times 18.0	1.6	2222 483 21433	.. 23433
0.068 0.075	8.0×17.0 (18.5) \times 18.0	1.7	2222 483 21473	.. 23473
0.082	8.5×17.5 (19.0) \times 18.0	1.8	2222 483 21513	.. 23513
0.091	9.0×18.0 (19.5) \times 18.0	1.9	2222 483 21563	.. 23563
0.1 0.11	9.5×18.5 (20.0) \times 18.0	2.0	2222 483 21623	.. 23623
0.12	10.0×19.0 (20.5) \times 18.0	2.1	2222 483 21683	.. 23683
0.13	10.5×19.5 (21.0) \times 18.0	2.2	2222 483 21753	.. 23753
0.15	11.0×20.0 (21.5) \times 18.0	2.3	2222 483 21823	.. 23823
			2222 483 21913	.. 23913
			2222 483 21104	.. 23104
			2222 483 21114	.. 23114
			2222 483 21124	.. 23124
			2222 483 21134	.. 23134
			2222 483 21154	.. 23154

Note

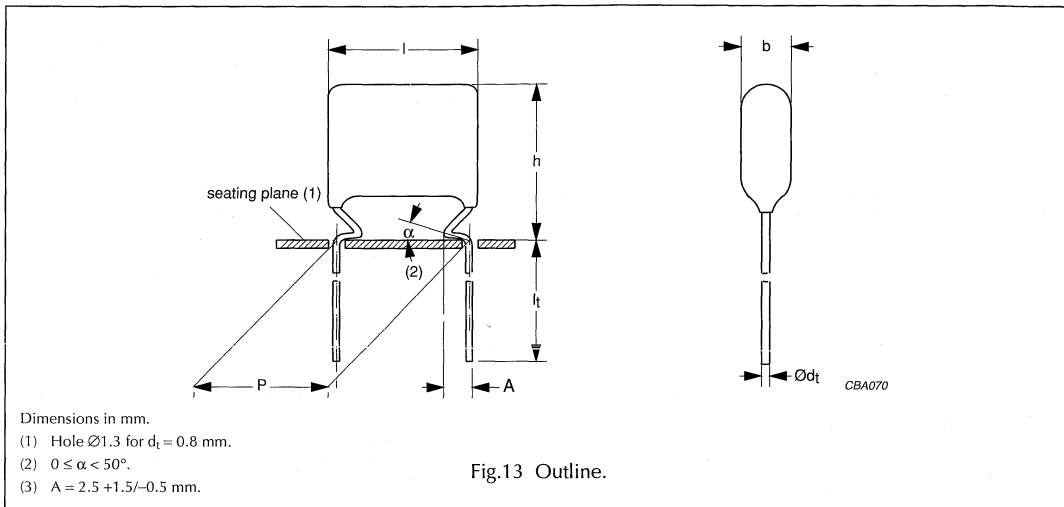
- Dimensions in brackets for bent back leads.

AC and pulse double metallized polypropylene film capacitors

MMKP 483

MMKP 483 GENERAL DATA

PITCH 22.5/27.5 mm



Specific reference data for the 630 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
$0.15 \mu\text{F} < C \leq 0.22 \mu\text{F}$	$\leq 8 \times 10^{-4}$	$\leq 25 \times 10^{-4}$
$0.22 \mu\text{F} < C \leq 0.3 \mu\text{F}$	$\leq 8 \times 10^{-4}$	$\leq 30 \times 10^{-4}$
$0.3 \mu\text{F} < C \leq 0.47 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 40 \times 10^{-4}$
$0.47 \mu\text{F} < C \leq 0.68 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 45 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 630 V (DC):		
$P = 22.5$ mm	470 V/ μs	
$P = 27.5$ mm	300 V/ μs	
R between leads, for $C \leq 1 \mu\text{F}$ at 500 V; 1 minute	$> 100000 \text{ M}\Omega$	
R between leads and case; 500 V; 1 minute	$> 30000 \text{ M}\Omega$	
Ionization (AC) voltage (typical value) at 50 pC peak discharge	$> 220 \text{ V}$	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	1000 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 630 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 5.0 \pm 1.0$ mm	$\pm 5\%$	2222 483 21...	preferred
	$l_t = 3.5 \pm 0.5$ mm	$\pm 5\%$	2222 483 20...	on request

AC and pulse double metallized polypropylene film capacitors

MMKP 483

 $U_{Rdc} = 630 \text{ V}; U_{Rac} = 220 \text{ V}; U_{p-p} = 630 \text{ V}$

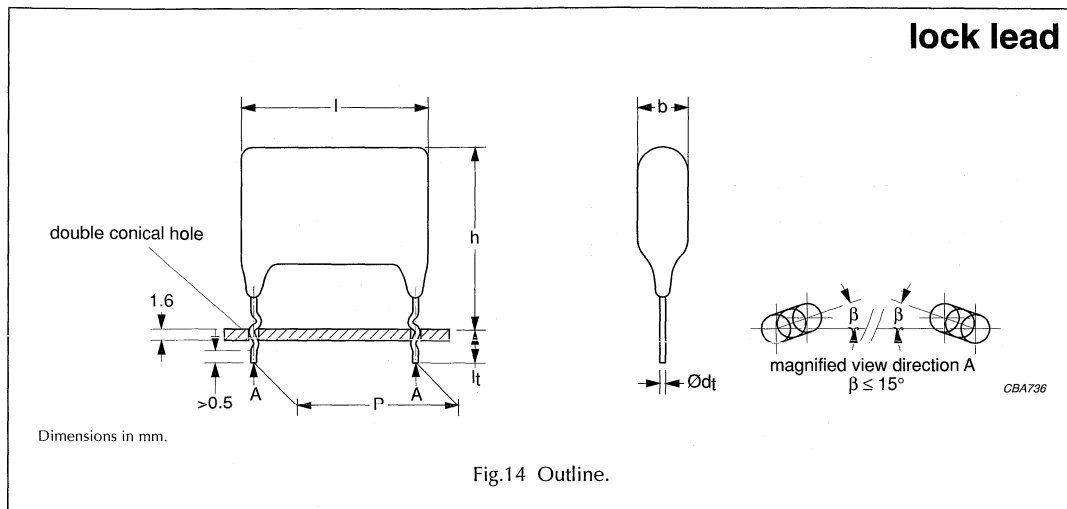
C (μF)	DIMENSIONS $b_{\max} \times h_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 5.0 \pm 1.0 \text{ mm}$
			C-tol = $\pm 5\%$
Pitch = $22.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.16	$8.5 \times 21.5 \times 26.0$	2.5	2222 483 21164
0.18	$9.0 \times 22.0 \times 26.0$	2.6	2222 483 21184
0.2	$9.5 \times 22.5 \times 26.0$	2.8	2222 483 21204
0.22			2222 483 21224
0.24	$10.0 \times 23.0 \times 26.0$	3.0	2222 483 21244
0.27	$10.5 \times 23.5 \times 26.0$	3.2	2222 483 21274
0.3	$11.0 \times 24.0 \times 26.0$	3.5	2222 483 21304
Pitch = $27.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.33	$10.5 \times 23.5 \times 31.0$	5.0	2222 483 21334
0.36	$11.0 \times 24.0 \times 31.0$	5.5	2222 483 21364
0.39			2222 483 21394
0.43	$11.5 \times 24.5 \times 31.0$	5.5	2222 483 21434
0.47	$12.0 \times 25.0 \times 31.0$	6.0	2222 483 21474
0.51	$12.5 \times 25.5 \times 31.0$	6.5	2222 483 21514
0.56	$13.5 \times 26.5 \times 31.0$	6.5	2222 483 21564
0.62	$14.0 \times 27.0 \times 31.0$	7.0	2222 483 21624
0.68	$14.5 \times 27.5 \times 31.0$	7.5	2222 483 21684

AC and pulse double metallized polypropylene film capacitors

MMKP 483

MMKP 483 GENERAL DATA

PITCH 15 mm (lock lead)



Specific reference data for the 630 V DC capacitors (lock lead)

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: $C \leq 0.15 \mu\text{F}$	$\leq 5 \times 10^{-4}$	$\leq 15 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 630 V (DC) $C \leq 0.051 \mu\text{F}$ $0.051 \mu\text{F} < C \leq 0.15 \mu\text{F}$	700 V/ μs 1400 V/ μs	
R between leads, for $C \leq 1 \mu\text{F}$ at 500 V; 1 minute	>100000 M Ω	
R between leads and case; 500 V; 1 minute	>30000 M Ω	
Ionization (AC) voltage (typical value) at 50 pC peak discharge	>220 V	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	1000 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 630 V DC versions (lock lead)

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 4.0 +1.0/-0.5 \text{ mm}$	$\pm 5\%$	2222 483 24...	preferred

AC and pulse double metallized polypropylene film capacitors

MMKP 483

$U_{Rdc} = 630 \text{ V}$; $U_{Rac} = 220 \text{ V}$; $U_{p-p} = 630 \text{ V}$ (lock lead)

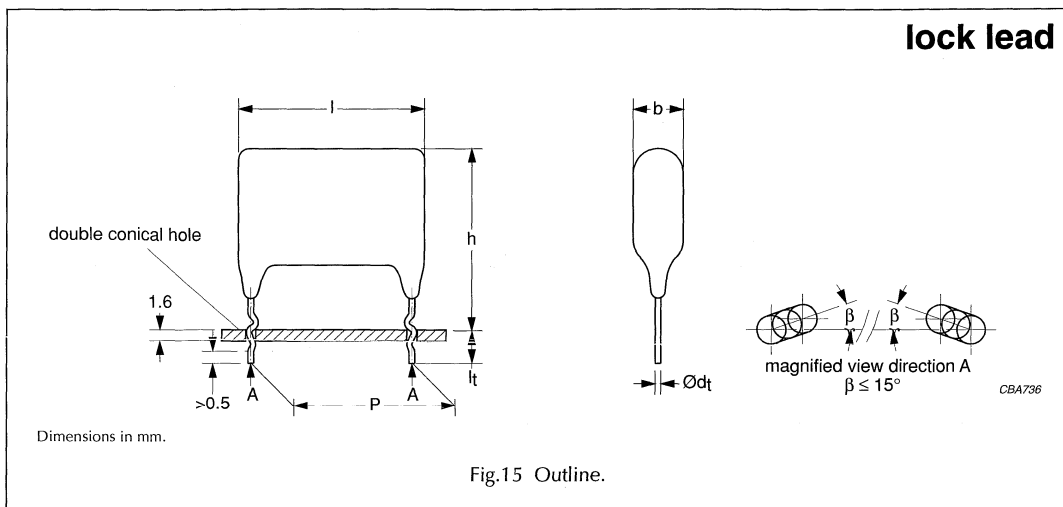
C (μF)	DIMENSIONS $b_{\max} \times h_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 4.0 +1.0/-0.5 \text{ mm}$
			C-tol = $\pm 5\%$
Pitch = $15.0 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.03	6.0 × 18.0 × 18.0	1.3	2222 483 24303
0.033			2222 483 24333
0.036	6.5 × 18.5 × 18.0	1.4	2222 483 24363
0.039			2222 483 24393
0.043			2222 483 24433
0.047	7.0 × 19.0 × 18.0	1.5	2222 483 24473
0.051			2222 483 24513
0.056	7.5 × 19.5 × 18.0	1.6	2222 483 24563
0.062			2222 483 24623
0.068	8.0 × 20.0 × 18.0	1.7	2222 483 24683
0.075			2222 483 24753
0.082	8.5 × 20.5 × 18.0	1.8	2222 483 24823
0.091	9.0 × 21.0 × 18.0	1.9	2222 483 24913
0.1	9.5 × 21.5 × 18.0	2.0	2222 483 24104
0.11			2222 483 24114
0.12	10.0 × 22.0 × 18.0	2.1	2222 483 24124
0.13	10.5 × 22.5 × 18.0	2.2	2222 483 24134
0.15	11.0 × 23.0 × 18.0	2.3	2222 483 24154

AC and pulse double metallized polypropylene film capacitors

MMKP 483

MMKP 483 GENERAL DATA

PITCH 22.5/27.5 mm (lock lead)



Specific reference data for the 630 V DC capacitors (lock lead)

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
0.15 $\mu\text{F} < C \leq 0.22 \mu\text{F}$	$\leq 8 \times 10^{-4}$	$\leq 25 \times 10^{-4}$
0.22 $\mu\text{F} < C \leq 0.3 \mu\text{F}$	$\leq 8 \times 10^{-4}$	$\leq 30 \times 10^{-4}$
0.3 $\mu\text{F} < C \leq 0.47 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 40 \times 10^{-4}$
0.47 $\mu\text{F} < C \leq 0.68 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 45 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 630 V (DC):		
P = 22.5 mm	470 V/ μs	
P = 27.5 mm	300 V/ μs	
R between leads, for $C \leq 1 \mu\text{F}$ at 500 V; 1 minute	$>100000 \text{ M}\Omega$	
R between leads and case; 500 V; 1 minute	$>30000 \text{ M}\Omega$	
Ionization (AC) voltage (typical value) at 50 pC peak discharge	$>220 \text{ V}$	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	1000 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 630 V DC versions (lock lead)

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 4.0 +1.0/-0.5 \text{ mm}$	$\pm 5\%$	2222 483 24...	preferred

AC and pulse double metallized polypropylene film capacitors

MMKP 483

$U_{Rdc} = 630 \text{ V}$; $U_{Rac} = 220 \text{ V}$; $U_{p-p} = 630 \text{ V}$ (lock lead)

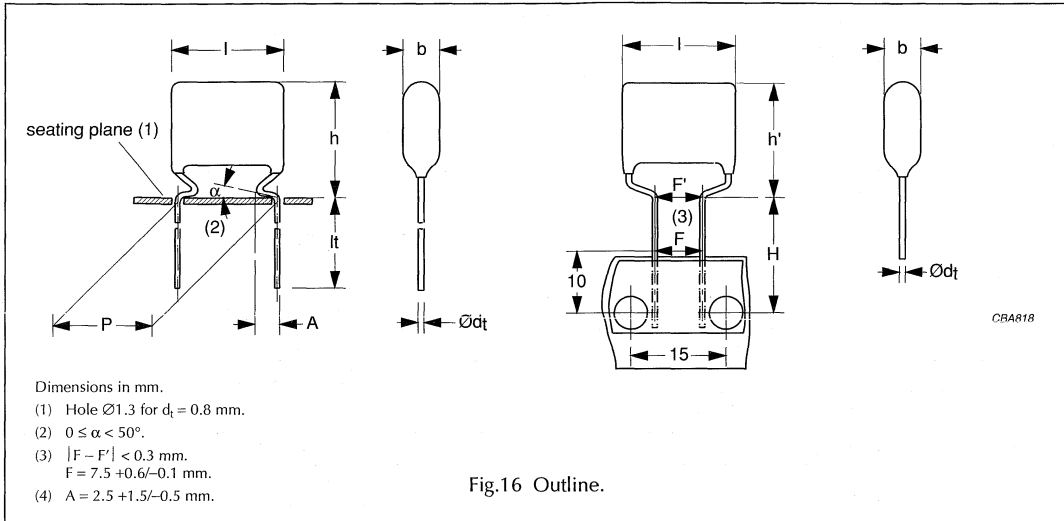
C (μF)	DIMENSIONS $b_{\max} \times h_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 4.0 +1.0/-0.5 \text{ mm}$
			C-tol = $\pm 5\%$
Pitch = $22.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.16	$8.5 \times 24.5 \times 26.0$	2.5	2222 483 24164
0.18	$9.0 \times 25.0 \times 26.0$	2.6	2222 483 24184
0.2	$9.5 \times 25.5 \times 26.0$	2.8	2222 483 24204
0.22			2222 483 24224
0.24	$10.0 \times 26.0 \times 26.0$	3.0	2222 483 24244
0.27	$10.5 \times 26.5 \times 26.0$	3.2	2222 483 24274
0.3	$11.0 \times 27.0 \times 26.0$	3.5	2222 483 24304
Pitch = $27.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.33	$10.5 \times 26.5 \times 31.0$	5.0	2222 483 24334
0.36	$11.0 \times 27.0 \times 31.0$	5.5	2222 483 24364
0.39			2222 483 24394
0.43	$11.5 \times 27.5 \times 31.0$	5.5	2222 483 24434
0.47	$12.0 \times 28.0 \times 31.0$	6.0	2222 483 24474
0.51	$12.5 \times 28.5 \times 31.0$	6.5	2222 483 24514
0.56	$13.5 \times 29.5 \times 31.0$	6.5	2222 483 24564
0.62	$14.0 \times 30.0 \times 31.0$	7.0	2222 483 24624
0.68	$14.5 \times 30.5 \times 31.0$	7.5	2222 483 24684

AC and pulse double metallized polypropylene film capacitors

MMKP 483

MMKP 483 GENERAL DATA

PITCH 15 mm
PITCH 7.5 mm (bent back leads)



Specific reference data for the 1000 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: $C \leq 0.062 \mu\text{F}$	$\leq 5 \times 10^{-4}$	$\leq 15 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 1000 V (DC) $C \leq 0.024 \mu\text{F}$ $0.024 \mu\text{F} < C \leq 0.062 \mu\text{F}$	1700 V/ μs 3300 V/ μs	
R between leads, for $C \leq 1 \mu\text{F}$ at 500 V; 1 minute	$>100000 \text{ M}\Omega$	
R between leads and case; 500 V; 1 minute	$>30000 \text{ M}\Omega$	
Ionization (AC) voltage (typical value) at 50 pC peak discharge	$>440 \text{ V}$	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	1600 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 1000 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 5.0 \pm 1.0$ mm	$\pm 5\%$	2222 483 31...	preferred
		$\pm 3\%$	2222 483 36...	on request
	$l_t = 3.5 \pm 0.5$ mm	$\pm 5\%$	2222 483 30...	on request
		$\pm 3\%$	2222 483 35...	on request
Taped on reel	$H = 16.0$ mm; $P_0 = 12.7$ mm	$\pm 5\%$	2222 483 32...	on request
		$\pm 3\%$	2222 483 37...	on request
Taped on reel (bent back)	$H = 16.0$ mm; $P_0 = 15.0$ mm	$\pm 5\%$	2222 483 33...	preferred
		$\pm 3\%$	2222 483 38...	on request

AC and pulse double metallized polypropylene film capacitors

MMKP 483

 $U_{Rdc} = 1000 \text{ V}; U_{Rac} = 350 \text{ V}; U_{p-p} = 1000 \text{ V}$

C (μF)	DIMENSIONS ⁽¹⁾ $b_{\max} \times h (h')_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER	
			LOOSE IN BOX	REEL DIAMETER = 500 mm
			$l_t = 5.0 \pm 1.0 \text{ mm}$	H = 16.0 mm; $P_0 = 15.0 \text{ mm}$
			C-tol = $\pm 5\%$	C-tol = $\pm 5\%$
			catalogue number	last 5 digits
Pitch = $15.0 \pm 0.4 \text{ mm}; d_t = 0.80 \pm 0.08 \text{ mm}$			pitch = 7.5 mm (bent back)	
0.0043	$6.0 \times 15.0 (16.5) \times 18.0$	1.3	2222 483 31432	.. 33432
0.0047			2222 483 31472	.. 33472
0.0051			2222 483 31512	.. 33512
0.0056			2222 483 31562	.. 33562
0.0062			2222 483 31622	.. 33622
0.0068			2222 483 31682	.. 33682
0.0075			2222 483 31752	.. 33752
0.0082			2222 483 31822	.. 33822
0.0091			2222 483 31912	.. 33912
0.010			2222 483 31103	.. 33103
0.011			2222 483 31113	.. 33113
0.012			2222 483 31123	.. 33123
0.013			2222 483 31133	.. 33133
0.015			2222 483 31153	.. 33153
0.016			2222 483 31163	.. 33163
0.018			$6.5 \times 15.5 (17.0) \times 18.0$	1.4
0.02	2222 483 31203	.. 33203		
0.022	$7.0 \times 16.0 (17.5) \times 18.0$	1.5	2222 483 31223	.. 33223
0.024			2222 483 31243	.. 33243
0.027	$7.5 \times 16.5 (18.0) \times 18.0$	1.6	2222 483 31273	.. 33273
0.03			2222 483 31303	.. 33303
0.033	$8.0 \times 17.0 (18.5) \times 18.0$	1.7	2222 483 31333	.. 33333
0.036	$8.5 \times 17.5 (19.0) \times 18.0$	1.8	2222 483 31363	.. 33363
0.039			2222 483 31393	.. 33393
0.043	$9.0 \times 18.0 (19.5) \times 18.0$	1.9	2222 483 31433	.. 33433
0.047	$9.5 \times 18.5 (20.0) \times 18.0$	2.0	2222 483 31473	.. 33473
0.051			2222 483 31513	.. 33513
0.056	$10.0 \times 19.0 (20.5) \times 18.0$	2.1	2222 483 31563	.. 33563
0.062	$10.5 \times 19.5 (21.0) \times 18.0$	2.2	2222 483 31623	.. 33623

Note

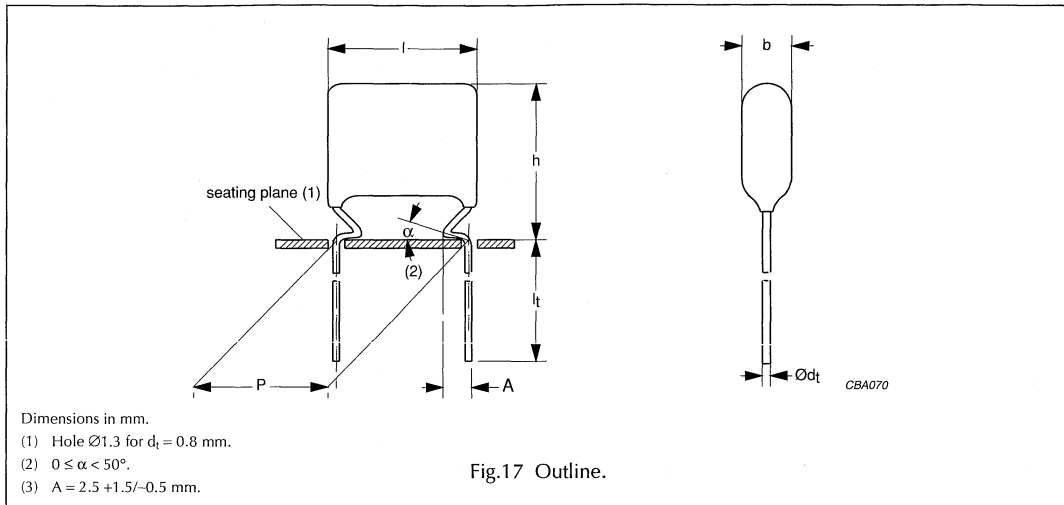
1. Dimensions in brackets for bent back leads.

AC and pulse double metallized polypropylene film capacitors

MMKP 483

MMKP 483 GENERAL DATA

PITCH 22.5/27.5 mm



Specific reference data for the 1000 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
0.062 $\mu\text{F} < C \leq 0.13 \mu\text{F}$	$\leq 6 \times 10^{-4}$	$\leq 20 \times 10^{-4}$
0.13 $\mu\text{F} < C \leq 0.22 \mu\text{F}$	$\leq 8 \times 10^{-4}$	$\leq 25 \times 10^{-4}$
0.22 $\mu\text{F} < C \leq 0.33 \mu\text{F}$	$\leq 8 \times 10^{-4}$	$\leq 30 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 1000 V (DC):		
P = 22.5 mm	1200 V/ μs	
P = 27.5 mm	700 V/ μs	
R between leads, for $C \leq 1 \mu\text{F}$ at 500 V; 1 minute	$>100000 \text{ M}\Omega$	
R between leads and case; 500 V; 1 minute	$>30000 \text{ M}\Omega$	
Ionization (AC) voltage (typical value) at 50 pC peak discharge	$>440 \text{ V}$	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	1600 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 1000 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 5.0 \pm 1.0 \text{ mm}$	$\pm 5\%$	2222 483 31...	preferred
		$\pm 3\%$	2222 483 36...	on request
	$l_t = 3.5 \pm 0.5 \text{ mm}$	$\pm 5\%$	2222 483 30...	on request
		$\pm 3\%$	2222 483 35...	on request

AC and pulse double metallized polypropylene film capacitors

MMKP 483

$U_{Rdc} = 1000 \text{ V}$; $U_{Rac} = 350 \text{ V}$; $U_{p-p} = 1000 \text{ V}$

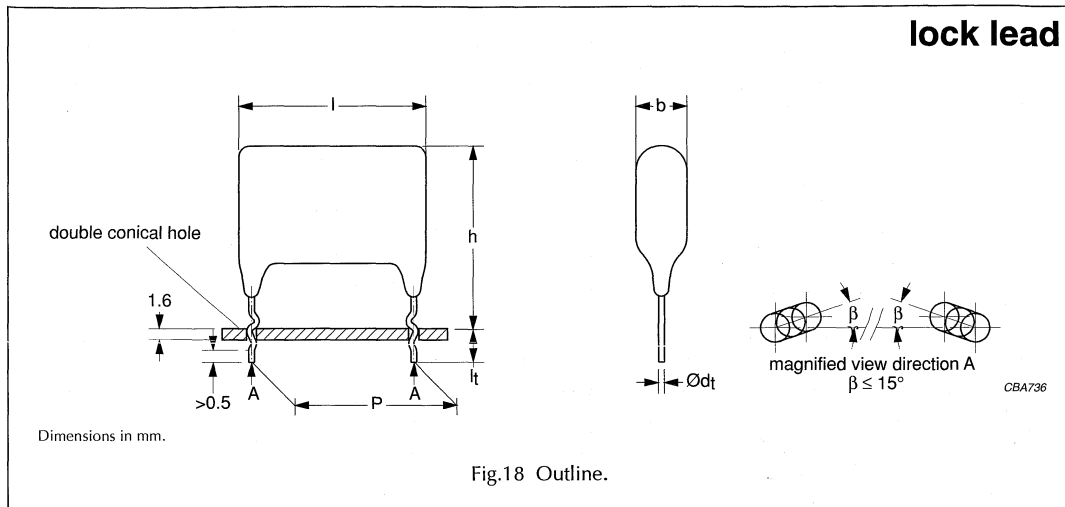
C (μF)	DIMENSIONS $b_{\max} \times h_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 5.0 \pm 1.0 \text{ mm}$
			C-tol = $\pm 5\%$
Pitch = $22.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.068	$8.0 \times 21.0 \times 26.0$	2.4	2222 483 31683
0.075	$8.5 \times 21.5 \times 26.0$	2.5	2222 483 31753
0.082	$9.0 \times 22.0 \times 26.0$	2.6	2222 483 31823
0.091			2222 483 31913
0.1	$9.5 \times 22.5 \times 26.0$	2.8	2222 483 31104
0.11	$10.0 \times 23.0 \times 26.0$	3.0	2222 483 31114
0.12	$10.5 \times 23.5 \times 26.0$	3.2	2222 483 31124
0.13	$11.0 \times 24.0 \times 26.0$	3.5	2222 483 31134
Pitch = $27.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.15	$10.0 \times 23.0 \times 31.0$	5.0	2222 483 31154
0.16	$10.5 \times 23.5 \times 31.0$	5.0	2222 483 31164
0.18	$11.0 \times 24.0 \times 31.0$	5.5	2222 483 31184
0.2	$11.5 \times 24.5 \times 31.0$	5.5	2222 483 31204
0.22	$12.0 \times 25.0 \times 31.0$	6.0	2222 483 31224
0.24	$12.5 \times 25.5 \times 31.0$	6.5	2222 483 31244
0.27	$13.5 \times 26.5 \times 31.0$	7.0	2222 483 31274
0.3	$14.0 \times 27.0 \times 31.0$	7.0	2222 483 31304
0.33	$15.0 \times 28.0 \times 31.0$	8.0	2222 483 31334

AC and pulse double metallized polypropylene film capacitors

MMKP 483

MMKP 483 GENERAL DATA

PITCH 15 mm (lock lead)



Specific reference data for the 1000 V DC capacitors (lock lead)

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: $C \leq 0.062 \mu\text{F}$	$\leq 5 \times 10^{-4}$	$\leq 15 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 1000 V (DC) $C \leq 0.024 \mu\text{F}$ $0.024 \mu\text{F} < C \leq 0.062 \mu\text{F}$	1700 V/ μs 3300 V/ μs	
R between leads, for $C \leq 1 \mu\text{F}$ at 500 V; 1 minute	$>100000 \text{ M}\Omega$	
R between leads and case; 500 V; 1 minute	$>30000 \text{ M}\Omega$	
Ionization (AC) voltage (typical value) at 50 pC peak discharge	$>440 \text{ V}$	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	1600 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 1000 V DC versions (lock lead)

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 4.0 +1.0/-0.5 \text{ mm}$	$\pm 5\%$	2222 483 34...	preferred
		$\pm 3\%$	2222 483 39...	on request

AC and pulse double metallized polypropylene film capacitors

MMKP 483

$U_{Rdc} = 1000 \text{ V}$; $U_{Rac} = 350 \text{ V}$; $U_{p-p} = 1000 \text{ V}$ (lock lead)

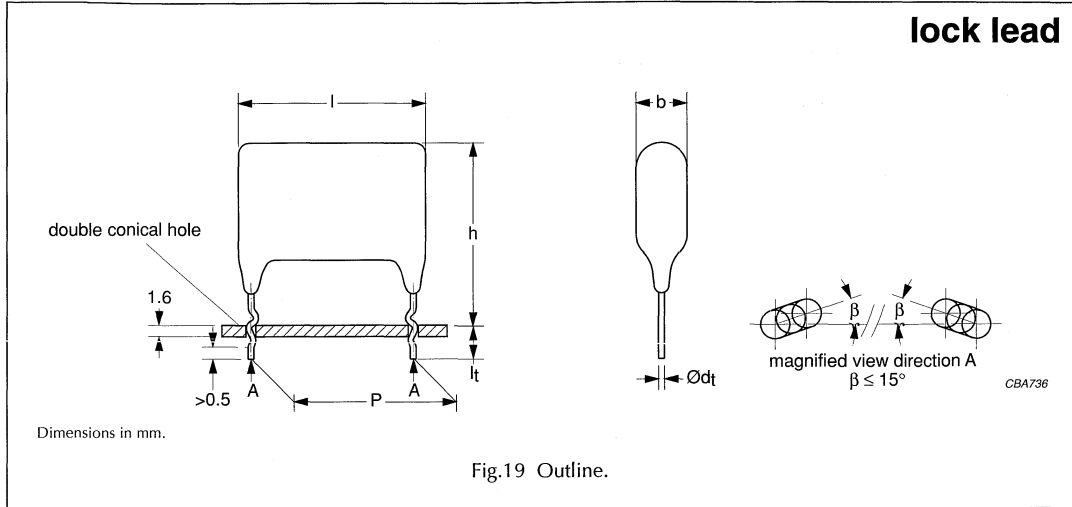
C (μF)	DIMENSIONS $b_{\text{max}} \times h_{\text{max}} \times l_{\text{max}}$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 4.0 +1.0/-0.5 \text{ mm}$
			C-tol = $\pm 5\%$
Pitch = $15.0 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.0043	$6.0 \times 18.0 \times 18.0$	1.3	2222 483 34432
0.0047			2222 483 34472
0.0051			2222 483 34512
0.0056			2222 483 34562
0.0062			2222 483 34622
0.0068			2222 483 34682
0.0075			2222 483 34752
0.0082			2222 483 34822
0.0091			2222 483 34912
0.010			2222 483 34103
0.011			2222 483 34113
0.012			2222 483 34123
0.013			2222 483 34133
0.015	2222 483 34153		
0.016	2222 483 34163		
0.018	$6.5 \times 18.5 \times 18.0$	1.4	2222 483 34183
0.02			2222 483 34203
0.022	$7.0 \times 19.0 \times 18.0$	1.5	2222 483 34223
0.024			2222 483 34243
0.027	$7.5 \times 19.5 \times 18.0$	1.6	2222 483 34273
0.03			2222 483 34303
0.033	$8.0 \times 20.0 \times 18.0$	1.7	2222 483 34333
0.036	$8.5 \times 20.5 \times 18.0$	1.8	2222 483 34363
0.039			2222 483 34393
0.043	$9.0 \times 21.0 \times 18.0$	1.9	2222 483 34433
0.047	$9.5 \times 21.5 \times 18.0$	2.0	2222 483 34473
0.051			2222 483 34513
0.056	$10.0 \times 22.0 \times 18.0$	2.1	2222 483 34563
0.062	$10.5 \times 22.5 \times 18.0$	2.2	2222 483 34623

AC and pulse double metallized polypropylene film capacitors

MMKP 483

MMKP 483 GENERAL DATA

PITCH 22.5/27.5 mm (lock lead)



Specific reference data for the 1000 V DC capacitors (lock lead)

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
0.062 $\mu\text{F} < C \leq 0.13 \mu\text{F}$	$\leq 6 \times 10^{-4}$	$\leq 20 \times 10^{-4}$
0.13 $\mu\text{F} < C \leq 0.22 \mu\text{F}$	$\leq 8 \times 10^{-4}$	$\leq 25 \times 10^{-4}$
0.22 $\mu\text{F} < C \leq 0.33 \mu\text{F}$	$\leq 8 \times 10^{-4}$	$\leq 30 \times 10^{-4}$
Rated voltage pulse slope (dU/dt) _R at 1000 V (DC):		
P = 22.5 mm	1 200 V/ μs	
P = 27.5 mm	700 V/ μs	
R between leads, for $C \leq 1 \mu\text{F}$ at 500 V; 1 minute	>100 000 M Ω	
R between leads and case; 500 V; 1 minute	>30 000 M Ω	
Ionization (AC) voltage (typical value) at 50 pC peak discharge	>440 V	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	1 600 V; 1 minute	
Withstanding (DC) voltage between leads and case	2 840 V; 1 minute	

Available 1000 V DC versions (lock lead)

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 4.0 +1.0/-0.5 \text{ mm}$	$\pm 5\%$	2222 483 34...	preferred
		$\pm 3\%$	2222 483 39...	on request

AC and pulse double metallized polypropylene film capacitors

MMKP 483

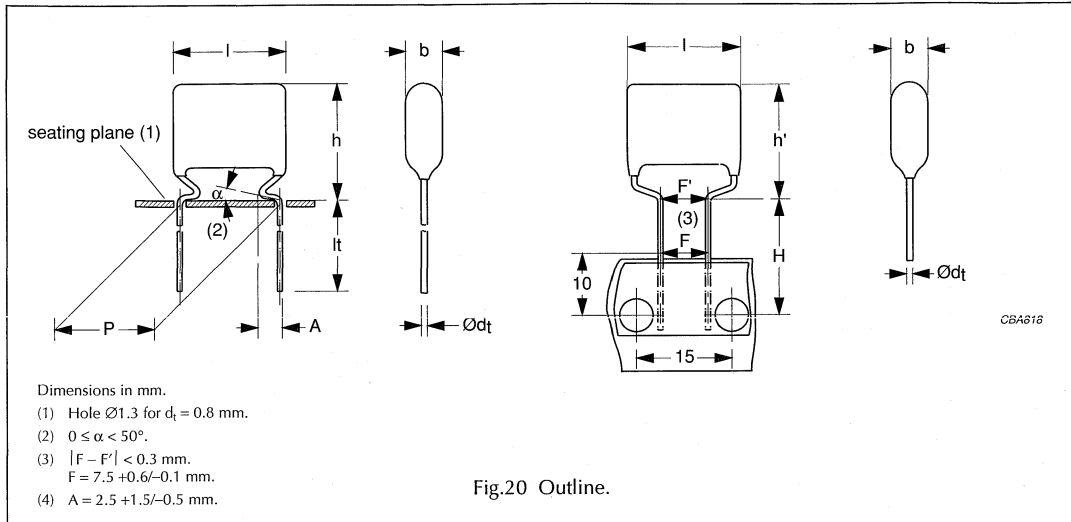
$U_{Rdc} = 1000 \text{ V}$; $U_{Rac} = 350 \text{ V}$; $U_{p-p} = 1000 \text{ V}$ (lock lead)

C (μF)	DIMENSIONS $b_{\max} \times h_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 4.0 +1.0/-0.5 \text{ mm}$
			C-tol = $\pm 5\%$
Pitch = $22.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.068	$8.0 \times 24.0 \times 26.0$	2.4	2222 483 34683
0.075	$8.5 \times 24.5 \times 26.0$	2.5	2222 483 34753
0.082	$9.0 \times 25.0 \times 26.0$	2.6	2222 483 34823
0.091			2222 483 34913
0.1	$9.5 \times 25.5 \times 26.0$	2.8	2222 483 34104
0.11	$10.0 \times 26.0 \times 26.0$	3.0	2222 483 34114
0.12	$10.5 \times 26.5 \times 26.0$	3.2	2222 483 34124
0.13	$11.0 \times 27.0 \times 26.0$	3.5	2222 483 34134
Pitch = $27.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.15	$10.0 \times 26.0 \times 31.0$	5.0	2222 483 34154
0.16	$10.5 \times 26.5 \times 31.0$	5.0	2222 483 34164
0.18	$11.0 \times 27.0 \times 31.0$	5.5	2222 483 34184
0.2	$11.5 \times 27.5 \times 31.0$	5.5	2222 483 34204
0.22	$12.0 \times 28.0 \times 31.0$	6.0	2222 483 34224
0.24	$12.5 \times 28.5 \times 31.0$	6.5	2222 483 34244
0.27	$13.5 \times 29.5 \times 31.0$	7.0	2222 483 34274
0.3	$14.0 \times 30.0 \times 31.0$	7.0	2222 483 34304
0.33	$15.0 \times 31.0 \times 31.0$	8.0	2222 483 34334

AC and pulse double metallized polypropylene film capacitors

MMKP 483

MMKP 483 GENERAL DATA

 PITCH 15 mm
 PITCH 7.5 mm (bent back leads)


Specific reference data for the 1400 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: $C \leq 0.016 \mu\text{F}$	$\leq 5 \times 10^{-4}$	$\leq 10 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 1400 V (DC) $C \leq 0.0056 \mu\text{F}$ $0.0056 \mu\text{F} < C \leq 0.016 \mu\text{F}$	8000 V/ μs 15000 V/ μs	
R between leads, for $C \leq 1 \mu\text{F}$ at 500 V; 1 minute	$> 100000 \text{ M}\Omega$	
R between leads and case; 500 V; 1 minute	$> 30000 \text{ M}\Omega$	
Ionization (AC) voltage (typical value) at 20 pC peak discharge	$> 440 \text{ V}$	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	2250 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 1400 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 5.0 \pm 1.0$ mm	$\pm 5\%$	2222 483 41...	preferred
		$\pm 3\%$	2222 483 46...	on request
	$l_t = 3.5 \pm 0.5$ mm	$\pm 5\%$	2222 483 40...	on request
		$\pm 3\%$	2222 483 45...	on request
Taped on reel	$H = 16.0$ mm; $P_0 = 12.7$ mm	$\pm 5\%$	2222 483 42...	on request
		$\pm 3\%$	2222 483 47...	on request
Taped on reel (bent back)	$H = 16.0$ mm; $P_0 = 15.0$ mm	$\pm 5\%$	2222 483 43...	preferred
		$\pm 3\%$	2222 483 48...	on request

AC and pulse double metallized polypropylene film capacitors

MMKP 483

 $U_{Rdc} = 1400 \text{ V}; U_{Rac} = 425 \text{ V}; U_{p-p} = 1200 \text{ V}$

C (μF)	DIMENSIONS ⁽¹⁾ $b_{\text{max}} \times h \text{ (h')}_{\text{max}} \times l_{\text{max}}$ (mm)	MASS (g)	CATALOGUE NUMBER	
			LOOSE IN BOX	REEL DIAMETER = 500 mm
			$l_1 = 5.0 \pm 1.0 \text{ mm}$	H = 16.0 mm; $P_0 = 15.0 \text{ mm}$
			C-tol = $\pm 5\%$	C-tol = $\pm 5\%$
			catalogue number	last 5 digits
Pitch = $15.0 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			pitch = 7.5 mm (bent back)	
0.0022	6.0 × 15.0 (16.5) × 18.0	1.3	2222 483 41222	.. 43222
0.0024			2222 483 41242	.. 43242
0.0027			2222 483 41272	.. 43272
0.003			2222 483 41302	.. 43302
0.0033			2222 483 41332	.. 43332
0.0036			2222 483 41362	.. 43362
0.0039	6.5 × 15.5 (17.0) × 18.0	1.4	2222 483 41392	.. 43392
0.0043			2222 483 41432	.. 43432
0.0047	7.0 × 16.0 (17.5) × 18.0	1.5	2222 483 41472	.. 43472
0.0051			2222 483 41512	.. 43512
0.0056			2222 483 41562	.. 43562
0.0062	7.5 × 16.5 (18.0) × 18.0	1.6	2222 483 41622	.. 43622
0.0068			2222 483 41682	.. 43682
0.0075	8.0 × 17.0 (18.5) × 18.0	1.7	2222 483 41752	.. 43752
0.0082	8.5 × 17.5 (19.0) × 18.0	1.8	2222 483 41822	.. 43822
0.0091			2222 483 41912	.. 43912
0.01	9.0 × 18.0 (19.5) × 18.0	1.9	2222 483 41103	.. 43103
0.011	9.5 × 18.5 (20.0) × 18.0	2.0	2222 483 41113	.. 43113
0.012	10.0 × 19.0 (20.5) × 18.0	2.1	2222 483 41123	.. 43123
0.013			2222 483 41133	.. 43133
0.015	11.0 × 20.0 (21.5) × 18.0	2.3	2222 483 41153	.. 43153
0.016			2222 483 41163	.. 43163

Note

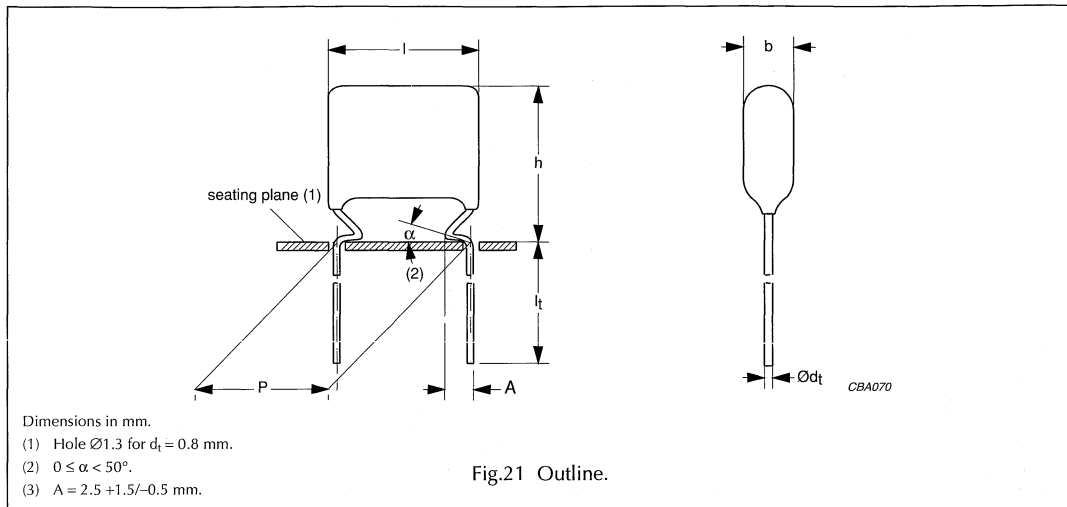
- Dimensions in brackets for bent back leads.

AC and pulse double metallized polypropylene film capacitors

MMKP 483

MMKP 483 GENERAL DATA

PITCH 22.5/27.5 mm



Specific reference data for the 1400 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: $0.016 \mu\text{F} < C \leq 0.039 \mu\text{F}$ $0.039 \mu\text{F} < C \leq 0.1 \mu\text{F}$	$\leq 5 \times 10^{-4}$ $\leq 5 \times 10^{-4}$	$\leq 12 \times 10^{-4}$ $\leq 15 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 1400 V (DC): P = 22.5 mm P = 27.5 mm	4000 V/ μs 2100 V/ μs	
R between leads, for $C \leq 1 \mu\text{F}$ at 500 V; 1 minute	$>100000 \text{ M}\Omega$	
R between leads and case; 500 V; 1 minute	$>30000 \text{ M}\Omega$	
Ionization (AC) voltage (typical value) at 20 pC peak discharge	$>440 \text{ V}$	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	2250 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 1400 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 5.0 \pm 1.0 \text{ mm}$	$\pm 5\%$	2222 483 41...	preferred
		$\pm 3\%$	2222 483 46...	on request
	$l_t = 3.5 \pm 0.5 \text{ mm}$	$\pm 5\%$	2222 483 40...	on request
		$\pm 3\%$	2222 483 45...	on request

AC and pulse double metallized polypropylene film capacitors

MMKP 483

$U_{Rdc} = 1400 \text{ V}$; $U_{Rac} = 425 \text{ V}$; $U_{p-p} = 1200 \text{ V}$

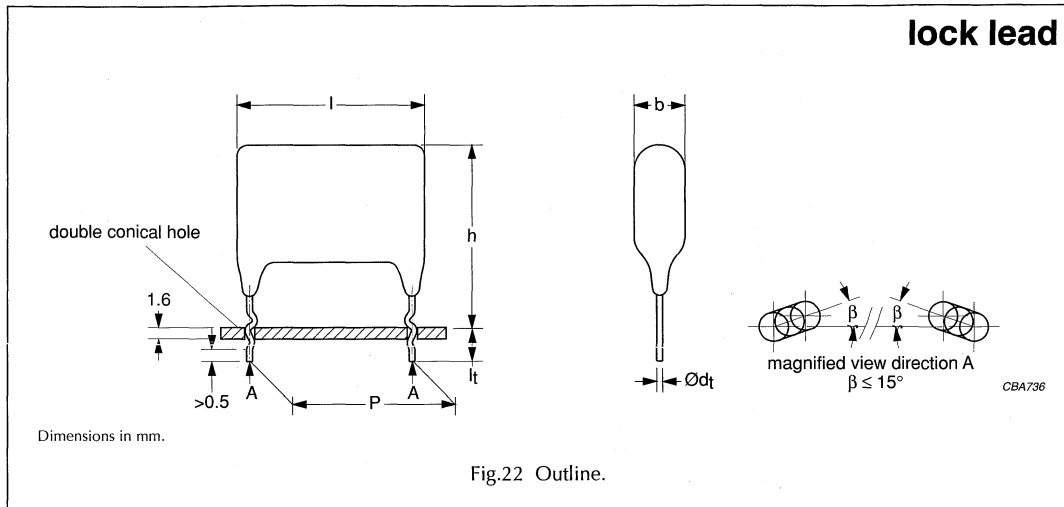
C (μF)	DIMENSIONS $b_{\max} \times h_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_1 = 5.0 \pm 1.0 \text{ mm}$
			C-tol = $\pm 5\%$
Pitch = $22.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.018	$8.0 \times 21.0 \times 26.0$	2.4	2222 483 41183
0.02	$8.5 \times 21.5 \times 26.0$	2.5	2222 483 41203
0.022	$9.0 \times 22.0 \times 26.0$	2.6	2222 483 41223
0.024			2222 483 41243
0.027	$9.5 \times 22.5 \times 26.0$	2.8	2222 483 41273
0.03	$10.0 \times 23.0 \times 26.0$	3.0	2222 483 41303
0.033	$10.5 \times 23.5 \times 26.0$	3.2	2222 483 41333
0.036	$11.0 \times 24.0 \times 26.0$	3.5	2222 483 41363
0.039	$11.5 \times 24.5 \times 26.0$	3.8	2222 483 41393
Pitch = $27.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.043	$10.5 \times 23.5 \times 31.0$	5.0	2222 483 41433
0.047			2222 483 41473
0.051	$11.0 \times 24.0 \times 31.0$	5.5	2222 483 41513
0.056	$11.5 \times 24.5 \times 31.0$	5.5	2222 483 41563
0.062	$12.0 \times 25.0 \times 31.0$	6.0	2222 483 41623
0.068	$12.5 \times 25.5 \times 31.0$	6.5	2222 483 41683
0.075	$13.5 \times 26.5 \times 31.0$	7.0	2222 483 41753
0.082	$14.0 \times 27.0 \times 31.0$	7.0	2222 483 41823
0.091	$14.5 \times 27.5 \times 31.0$	7.5	2222 483 41913
0.1	$15.5 \times 28.5 \times 31.0$	8.5	2222 483 41104

AC and pulse double metallized polypropylene film capacitors

MMKP 483

MMKP 483 GENERAL DATA

PITCH 15 mm (lock lead)



Specific reference data for the 1400 V DC capacitors (lock lead)

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: C ≤ 0.016 μF	≤ 5 × 10 ⁻⁴	≤ 10 × 10 ⁻⁴
Rated voltage pulse slope (dU/dt) _R at 1400 V (DC) C ≤ 0.0056 μF 0.0056 μF < C ≤ 0.016 μF	8000 V/μs 15000 V/μs	
R between leads, for C ≤ 1 μF at 500 V; 1 minute	>100000 MΩ	
R between leads and case; 500 V; 1 minute	>30000 MΩ	
Ionization (AC) voltage (typical value) at 20 pC peak discharge	>440 V	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	2250 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 1400 V DC versions (lock lead)

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	l _t = 4.0 +1.0/-0.5 mm	±5%	2222 483 44...	preferred
		±3%	2222 483 49...	on request

AC and pulse double metallized polypropylene film capacitors

MMKP 483

$U_{Rdc} = 1400 \text{ V}$; $U_{Rac} = 425 \text{ V}$; $U_{p-p} = 1200 \text{ V}$ (lock lead)

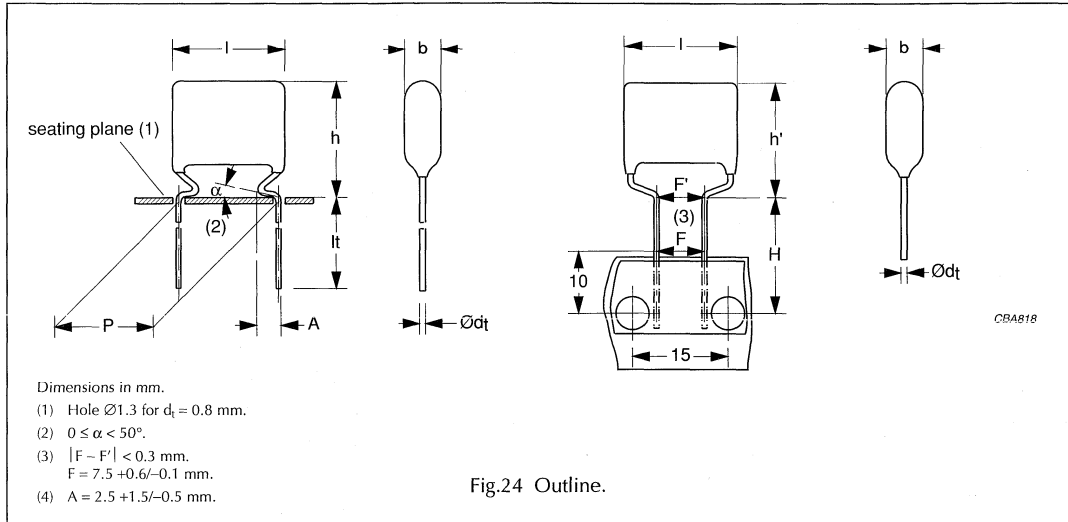
C (μF)	DIMENSIONS $b_{\max} \times h_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 4.0 +1.0/-0.5 \text{ mm}$
			C-tol = $\pm 5\%$
Pitch = $15.0 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.0022	6.0 × 18.0 × 18.0	1.3	2222 483 44222
0.0024			2222 483 44242
0.0027			2222 483 44272
0.003			2222 483 44302
0.0033			2222 483 44332
0.0036			2222 483 44362
0.0039	6.5 × 18.5 × 18.0	1.4	2222 483 44392
0.0043			2222 483 44432
0.0047	7.0 × 19.0 × 18.0	1.5	2222 483 44472
0.0051			2222 483 44512
0.0056			2222 483 44562
0.0062	7.5 × 19.5 × 18.0	1.6	2222 483 44622
0.0068			2222 483 44682
0.0075	8.0 × 20.0 × 18.0	1.7	2222 483 44752
0.0082	8.5 × 20.5 × 18.0	1.8	2222 483 44822
0.0091			2222 483 44912
0.01	9.0 × 21.0 × 18.0	1.9	2222 483 44103
0.011	9.5 × 21.5 × 18.0	2.0	2222 483 44113
0.012	10.0 × 22.0 × 18.0	2.1	2222 483 44123
0.013			2222 483 44133
0.015	11.0 × 23.0 × 18.0	2.3	2222 483 44153
0.016			2222 483 44163

AC and pulse double metallized polypropylene film capacitors

MMKP 483

MMKP 483 GENERAL DATA

PITCH 15 mm
PITCH 7.5 mm (bent back leads)



Specific reference data for the 1600 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: $C \leq 0.01 \mu\text{F}$	$\leq 5 \times 10^{-4}$	$\leq 10 \times 10^{-4}$
Rated voltage pulse slope (dU/dt) _R at 1600 V (DC) $C \leq 0.0036 \mu\text{F}$ $0.0036 \mu\text{F} < C \leq 0.01 \mu\text{F}$	11 000 V/ μs 20 000 V/ μs	
R between leads, for $C \leq 1 \mu\text{F}$ at 500 V; 1 minute	>100 000 M Ω	
R between leads and case; 500 V; 1 minute	>30 000 M Ω	
Ionization (AC) voltage (typical value) at 20 pC peak discharge	>440 V	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	2400 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 1600 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 5.0 \pm 1.0$ mm	$\pm 5\%$	2222 483 51...	preferred
		$\pm 3\%$	2222 483 56...	on request
	$l_t = 3.5 \pm 0.5$ mm	$\pm 5\%$	2222 483 50...	on request
		$\pm 3\%$	2222 483 55...	on request
Taped on reel	$H = 16.0$ mm; $P_0 = 12.7$ mm	$\pm 5\%$	2222 483 52...	on request
		$\pm 3\%$	2222 483 57...	on request
Taped on reel (bent back)	$H = 16.0$ mm; $P_0 = 15.0$ mm	$\pm 5\%$	2222 483 53...	preferred
		$\pm 3\%$	2222 483 58...	on request

AC and pulse double metallized polypropylene film capacitors

MMKP 483

 $U_{Rdc} = 1\,600\text{ V}; U_{Rac} = 460\text{ V}; U_{p-p} = 1\,300\text{ V}$

C (μF)	DIMENSIONS ⁽¹⁾ $b_{\max} \times h (h')_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER	
			LOOSE IN BOX	REEL DIAMETER = 500 mm
			$l_1 = 5.0 \pm 1.0\text{ mm}$	H = 16.0 mm; $P_0 = 15.0\text{ mm}$
			C-tol = $\pm 5\%$	C-tol = $\pm 5\%$
Pitch = $15.0 \pm 0.4\text{ mm}$; $d_t = 0.80 \pm 0.08\text{ mm}$			catalogue number	
			last 5 digits	
			pitch = 7.5 mm (bent back)	
0.0016	6.0 × 15.0 (16.5) × 18.0	1.3	2222 483 51162	.. 53162
0.0018			2222 483 51182	.. 53182
0.002			2222 483 51202	.. 53202
0.0022			2222 483 51222	.. 53222
0.0024	6.5 × 15.5 (17.0) × 18.0	1.4	2222 483 51242	.. 53242
0.0027			2222 483 51272	.. 53272
0.003	7.0 × 16.0 (17.5) × 18.0	1.5	2222 483 51302	.. 53302
0.0033			2222 483 51332	.. 53332
0.0036			2222 483 51362	.. 53362
0.0039	7.5 × 16.5 (18.0) × 18.0	1.6	2222 483 51392	.. 53392
0.0043			2222 483 51432	.. 53432
0.0047	8.0 × 17.0 (18.5) × 18.0	1.7	2222 483 51472	.. 53472
0.0051	8.5 × 17.5 (19.0) × 18.0	1.8	2222 483 51512	.. 53512
0.0056			2222 483 51562	.. 53562
0.0062	9.0 × 18.0 (19.5) × 18.0	1.9	2222 483 51622	.. 53622
0.0068	9.5 × 18.5 (20.0) × 18.0	2.0	2222 483 51682	.. 53682
0.0075			2222 483 51752	.. 53752
0.0082	10.0 × 19.0 (20.5) × 18.0	2.1	2222 483 51822	.. 53822
0.0091	10.5 × 19.5 (21.0) × 18.0	2.2	2222 483 51912	.. 53912
0.01	11.0 × 20.0 (21.5) × 18.0	2.3	2222 483 51103	.. 53103

Note

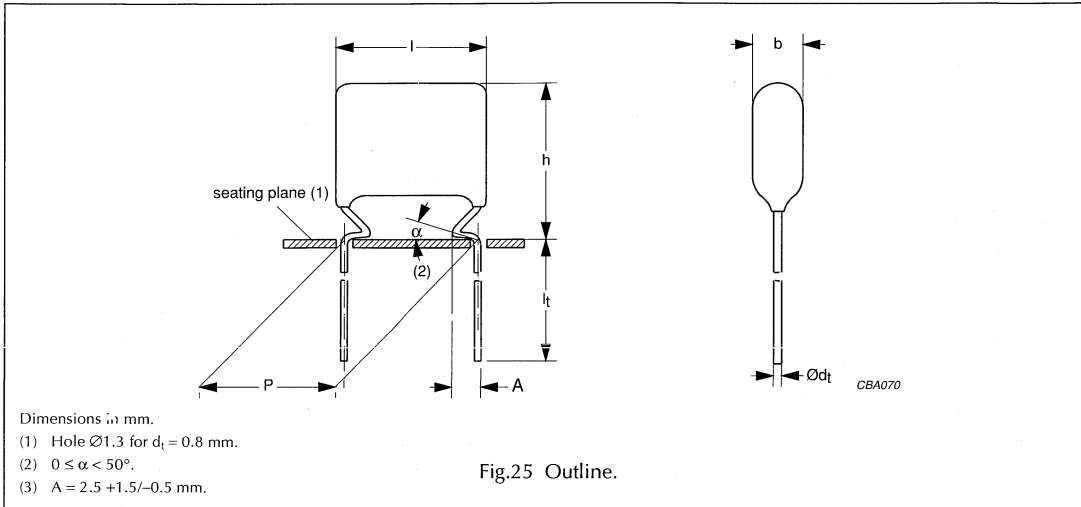
1. Dimensions in brackets for bent back leads.

AC and pulse double metallized polypropylene film capacitors

MMKP 483

MMKP 483 GENERAL DATA

PITCH 22.5/27.5 mm



Specific reference data for the 1600 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: $0.01 \mu\text{F} < C \leq 0.033 \mu\text{F}$ $0.033 \mu\text{F} < C \leq 0.056 \mu\text{F}$	$\leq 5 \times 10^{-4}$	$\leq 10 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 1600 V (DC): $P = 22.5$ mm $P = 27.5$ mm	6000 V/ μs 3000 V/ μs	
R between leads, for $C \leq 1 \mu\text{F}$ at 500 V; 1 minute	>100000 M Ω	
R between leads and case; 500 V; 1 minute	>30000 M Ω	
Ionization (AC) voltage (typical value) at 20 pC peak discharge	>440 V	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	2400 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 1600 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 5.0 \pm 1.0$ mm	$\pm 5\%$	2222 483 51...	preferred
		$\pm 3\%$	2222 483 56...	on request
	$l_t = 3.5 \pm 0.5$ mm	$\pm 5\%$	2222 483 50...	on request
		$\pm 3\%$	2222 483 55...	on request

AC and pulse double metallized polypropylene film capacitors

MMKP 483

$U_{Rdc} = 1600 \text{ V}$; $U_{Rac} = 460 \text{ V}$; $U_{p-p} = 1300 \text{ V}$

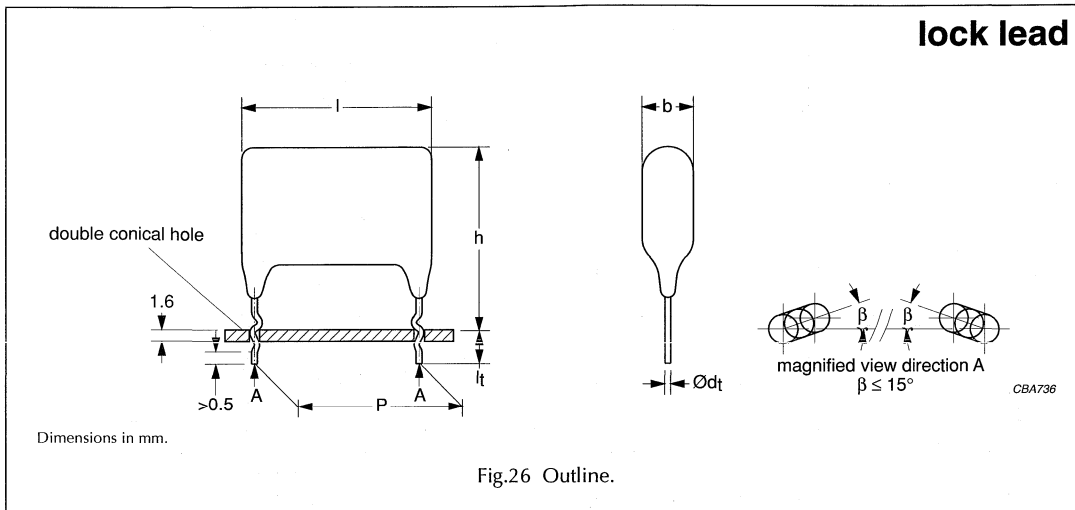
C (μF)	DIMENSIONS $b_{\max} \times h_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_1 = 5.0 \pm 1.0 \text{ mm}$
			C-tol = $\pm 5\%$
Pitch = $22.5 \pm 0.4 \text{ mm}$; $d_1 = 0.80 \pm 0.08 \text{ mm}$			
0.011	$8.0 \times 21.0 \times 26.0$	2.4	2222 483 51113
0.012	$8.5 \times 21.5 \times 26.0$	2.5	2222 483 51123
0.013			2222 483 51133
0.015	$9.0 \times 22.0 \times 26.0$	2.6	2222 483 51153
0.016	$9.5 \times 22.5 \times 26.0$	2.8	2222 483 51163
0.018	$10.0 \times 23.0 \times 26.0$	3.0	2222 483 51183
0.02			2222 483 51203
0.022	$10.5 \times 23.5 \times 26.0$	3.2	2222 483 51223
0.024	$11.0 \times 24.0 \times 26.0$	3.5	2222 483 51243
0.027	$11.5 \times 24.5 \times 26.0$	3.8	2222 483 51273
0.03	$12.5 \times 25.5 \times 26.0$	4.6	2222 483 51303
0.033	$13.0 \times 26.0 \times 26.0$	5.0	2222 483 51333
Pitch = $27.5 \pm 0.4 \text{ mm}$; $d_1 = 0.80 \pm 0.08 \text{ mm}$			
0.036	$11.5 \times 24.5 \times 31.0$	5.5	2222 483 51363
0.039	$12.0 \times 25.0 \times 31.0$	6.0	2222 483 51393
0.043	$12.5 \times 25.5 \times 31.0$	6.5	2222 483 51433
0.047	$13.0 \times 26.0 \times 31.0$	6.5	2222 483 51473
0.051	$13.5 \times 26.5 \times 31.0$	7.0	2222 483 51513
0.056	$14.5 \times 27.5 \times 31.0$	7.5	2222 483 51563

AC and pulse double metallized polypropylene film capacitors

MMKP 483

MMKP 483 GENERAL DATA

PITCH 15 mm (lock lead)



Specific reference data for the 1 600 V DC capacitors (lock lead)

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: $C \leq 0.01 \mu\text{F}$	$\leq 5 \times 10^{-4}$	$\leq 10 \times 10^{-4}$
Rated voltage pulse slope (dU/dt) _R at 1 600 V (DC) $C \leq 0.0036 \mu\text{F}$ $0.0036 \mu\text{F} < C \leq 0.01 \mu\text{F}$	11 000 V/μs	20 000 V/μs
R between leads, for $C \leq 1 \mu\text{F}$ at 500 V; 1 minute	>100 000 MΩ	
R between leads and case; 500 V; 1 minute	>30 000 MΩ	
Ionization (AC) voltage (typical value) at 20 pC peak discharge	>440 V	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	2 400 V; 1 minute	
Withstanding (DC) voltage between leads and case	2 840 V; 1 minute	

Available 1 600 V DC versions (lock lead)

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 4.0 +1.0/-0.5 \text{ mm}$	±5%	2222 483 54...	preferred
		±3%	2222 483 59...	on request

AC and pulse double metallized polypropylene film capacitors

MMKP 483

$U_{Rdc} = 1600\text{ V}$; $U_{Rac} = 460\text{ V}$; $U_{p-p} = 1300\text{ V}$ (lock lead)

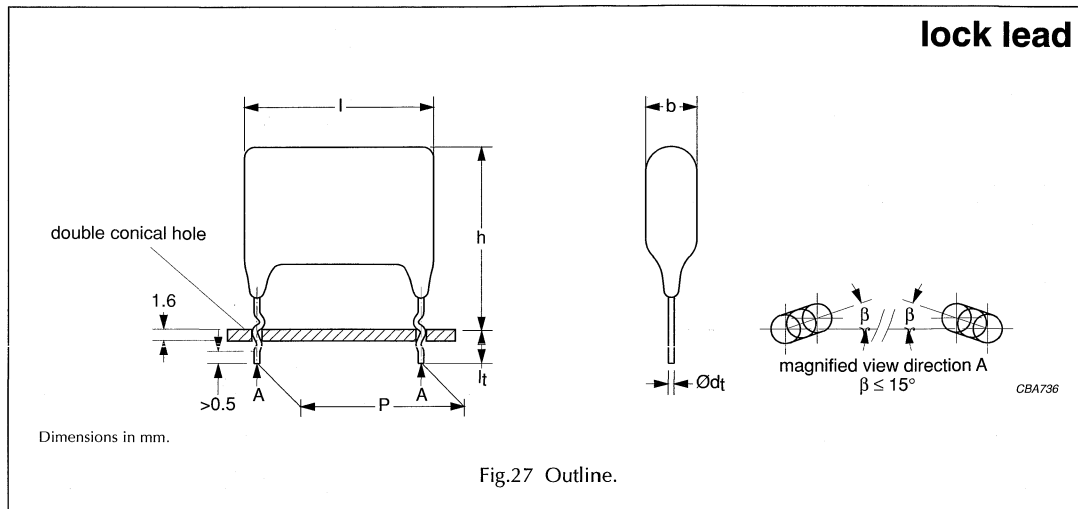
C (μF)	DIMENSIONS $b_{\text{max}} \times h_{\text{max}} \times l_{\text{max}}$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 4.0 +1.0/-0.5\text{ mm}$
			C-tol = $\pm 5\%$
Pitch = $15.0 \pm 0.4\text{ mm}$; $d_t = 0.80 \pm 0.08\text{ mm}$			
0.0016	6.0 × 18.0 × 18.0	1.3	2222 483 54162
0.0018			2222 483 54182
0.002			2222 483 54202
0.0022			2222 483 54222
0.0024	6.5 × 18.5 × 18.0	1.4	2222 483 54242
0.0027			2222 483 54272
0.003	7.0 × 19.0 × 18.0	1.5	2222 483 54302
0.0033			2222 483 54332
0.0036			2222 483 54362
0.0039	7.5 × 19.5 × 18.0	1.6	2222 483 54392
0.0043			2222 483 54432
0.0047	8.0 × 20.0 × 18.0	1.7	2222 483 54472
0.0051	8.5 × 20.5 × 18.0	1.8	2222 483 54512
0.0056			2222 483 54562
0.0062	9.0 × 21.0 × 18.0	1.9	2222 483 54622
0.0068	9.5 × 21.5 × 18.0	2.0	2222 483 54682
0.0075			2222 483 54752
0.0082	10.0 × 22.0 × 18.0	2.1	2222 483 54822
0.0091	10.5 × 22.5 × 18.0	2.2	2222 483 54912
0.01	11.0 × 23.0 × 18.0	2.3	2222 483 54103

AC and pulse double metallized polypropylene film capacitors

MMKP 483

MMKP 483 GENERAL DATA

PITCH 22.5/27.5 mm (lock lead)



Specific reference data for the 1600 V DC capacitors (lock lead)

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
0.01 $\mu\text{F} < C \leq 0.033 \mu\text{F}$	$\leq 5 \times 10^{-4}$	$\leq 10 \times 10^{-4}$
0.033 $\mu\text{F} < C \leq 0.056 \mu\text{F}$	$\leq 5 \times 10^{-4}$	$\leq 12 \times 10^{-4}$
Rated voltage pulse slope (dU/dt) _R at 1600 V (DC):		
P = 22.5 mm	6000 V/ μs	
P = 27.5 mm	3000 V/ μs	
R between leads, for $C \leq 1 \mu\text{F}$ at 500 V; 1 minute	>100000 M Ω	
R between leads and case; 500 V; 1 minute	>30000 M Ω	
Ionization (AC) voltage (typical value) at 20 pC peak discharge	>440 V	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	2400 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 1600 V DC versions (lock lead)

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 4.0 +1.0/-0.5 \text{ mm}$	$\pm 5\%$	2222 483 54...	preferred
		$\pm 3\%$	2222 483 59...	on request

AC and pulse double metallized polypropylene film capacitors

MMKP 483

$U_{Rdc} = 1\,600\text{ V}$; $U_{Rac} = 460\text{ V}$; $U_{p-p} = 1\,300\text{ V}$ (lock lead)

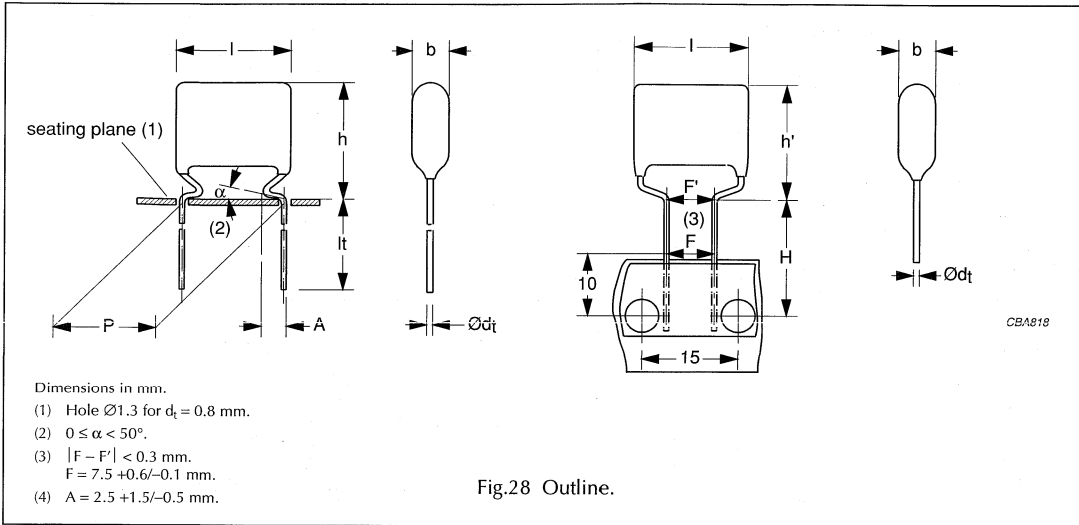
C (μF)	DIMENSIONS $b_{\max} \times h_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 4.0 +1.0/-0.5\text{ mm}$
			C-tol = $\pm 5\%$
Pitch = $22.5 \pm 0.4\text{ mm}$; $d_t = 0.80 \pm 0.08\text{ mm}$			
0.011	$8.0 \times 24.0 \times 26.0$	2.4	2222 483 54113
0.012	$8.5 \times 24.5 \times 26.0$	2.5	2222 483 54123
0.013			2222 483 54133
0.015	$9.0 \times 25.0 \times 26.0$	2.6	2222 483 54153
0.016	$9.5 \times 25.5 \times 26.0$	2.8	2222 483 54163
0.018	$10.0 \times 26.0 \times 26.0$	3.0	2222 483 54183
0.02			2222 483 54203
0.022	$10.5 \times 26.5 \times 26.0$	3.2	2222 483 54223
0.024	$11.0 \times 27.0 \times 26.0$	3.5	2222 483 54243
0.027	$11.5 \times 27.5 \times 26.0$	3.8	2222 483 54273
0.03	$12.5 \times 28.5 \times 26.0$	4.6	2222 483 54303
0.033	$13.0 \times 29.0 \times 26.0$	5.0	2222 483 54333
Pitch = $27.5 \pm 0.4\text{ mm}$; $d_t = 0.80 \pm 0.08\text{ mm}$			
0.036	$11.5 \times 27.5 \times 31.0$	5.5	2222 483 54363
0.039	$12.0 \times 28.0 \times 31.0$	6.0	2222 483 54393
0.043	$12.5 \times 28.5 \times 31.0$	6.5	2222 483 54433
0.047	$13.0 \times 29.0 \times 31.0$	6.5	2222 483 54473
0.051	$13.5 \times 29.5 \times 31.0$	7.0	2222 483 54513
0.056	$14.5 \times 30.5 \times 31.0$	7.5	2222 483 54563

AC and pulse double metallized polypropylene film capacitors

MMKP 483

MMKP 483 GENERAL DATA

PITCH 15 mm
PITCH 7.5 mm (bent back leads)



Specific reference data for the 2000 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: $C \leq 0.0051 \mu\text{F}$	$\leq 5 \times 10^{-4}$	$\leq 10 \times 10^{-4}$
Rated voltage pulse slope (dU/dt) _R at 2000 V (DC)	20000 V/ μs	
R between leads, for $C \leq 1 \mu\text{F}$ at 500 V; 1 minute	$>100000 \text{ M}\Omega$	
R between leads and case; 500 V; 1 minute	$>30000 \text{ M}\Omega$	
Ionization (AC) voltage (typical value) at 20 pC peak discharge	$>440 \text{ V}$	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	3000 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 2000 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 5.0 \pm 1.0 \text{ mm}$	$\pm 5\%$	2222 483 61...	preferred
		$\pm 3\%$	2222 483 66...	on request
	$l_t = 3.5 \pm 0.5 \text{ mm}$	$\pm 5\%$	2222 483 60...	on request
		$\pm 3\%$	2222 483 65...	on request
Taped on reel	$H = 16.0 \text{ mm}; P_0 = 12.7 \text{ mm}$	$\pm 5\%$	2222 483 62...	on request
		$\pm 3\%$	2222 483 67...	on request
Taped on reel (bent back)	$H = 16.0 \text{ mm}; P_0 = 15.0 \text{ mm}$	$\pm 5\%$	2222 483 63...	preferred
		$\pm 3\%$	2222 483 68...	on request

AC and pulse double metallized polypropylene film capacitors

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 $U_{Rdc} = 2000 \text{ V}; U_{Rac} = 530 \text{ V}; U_{p-p} = 1500 \text{ V}$

C (μF)	DIMENSIONS ⁽¹⁾ $b_{\max} \times h (h')_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER	
			LOOSE IN BOX	REEL DIAMETER = 500 mm
			$l_t = 5.0 \pm 1.0 \text{ mm}$	$H = 16.0 \text{ mm}; P_0 = 15.0 \text{ mm}$
			C-tol = $\pm 5\%$	C-tol = $\pm 5\%$
			catalogue number	last 5 digits
Pitch = $15.0 \pm 0.4 \text{ mm}; d_t = 0.80 \pm 0.08 \text{ mm}$			pitch = 7.5 mm (bent back)	
0.001	$6.0 \times 15.0 (16.5) \times 18.0$	1.3	2222 483 61102	.. 63102
0.0011	$6.5 \times 15.5 (17.0) \times 18.0$	1.4	2222 483 61112	.. 63112
0.0012			2222 483 61122	.. 63122
0.0013			2222 483 61132	.. 63132
0.0015	$7.0 \times 16.0 (17.5) \times 18.0$	1.5	2222 483 61152	.. 63152
0.0016			2222 483 61162	.. 63162
0.0018	$7.5 \times 16.5 (18.0) \times 18.0$	1.6	2222 483 61182	.. 63182
0.002			2222 483 61202	.. 63202
0.0022	$8.0 \times 17.0 (18.5) \times 18.0$	1.7	2222 483 61222	.. 63222
0.0024			2222 483 61242	.. 63242
0.0027	$8.5 \times 17.5 (19.0) \times 18.0$	1.8	2222 483 61272	.. 63272
0.003	$9.0 \times 18.0 (19.5) \times 18.0$	1.9	2222 483 61302	.. 63302
0.0033	$9.5 \times 18.5 (20.0) \times 18.0$	2.0	2222 483 61332	.. 63332
0.0036			2222 483 61362	.. 63362
0.0039	$10.0 \times 19.0 (20.5) \times 18.0$	2.1	2222 483 61392	.. 63392
0.0043	$10.5 \times 19.5 (21.0) \times 18.0$	2.2	2222 483 61432	.. 63432
0.0047			2222 483 61472	.. 63472
0.0051	$11.0 \times 20.0 (21.5) \times 18.0$	2.3	2222 483 61512	.. 63512

Note

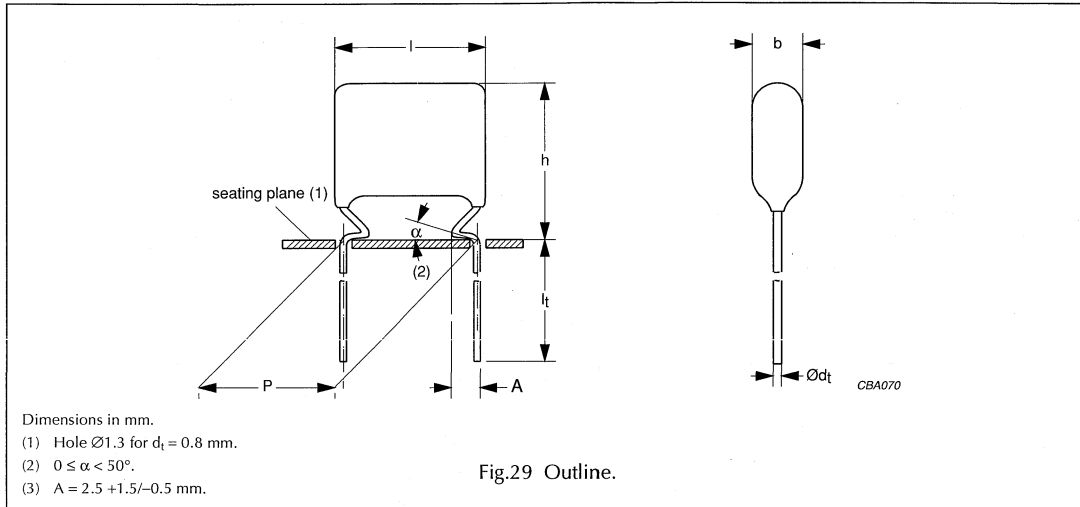
- Dimensions in brackets for bent back leads.

AC and pulse double metallized polypropylene film capacitors

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MMKP 483 GENERAL DATA

PITCH 22.5/27.5 mm



Specific reference data for the 2000 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: $0.0051 \mu\text{F} < C \leq 0.033 \mu\text{F}$	$\leq 5 \times 10^{-4}$	$\leq 10 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 2000 V (DC): P = 22.5 mm P = 27.5 mm	10000 V/ μs 5500 V/ μs	
R between leads, for $C \leq 1 \mu\text{F}$ at 500 V; 1 minute	$>100000 \text{ M}\Omega$	
R between leads and case; 500 V; 1 minute	$>30000 \text{ M}\Omega$	
Ionization (AC) voltage (typical value) at 20 pC peak discharge	$>440 \text{ V}$	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	3000 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 2000 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 5.0 \pm 1.0$ mm	$\pm 5\%$	2222 483 61...	preferred
		$\pm 3\%$	2222 483 66...	on request
	$l_t = 3.5 \pm 0.5$ mm	$\pm 5\%$	2222 483 60...	on request
		$\pm 3\%$	2222 483 65...	on request

AC and pulse double metallized polypropylene film capacitors

MMKP 483

 $U_{Rdc} = 2000 \text{ V}; U_{Rac} = 530 \text{ V}; U_{p-p} = 1500 \text{ V}$

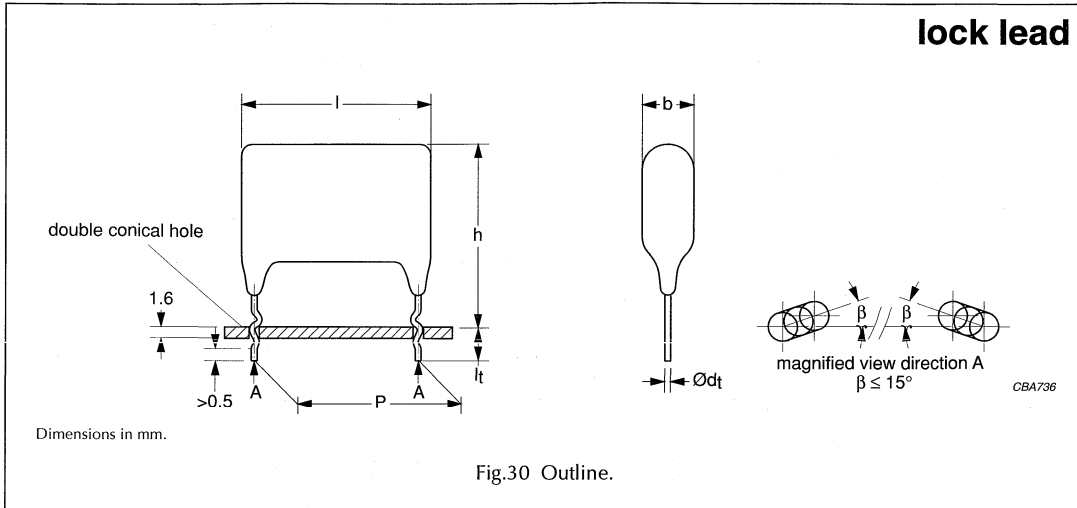
C (μF)	DIMENSIONS $b_{\max} \times h_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 5.0 \pm 1.0 \text{ mm}$
			C-tol = $\pm 5\%$
Pitch = $22.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.0056	8.5 × 21.5 × 26.0	2.5	2222 483 61562
0.0062			2222 483 61622
0.0068	9.0 × 22.0 × 26.0	2.6	2222 483 61682
0.0075			2222 483 61752
0.0082	9.5 × 22.5 × 26.0	2.8	2222 483 61822
0.0091	10.0 × 23.0 × 26.0	3.0	2222 483 61912
0.01	10.5 × 23.5 × 26.0	3.2	2222 483 61103
0.011	11.0 × 24.0 × 26.0	3.5	2222 483 61113
0.012	11.5 × 24.5 × 26.0	3.8	2222 483 61123
0.013			2222 483 61133
0.015	12.5 × 25.5 × 26.0	4.6	2222 483 61153
0.016	13.0 × 26.0 × 26.0	5.0	2222 483 61163
Pitch = $27.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.018	11.5 × 24.5 × 31.0	5.5	2222 483 61183
0.02	12.5 × 25.5 × 31.0	6.5	2222 483 61203
0.022	13.0 × 26.0 × 31.0	6.5	2222 483 61223
0.024	13.5 × 26.5 × 31.0	7.0	2222 483 61243
0.027	14.0 × 27.0 × 31.0	7.0	2222 483 61273
0.03	15.0 × 28.0 × 31.0	8.0	2222 483 61303
0.033	15.5 × 28.5 × 31.0	8.5	2222 483 61333

AC and pulse double metallized polypropylene film capacitors

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MMKP 483 GENERAL DATA

PITCH 15 mm (lock lead)



Specific reference data for the 2000 V DC capacitors (lock lead)

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: $C \leq 0.0051 \mu\text{F}$	$\leq 5 \times 10^{-4}$	$\leq 10 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 2000 V (DC)	20000 V/ μs	
R between leads, for $C \leq 1 \mu\text{F}$ at 500 V; 1 minute	>100000 M Ω	
R between leads and case; 500 V; 1 minute	>30000 M Ω	
Ionization (AC) voltage (typical value) at 20 pC peak discharge	>440 V	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	3000 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 2000 V DC versions (lock lead)

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 4.0 +1.0/-0.5 \text{ mm}$	$\pm 5\%$	2222 483 64...	preferred
		$\pm 3\%$	2222 483 69...	on request

AC and pulse double metallized polypropylene film capacitors

MMKP 483

$U_{Rdc} = 2000 \text{ V}$; $U_{Rac} = 530 \text{ V}$; $U_{p-p} = 1500 \text{ V}$ (lock lead)

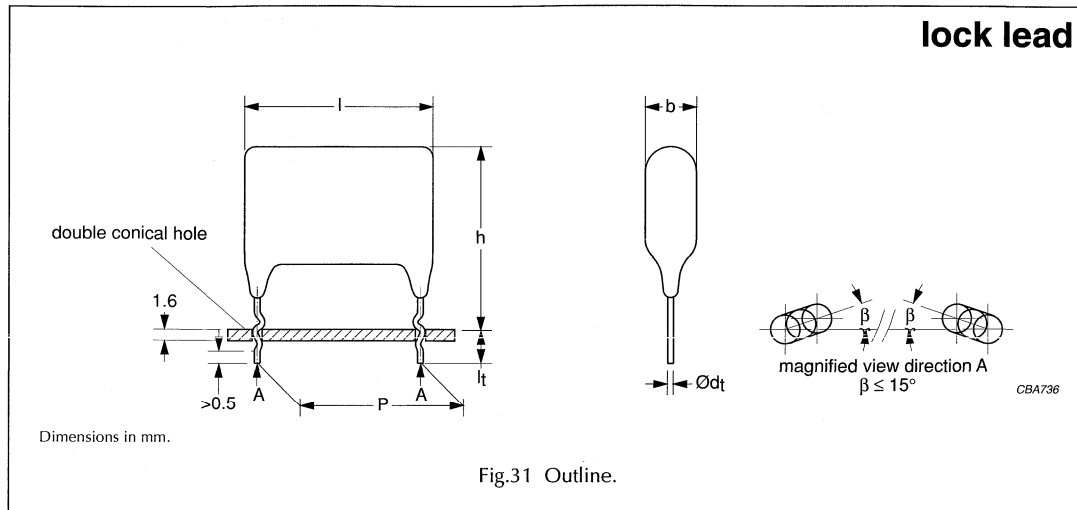
C (μF)	DIMENSIONS $b_{\max} \times h_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 4.0 +1.0/-0.5 \text{ mm}$
			C-tol = $\pm 5\%$
Pitch = $15.0 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.001	$6.0 \times 18.0 \times 18.0$	1.3	2222 483 64102
0.0011	$6.5 \times 18.5 \times 18.0$	1.4	2222 483 64112
0.0012			2222 483 64122
0.0013			2222 483 64132
0.0015	$7.0 \times 19.0 \times 18.0$	1.5	2222 483 64152
0.0016			2222 483 64162
0.0018	$7.5 \times 19.5 \times 18.0$	1.6	2222 483 64182
0.002			2222 483 64202
0.0022	$8.0 \times 20.0 \times 18.0$	1.7	2222 483 64222
0.0024			2222 483 64242
0.0027	$8.5 \times 20.5 \times 18.0$	1.8	2222 483 64272
0.003	$9.0 \times 21.0 \times 18.0$	1.9	2222 483 64302
0.0033	$9.5 \times 21.5 \times 18.0$	2.0	2222 483 64332
0.0036			2222 483 64362
0.0039	$10.0 \times 22.0 \times 18.0$	2.1	2222 483 64392
0.0043	$10.5 \times 22.5 \times 18.0$	2.2	2222 483 64432
0.0047			2222 483 64472
0.0051	$11.0 \times 23.0 \times 18.0$	2.3	2222 483 64512

AC and pulse double metallized polypropylene film capacitors

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MMKP 483 GENERAL DATA

PITCH 22.5/27.5 mm (lock lead)



Specific reference data for the 2000 V DC capacitors (lock lead)

DESCRIPTION	VALUE	
Tangent of loss angle: $0.0051 \mu\text{F} < C \leq 0.033 \mu\text{F}$	at 10 kHz	at 100 kHz
	$\leq 5 \times 10^{-4}$	$\leq 10 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 2000 V (DC): P = 22.5 mm P = 27.5 mm	10000 V/ μs 5500 V/ μs	
R between leads, for $C \leq 1 \mu\text{F}$ at 500 V; 1 minute	$>100000 \text{ M}\Omega$	
R between leads and case; 500 V; 1 minute	$>30000 \text{ M}\Omega$	
Ionization (AC) voltage (typical value) at 20 pC peak discharge	$>440 \text{ V}$	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	3000 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 2000 V DC versions (lock lead)

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 4.0 +1.0/-0.5 \text{ mm}$	$\pm 5\%$	2222 483 64...	preferred
		$\pm 3\%$	2222 483 69...	on request

AC and pulse double metallized polypropylene film capacitors

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$U_{Rdc} = 2000 \text{ V}$; $U_{Rac} = 530 \text{ V}$; $U_{p-p} = 1500 \text{ V}$ (lock lead)

C (μF)	DIMENSIONS $b_{\max} \times h_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 4.0 +1.0/-0.5 \text{ mm}$
			C-tol = $\pm 5\%$
Pitch = $22.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.0056 0.0062	$8.5 \times 24.5 \times 26.0$	2.5	2222 483 64562 2222 483 64622
0.0068 0.0075	$9.0 \times 25.0 \times 26.0$	2.6	2222 483 64682 2222 483 64752
0.0082	$9.5 \times 25.5 \times 26.0$	2.8	2222 483 64822
0.0091	$10.0 \times 26.0 \times 26.0$	3.0	2222 483 64912
0.01	$10.5 \times 26.5 \times 26.0$	3.2	2222 483 64103
0.011	$11.0 \times 27.0 \times 26.0$	3.5	2222 483 64113
0.012 0.013	$11.5 \times 27.5 \times 26.0$	3.8	2222 483 64123 2222 483 64133
0.015	$12.5 \times 28.5 \times 26.0$	4.6	2222 483 64153
0.016	$13.0 \times 29.0 \times 26.0$	5.0	2222 483 64163
Pitch = $27.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.018	$11.5 \times 27.5 \times 31.0$	5.5	2222 483 64183
0.02	$12.5 \times 28.5 \times 31.0$	6.5	2222 483 64203
0.022	$13.0 \times 29.0 \times 31.0$	6.5	2222 483 64223
0.024	$13.5 \times 29.5 \times 31.0$	7.0	2222 483 64243
0.027	$14.0 \times 30.0 \times 31.0$	7.0	2222 483 64273
0.03	$15.0 \times 31.0 \times 31.0$	8.0	2222 483 64303
0.033	$15.5 \times 31.5 \times 31.0$	8.5	2222 483 64333

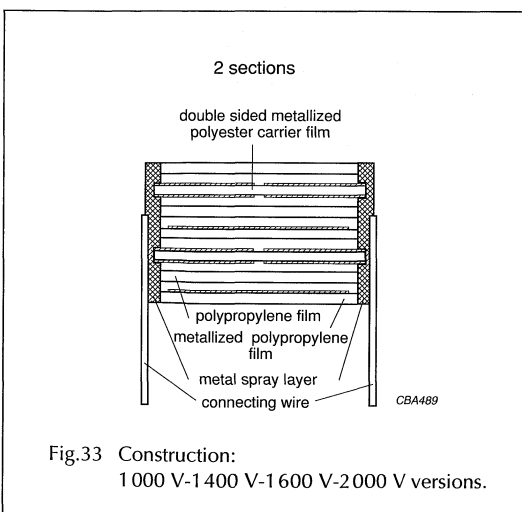
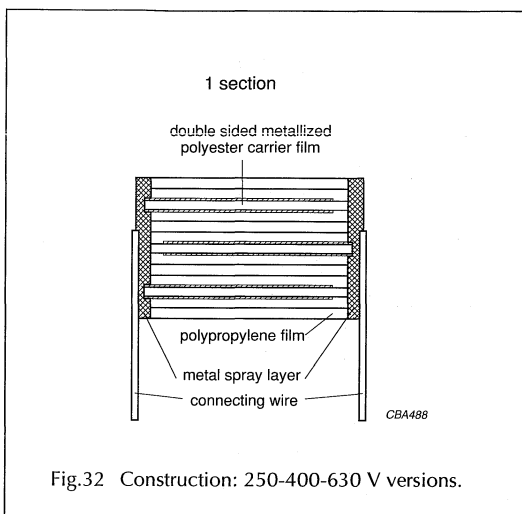
AC and pulse double metallized polypropylene film capacitors

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CONSTRUCTION

Description

- Low-inductive wound cell of double sided metallized polyester carrier film and polypropylene (PP) film
- Protected by a hard, water-repellent, solvent-resistant epoxy lacquer
- Radial leads, solder-coated wire



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 tape specifications refer to this handbook, chapter "Packaging information".

SPECIFIC METHOD OF MOUNTING TO WITHSTAND VIBRATION AND SHOCK

- For original pitch = 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.

Storage temperature

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

RATINGS AND CHARACTERISTICS REFERENCE CONDITIONS

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 $50 \pm 2\%$.

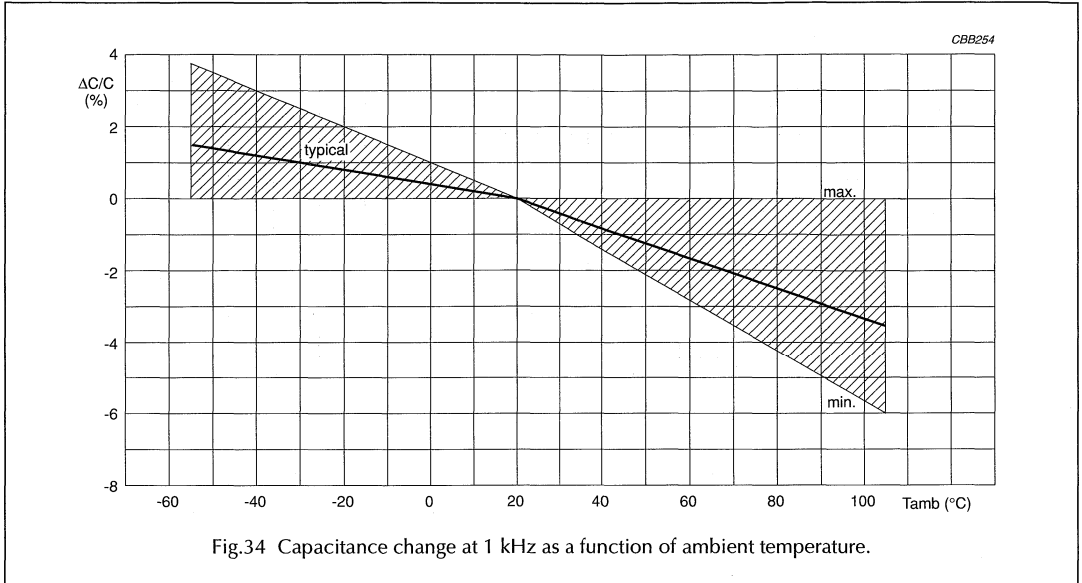
For reference testing, a conditioning period shall be applied over 96 ± 4 hours by heating the products in a circulating air oven at the rated temperature and a relative humidity not exceeding 20%.

AC and pulse double metallized polypropylene film capacitors

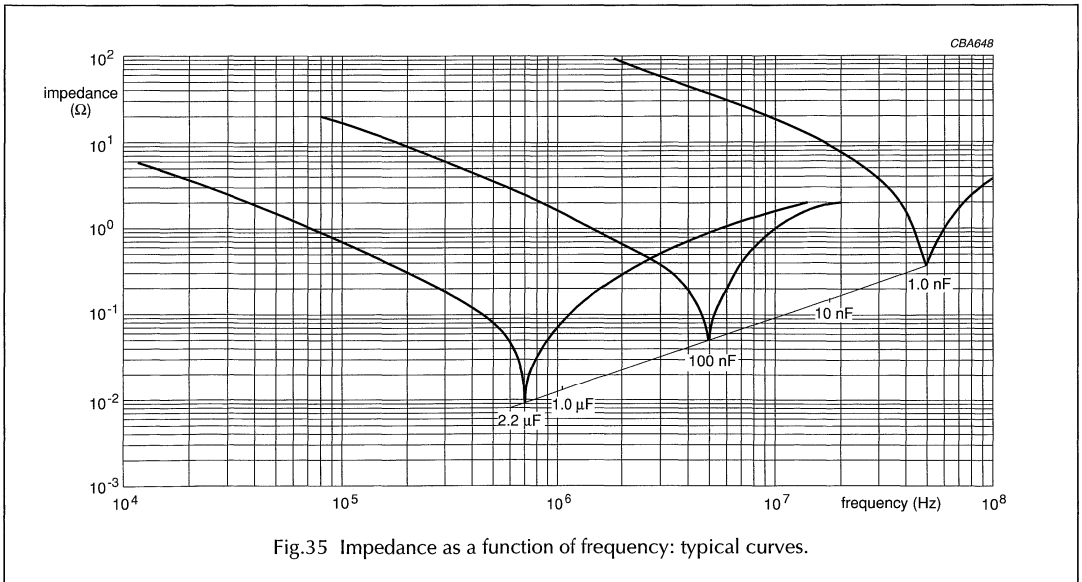
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CHARACTERISTICS

Capacitance



Impedance



AC and pulse double metallized polypropylene film capacitors

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Maximum DC voltage as a function of temperature

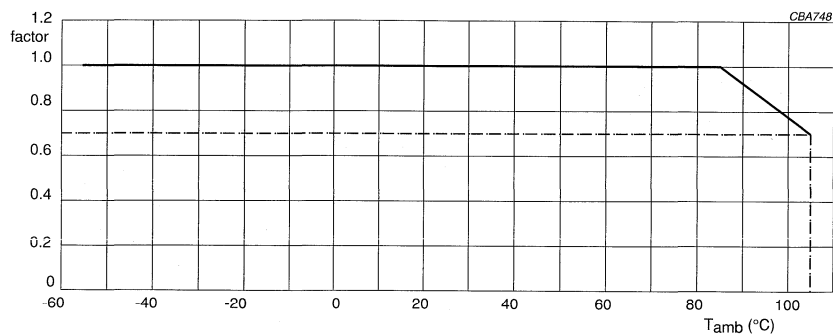
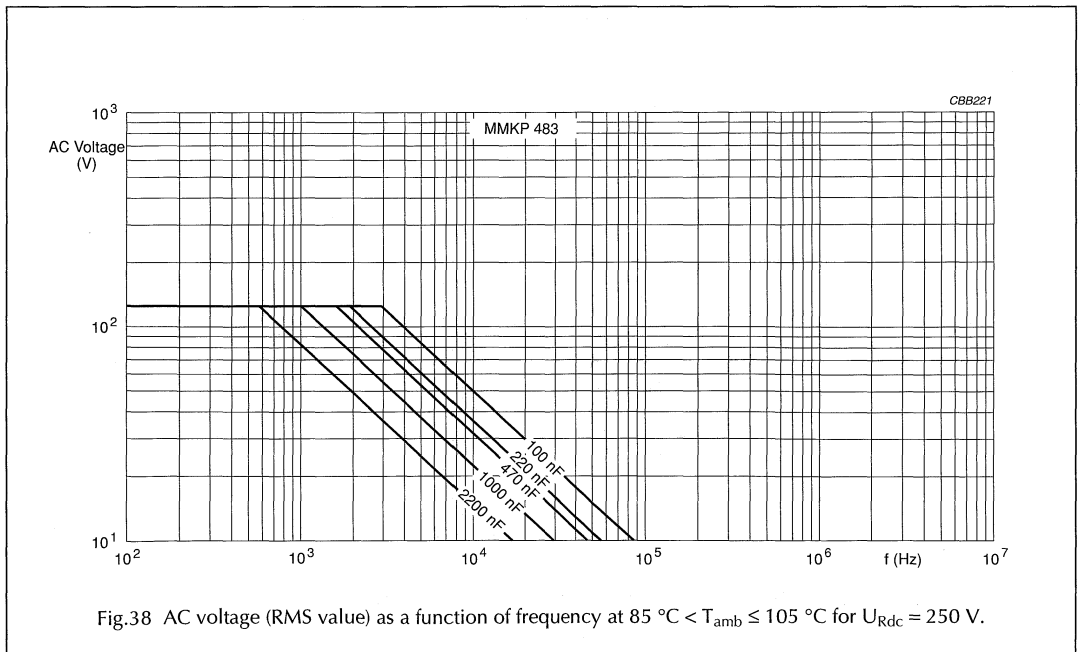
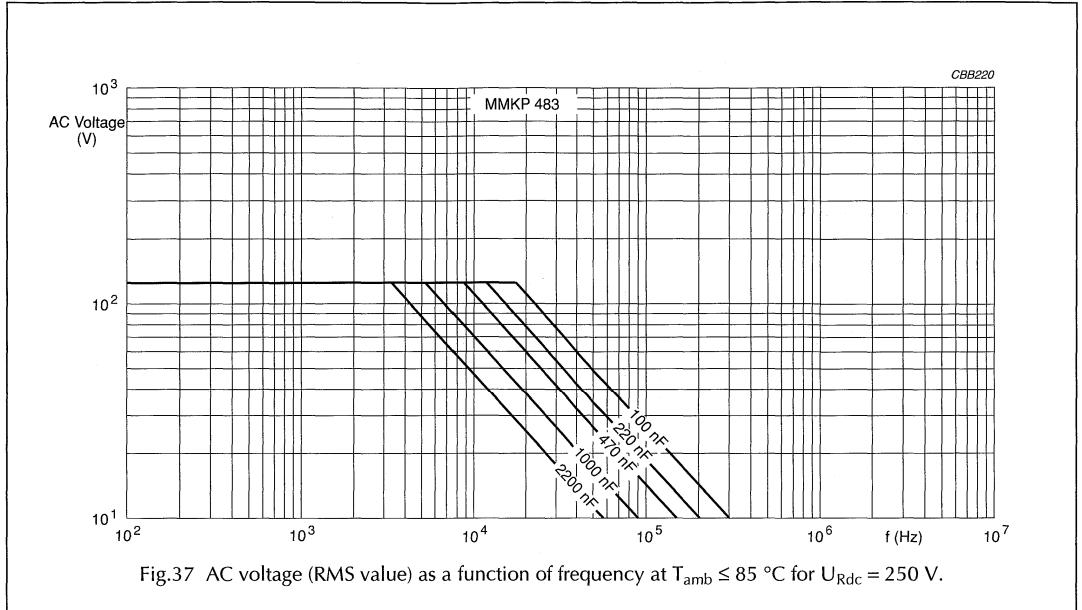


Fig.36 Multiplying factor as a function of temperature.

AC and pulse double metallized polypropylene film capacitors

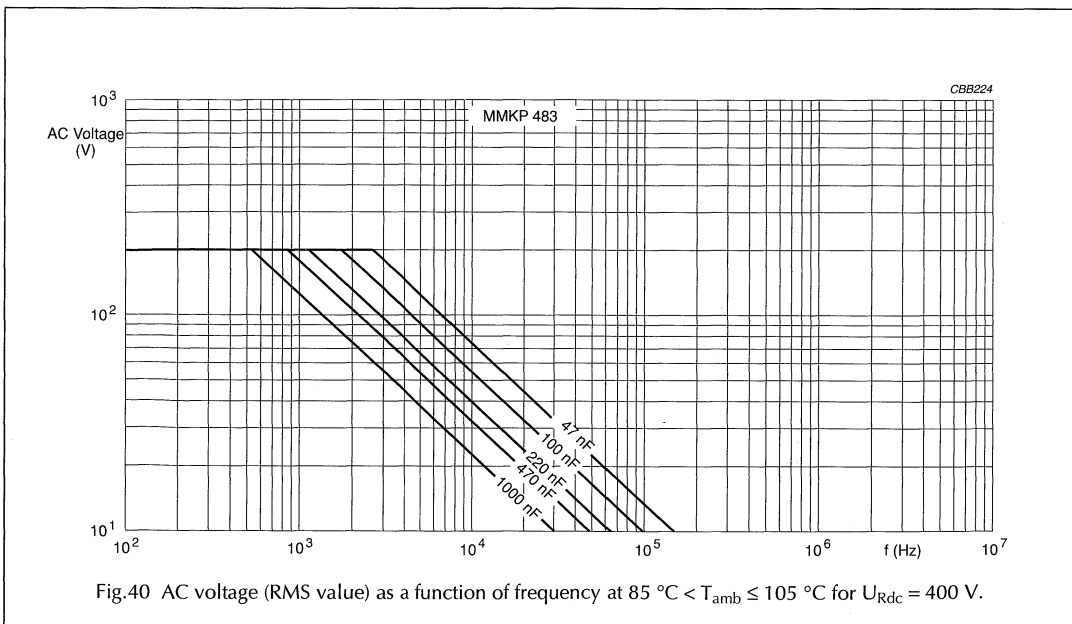
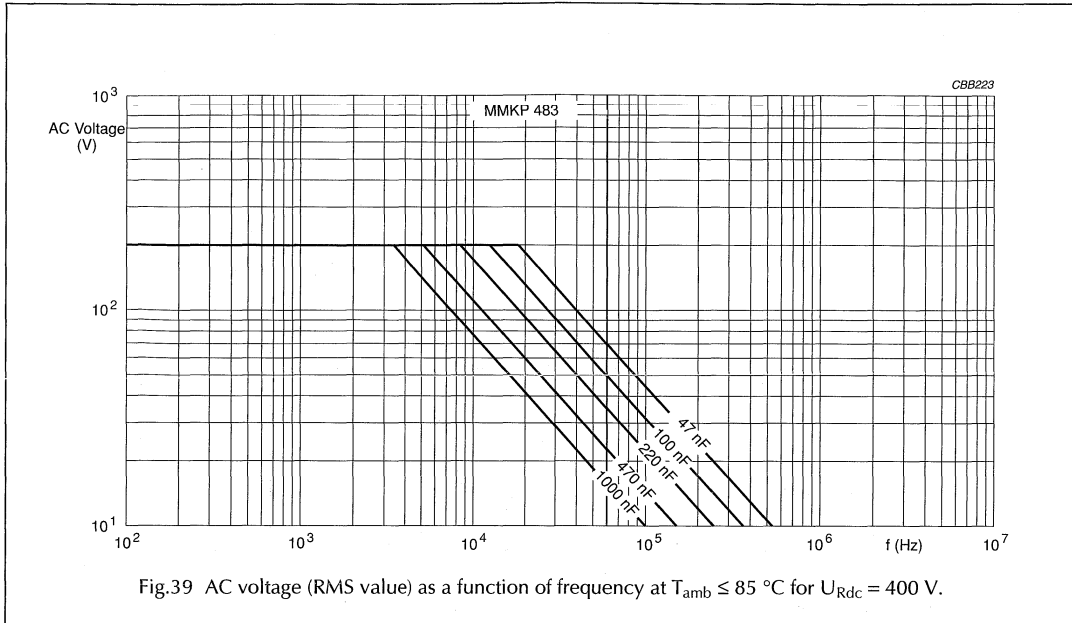
MMKP 483

Maximum RMS voltage (sinewave) as a function of frequency



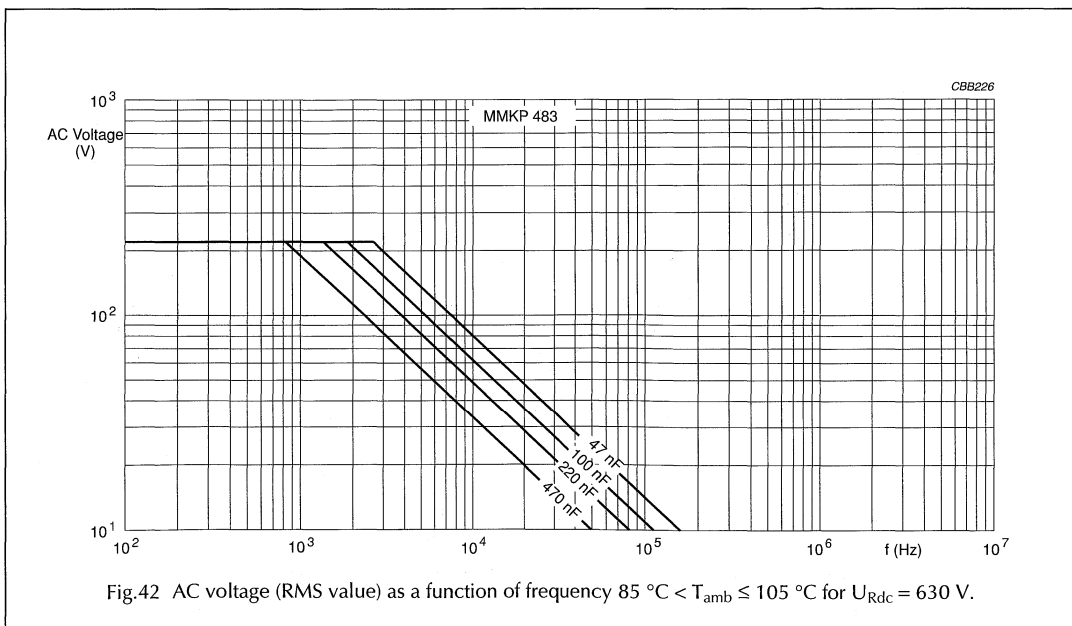
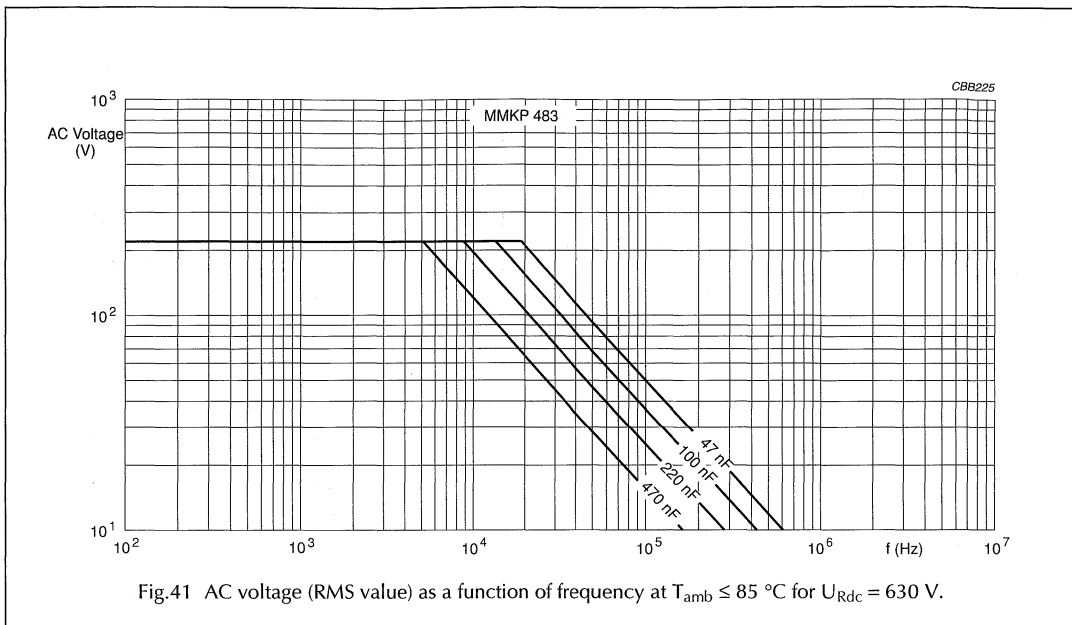
**AC and pulse double
metallized polypropylene film capacitors**

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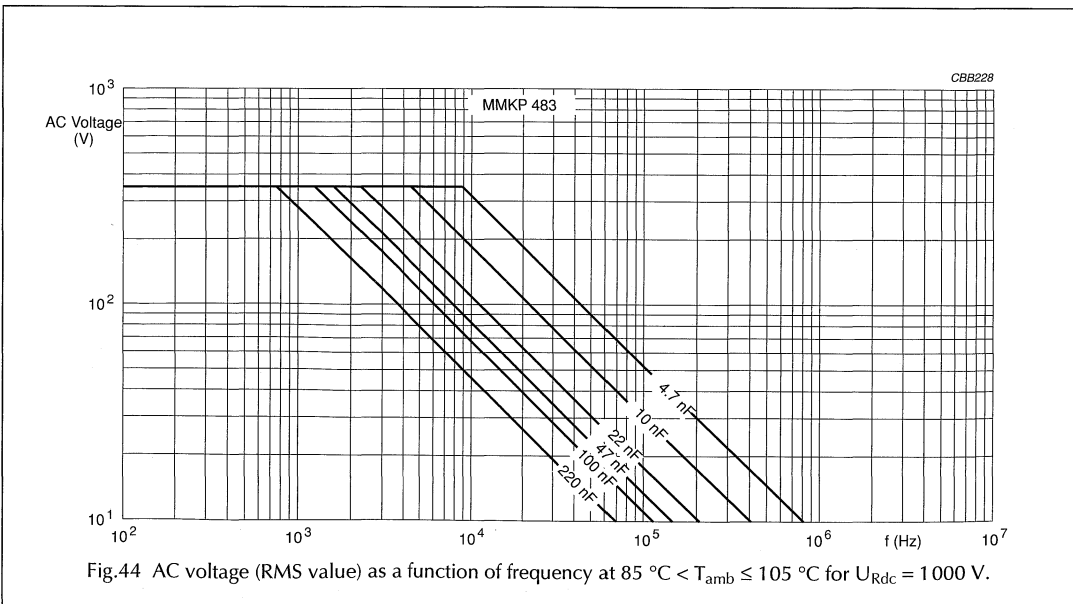
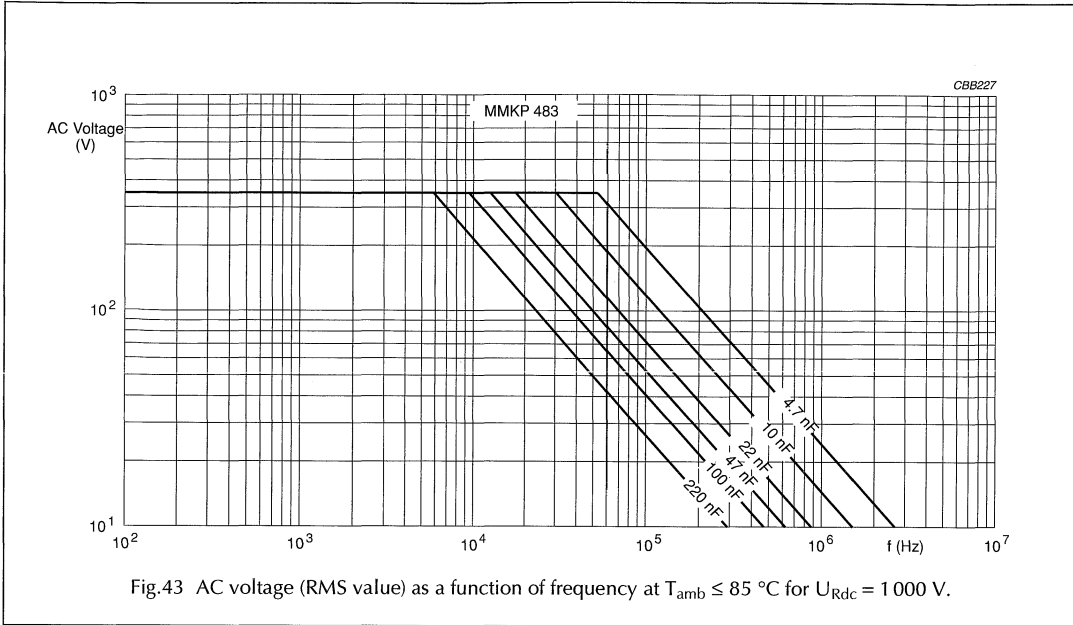
AC and pulse double metallized polypropylene film capacitors

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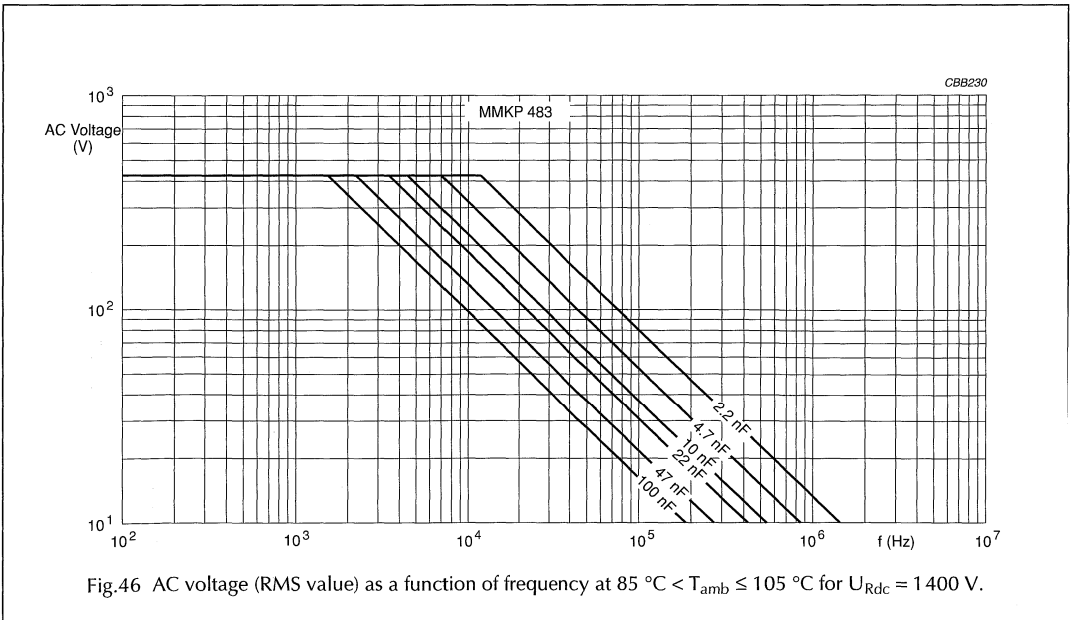
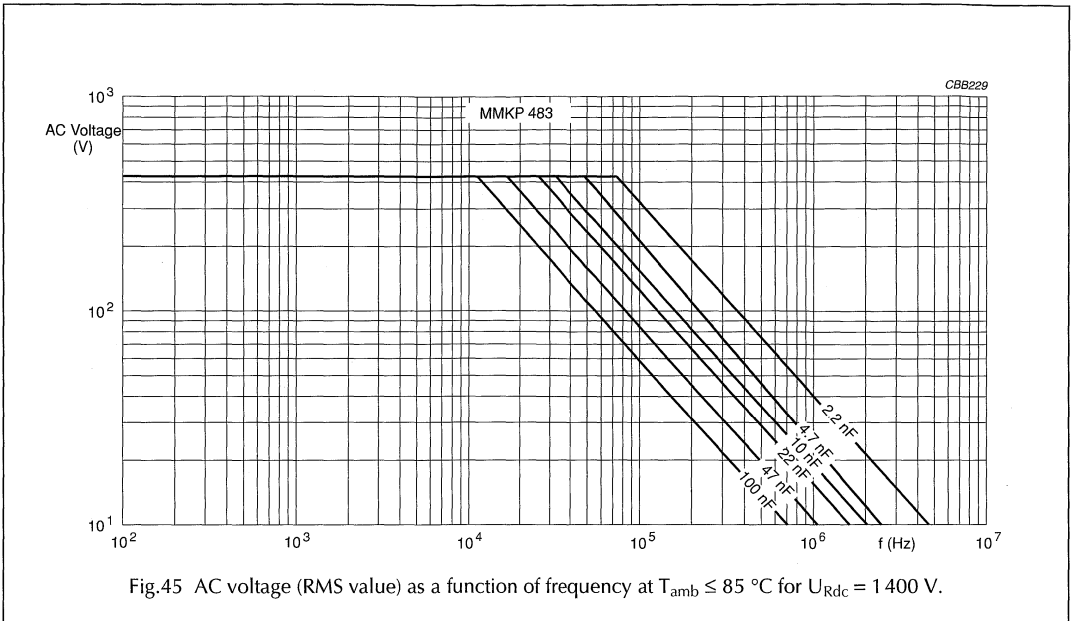
**AC and pulse double
metallized polypropylene film capacitors**

MMKP 483



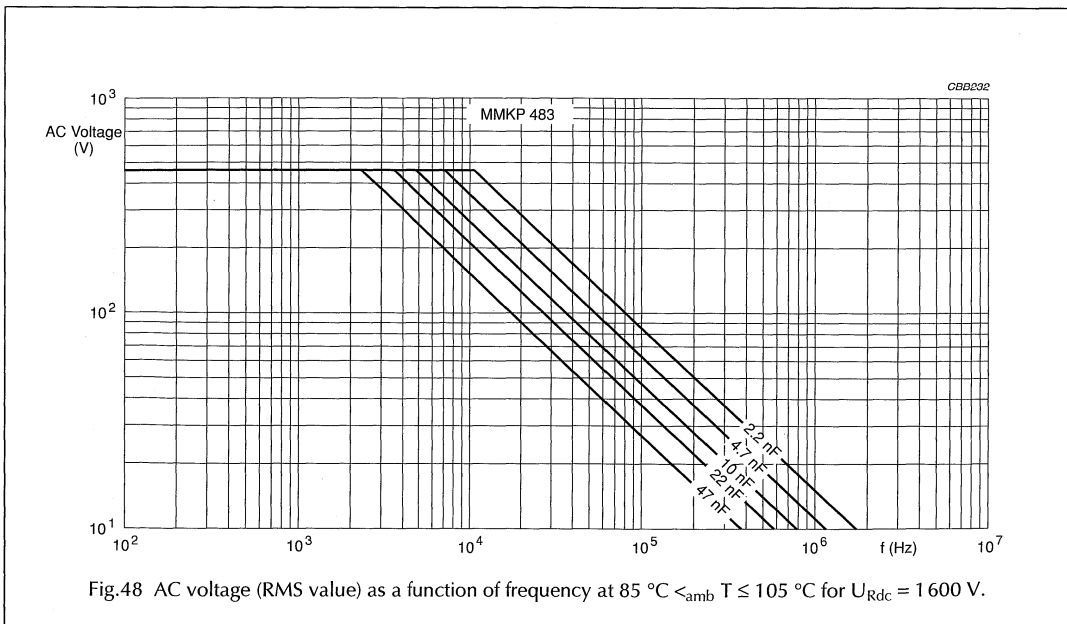
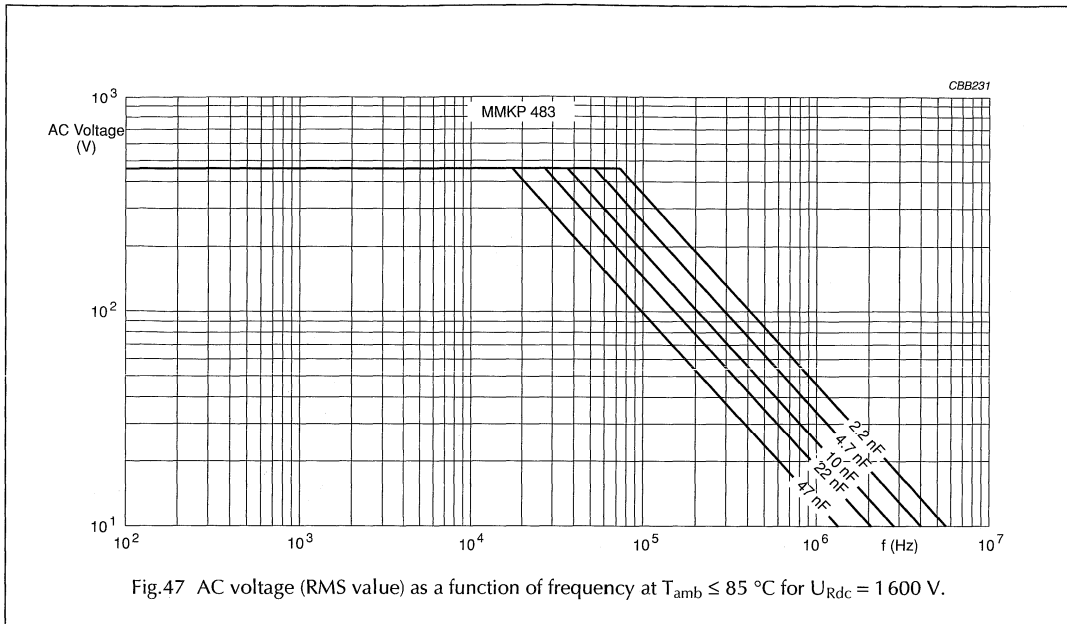
**AC and pulse double
metallized polypropylene film capacitors**

MMKP 483



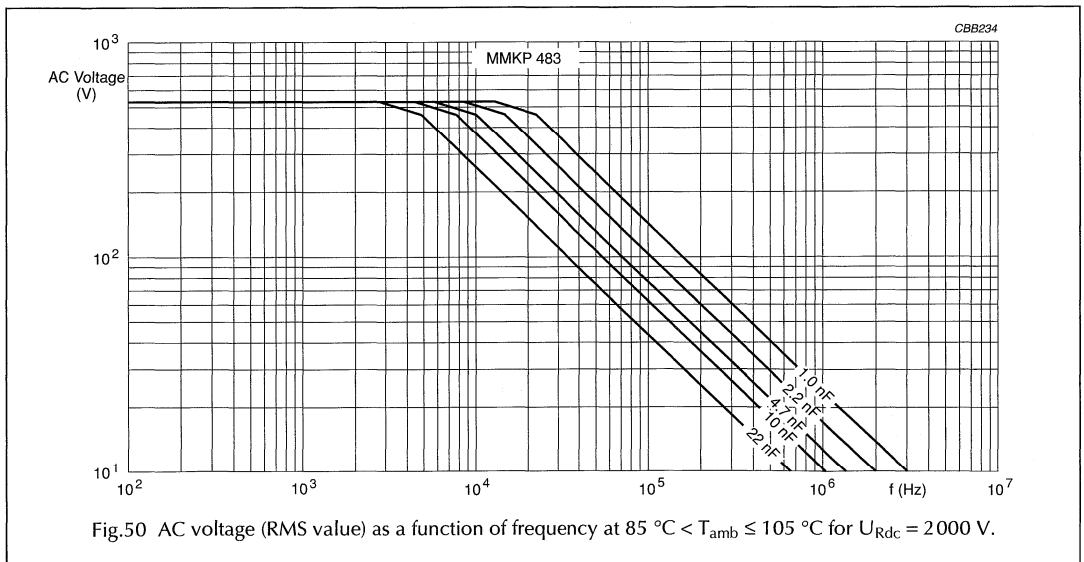
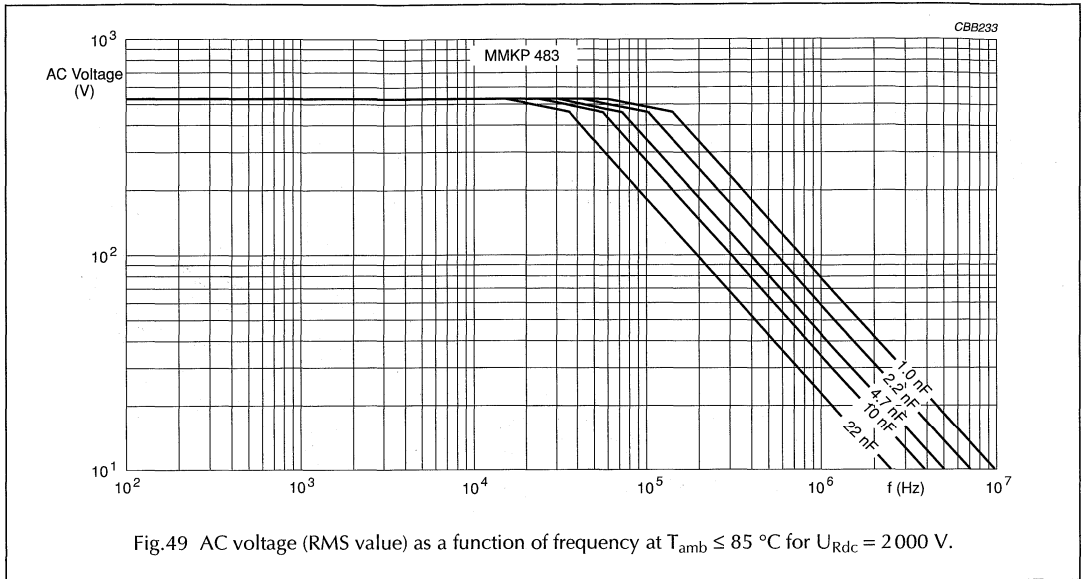
AC and pulse double metallized polypropylene film capacitors

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AC and pulse double metallized polypropylene film capacitors

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Maximum RMS current (sinewave) as a function of frequency

The maximum RMS current is defined by $I_{ac} = \omega \times C \times U_{ac}$.

U_{ac} is the maximum AC voltage depending on the ambient temperature in Figs 37 to 50.

AC and pulse double metallized polypropylene film capacitors

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Tangent of loss angle

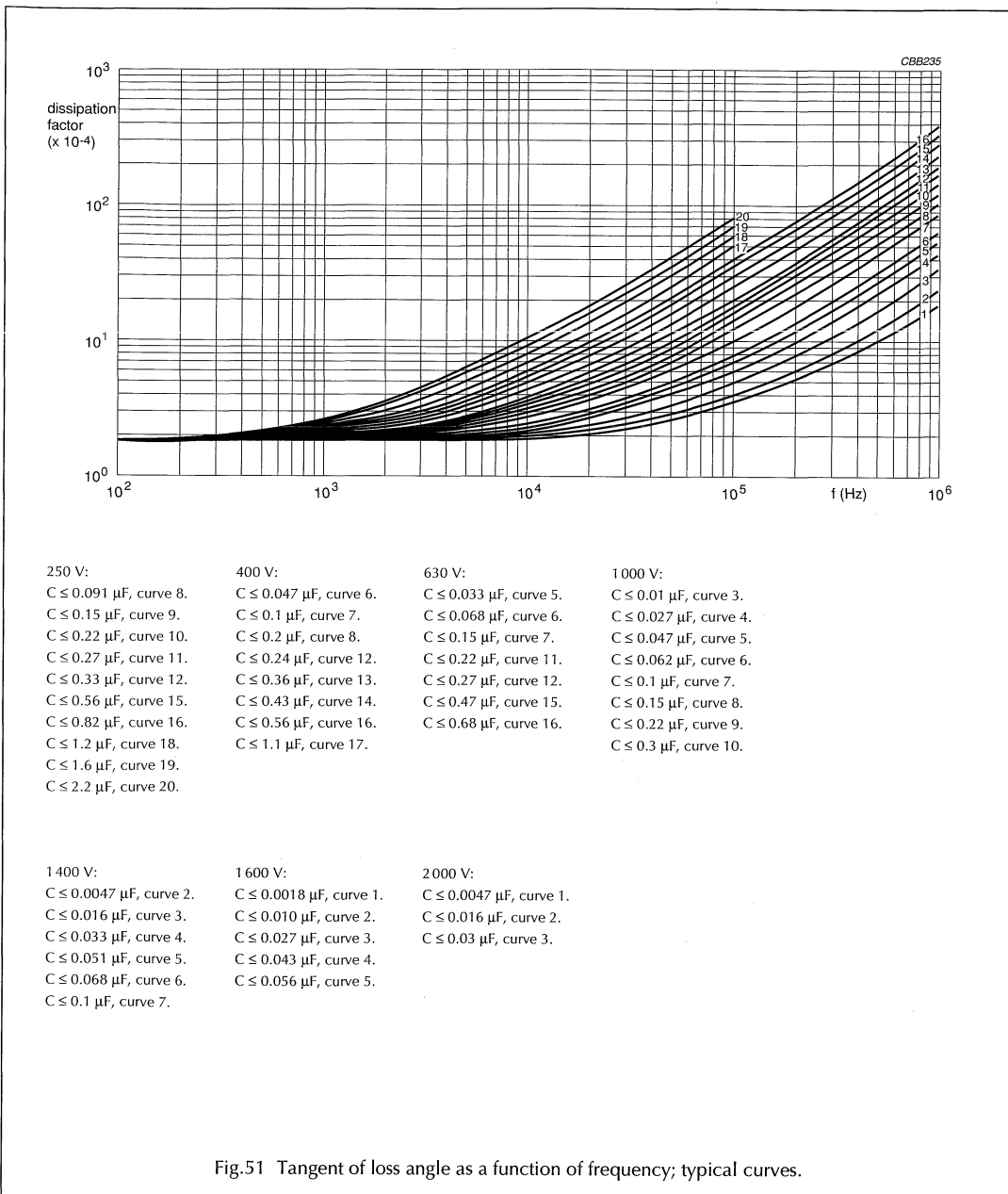


Fig.51 Tangent of loss angle as a function of frequency; typical curves.

AC and pulse double metallized polypropylene film capacitors

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Insulation resistance

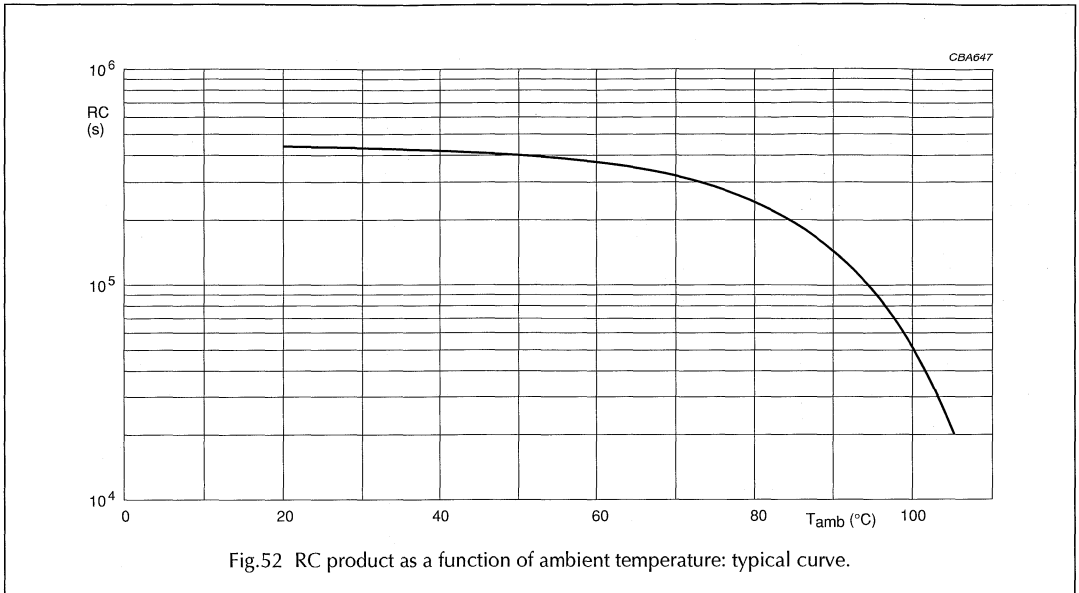


Fig.52 RC product as a function of ambient temperature: typical curve.

Maximum allowed component temperature rise (ΔT) as a function of the ambient temperature (T_{amb})

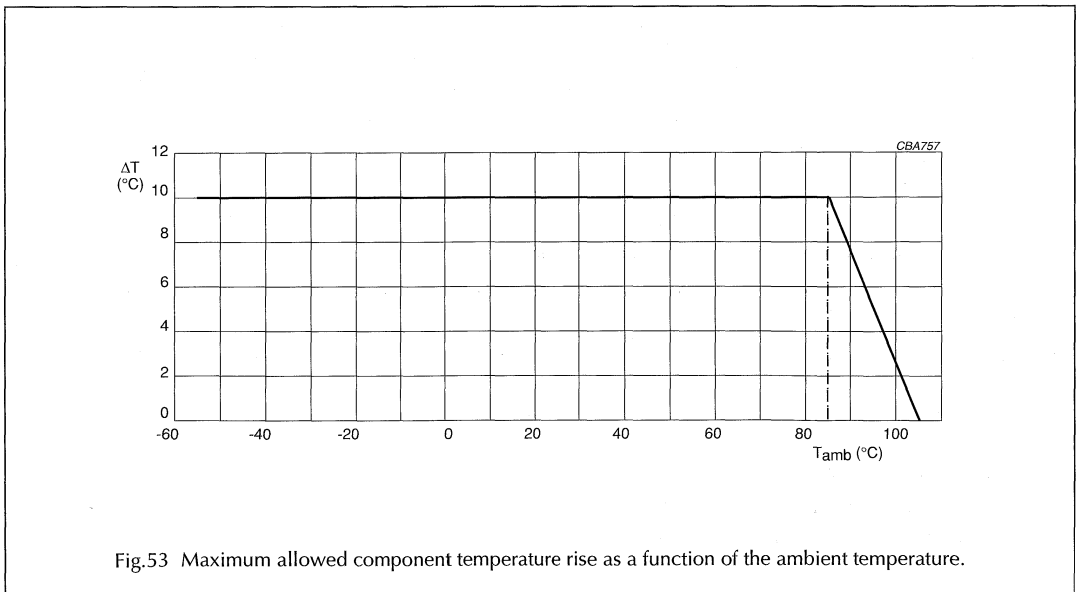


Fig.53 Maximum allowed component temperature rise as a function of the ambient temperature.

AC and pulse double metallized polypropylene film capacitors

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Heat conductivity (G) as a function of pitch and capacitor body thickness in mW/°C

Table 1 Heat conductivity

b _{max} (mm)	ORIGINAL PITCH (mm)		
	15	22.5	27.5
5.0	6.0	–	–
5.5	7.0	–	–
6.0	7.0	13.0	15.0
6.5	8.0	14.0	16.0
7.0	8.0	15.0	17.0
7.5	9.0	16.0	18.0
8.0	10.0	16.0	19.0
8.5	10.0	17.0	20.0
9.0	11.0	18.0	21.0
9.5	12.0	19.0	22.0
10.0	12.0	20.0	23.0
10.5	13.0	21.0	24.0
11.0	14.0	22.0	25.0
11.5	–	23.0	26.0
12.0	–	24.0	27.0
12.5	–	24.0	28.0
13.0	–	25.0	29.0
13.5	–	–	31.0
14.0	–	–	32.0
14.5	–	–	33.0
15.0	–	–	34.0
15.5	–	–	35.0
16.0	–	–	36.0

Power dissipation and maximum component temperature rise

The power dissipation must be limited in order not to exceed the maximum allowed component temperature rise as a function of the free air ambient temperature.

The power dissipation can be calculated according chapter "Introduction", section "Maximum power dissipation" with the typical $\tan \delta$ of the curves in Fig.51.

The component temperature rise (ΔT) can be measured (see Section "Measuring the component temperature" for more details) or calculated by $\Delta T = P/G$

- ΔT = component temperature rise (°C).
- P = power dissipation of the component (mW).
- G = heat conductivity of the component (mW/°C).

AC and pulse double metallized polypropylene film capacitors

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Measuring the component temperature

A thermocouple must be attached to the capacitor body; see Fig.54.

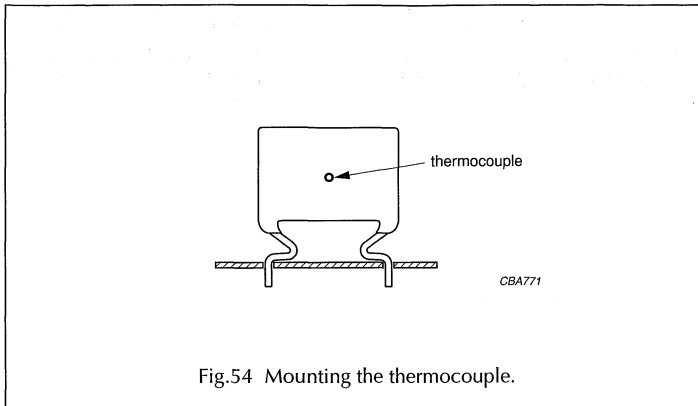


Fig.54 Mounting the thermocouple.

The temperature is measured in unloaded (T_{amb}) and maximum loaded condition (T_c).

The temperature rise is given by $\Delta T = T_c - T_{amb}$.

To avoid radiation or convection, the capacitor should be tested in a wind-free box.

AC and pulse double metallized polypropylene film capacitors

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Application note and limiting conditions

To select the capacitor for a certain application, the following 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 the maximum U_{p-p} to avoid the ionisation inception level.
3. The voltage pulse slope (dU/dt) shall not exceed the rated voltage pulse slope in an RC-circuit at rated voltage and without ringing. If the pulse voltage is lower than the rated DC voltage, the rated voltage pulse slope may be multiplied by U_{Rdc} and divided by the applied voltage.

For all other pulses following equation must be fulfilled:

$$2 \times \int_0^T \left(\frac{dU}{dt} \right)^2 \times dt < U_{Rdc} \times \left(\frac{dU}{dt} \right)_{rated}$$

T is the pulse duration.

4. The maximum component surface temperature rise must be lower than the limits in Fig.53.

Example

C = 8.2 nF - 1600 V.

This is a signal as in Fig.55 with:

$$U_{p-p} = 1200 \text{ V}; U_p = 1100 \text{ V}; T_1 = 12 \text{ } \mu\text{s}; T_2 = 64 \text{ } \mu\text{s}.$$

The ambient temperature is 50 °C

Checking the conditions:

1. The peak voltage $U_p = 1100 \text{ V}$ is lower than 1600 V (DC).
2. The peak-to-peak voltage 1200 V is lower than $2 \times \sqrt{2} \times 460 \text{ V(AC)} = 1300 \text{ V}$.
3. The voltage pulse slope: 320 V/ μs is much lower than 11000 V/ μs .
4. The dissipated power is 77 mW as calculated with Fourier terms and typical tangent of loss angle.

This gives a temperature rise of $\frac{77 \text{ mW}}{12 \text{ mW}/^\circ\text{C}} = 6.4 \text{ }^\circ\text{C}$ for an ambient temperature of 50 °C

which is permitted; see Fig.53.

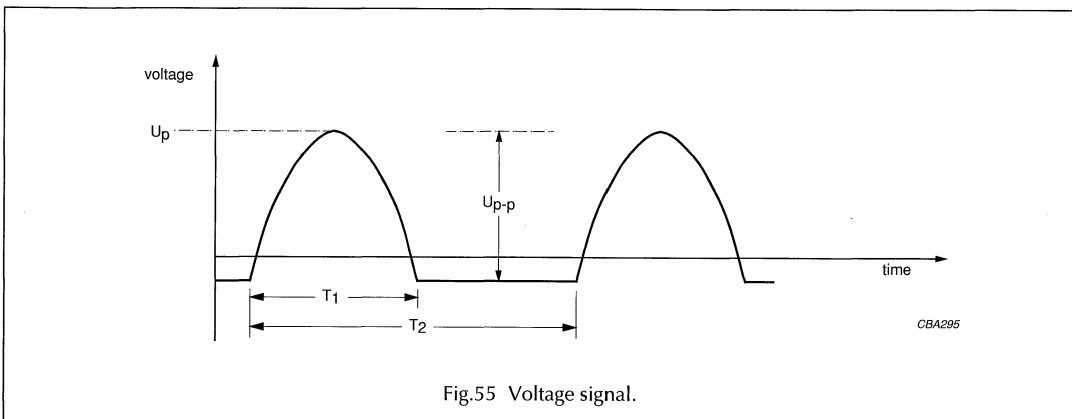


Fig.55 Voltage signal.

AC and pulse double metallized polypropylene film capacitors

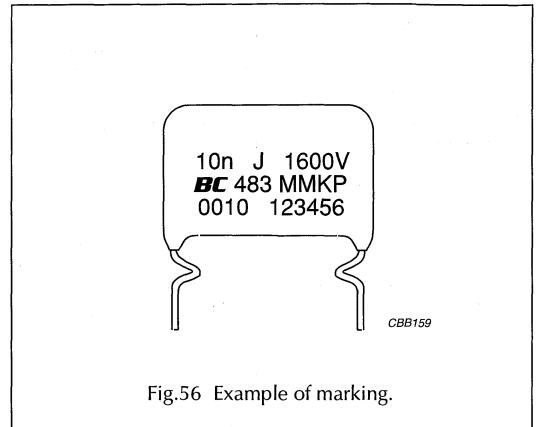
MMKP 483

MARKING

Product marking

The capacitors are marked by laser print; on the side (see Fig.56) with the following information:

1. Rated capacitance code in accordance with "IEC 60062"
2. Tolerance on rated capacitance: A = $\pm 3\%$; J = $\pm 5\%$
3. Rated (DC) voltage (e.g. 1 600 V)
4. Manufacturer
5. Manufacturer's type designation (483)
6. Code for dielectric material (MMKP)
7. Year and week of manufacture (e.g. 0010).
8. Batchnumber (e.g. 123456).



QUICK REFERENCE TEST REQUIREMENTS

TEST	PROCEDURE (quick reference)	REQUIREMENTS
Robustness of leads		
Tensile strength: "IEC 60068-2-21"	load 10 N; 10 s	no visible damage legible marking $ \Delta C/C \leq 1\%$ $\Delta \tan \delta \leq 5 \times 10^{-4}$ ($C \leq 100$ nF) $\Delta \tan \delta \leq 10 \times 10^{-4}$ (100 nF < $C \leq 470$ nF) $\Delta \tan \delta \leq 15 \times 10^{-4}$ ($C > 470$ nF)
Bending: "IEC 60068-2-21"	load 5 N; $4 \times 90^\circ$	
Resistance to soldering heat: "IEC 60068-2-20"	solder bath: 260 °C; 10 s	
Component solvent resistance	isopropyl alcohol; 23 °C; 5 minutes	
Robustness of component		
Vibration: "IEC 60068-2-6"	10 Hz to 55 Hz; amplitude 0.75 mm or acceleration 98 m/s ² ; 6 hours	$ \Delta C/C \leq 1\%$ $\Delta \tan \delta \leq 5 \times 10^{-4}$ ($C \leq 100$ nF) $\Delta \tan \delta \leq 10 \times 10^{-4}$ (100 nF < $C \leq 470$ nF) $\Delta \tan \delta \leq 15 \times 10^{-4}$ ($C > 470$ nF)
Shock: "IEC 60068-2-27"	half sinewave; 490 m/s ² ; 11 ms	
Climatic sequence		
Dry heat: "IEC 60068-2-2"	16 hours; +105 °C	$ \Delta C/C \leq 2\%$ (original pitch = 22.5 or 27.5 mm) $ \Delta C/C \leq 3\%$ (original pitch = 15 mm) $\Delta \tan \delta \leq 5 \times 10^{-4}$ ($C \leq 100$ nF) $\Delta \tan \delta \leq 10 \times 10^{-4}$ (100 nF < $C \leq 470$ nF) $\Delta \tan \delta \leq 15 \times 10^{-4}$ ($C > 470$ nF) $R_{ins} \geq 50\%$ of specified value
Damp heat, cyclic, test Db, first cycle: "IEC 60068-2-30"		
Cold: "IEC 60068-2-1"	2 hours; -55 °C	
Damp heat, cyclic, test Db, remaining cycles: "IEC 60068-2-30"		

AC and pulse double metallized polypropylene film capacitors

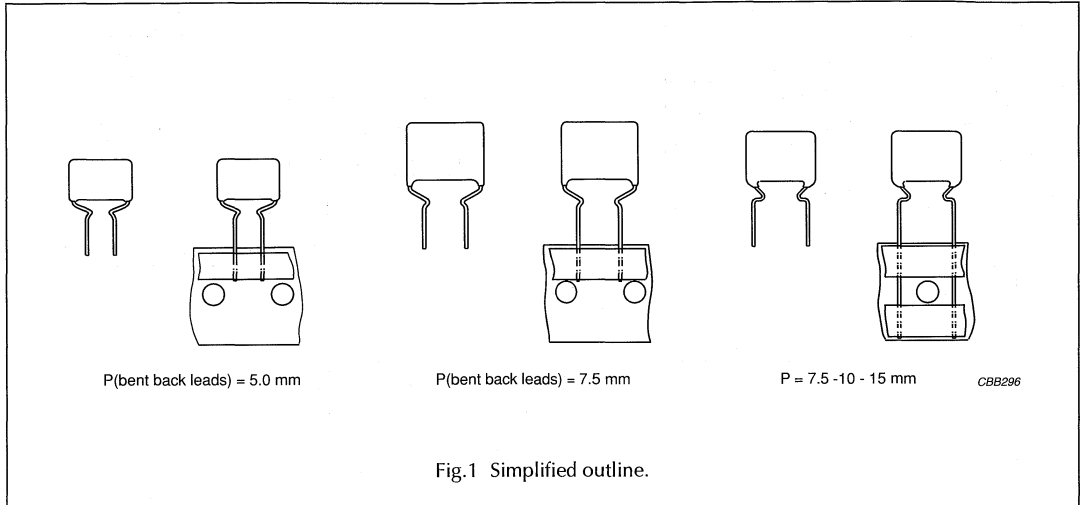
MMKP 483

TEST	PROCEDURE (quick reference)	REQUIREMENTS
Other applicable tests		
Damp heat, steady state: "IEC 60068-2-3"	56 days; 40 °C; 90 to 95% RH	$ \Delta C/C \leq 2\%$ $\Delta \tan \delta \leq 5 \times 10^{-4}$ ($C \leq 100$ nF) $\Delta \tan \delta \leq 10 \times 10^{-4}$ (100 nF < $C \leq 470$ nF) $\Delta \tan \delta \leq 15 \times 10^{-4}$ ($C > 470$ nF) $R_{ins} \geq 50\%$ of specified value
Endurance (AC): "IEC 60384-17"	2000 hours; $1.25 \times U_{Rac}$ (RMS); 50 Hz; 105 °C	$ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 5 \times 10^{-4}$ ($C \leq 100$ nF) $\Delta \tan \delta \leq 10 \times 10^{-4}$ (100 nF < $C \leq 470$ nF) $\Delta \tan \delta \leq 15 \times 10^{-4}$ ($C > 470$ nF) $R_{ins} \geq 50\%$ of specified value
Heat storage: "IEC 60384-17"	2000 hours; 105 °C	$ \Delta C/C \leq 1\%$ (original pitch = 22.5 or 27.5 mm) $ \Delta C/C \leq 2\%$ (original pitch = 15 mm) $\Delta \tan \delta \leq 5 \times 10^{-4}$ ($C \leq 100$ nF) $\Delta \tan \delta \leq 10 \times 10^{-4}$ (100 nF < $C \leq 470$ nF) $\Delta \tan \delta \leq 15 \times 10^{-4}$ ($C > 470$ nF)
Resistance to soldering heat with preheating: "IEC 60384-17"	body temperature: 105 °C; bath temperature: 260 °C; dwell time: 10 s	$ \Delta C/C \leq 1\%$ (original pitch = 22.5 or 27.5 mm) $ \Delta C/C \leq 2\%$ (original pitch = 15 mm) $\Delta \tan \delta \leq 5 \times 10^{-4}$ ($C \leq 100$ nF) $\Delta \tan \delta \leq 10 \times 10^{-4}$ (100 nF < $C \leq 470$ nF) $\Delta \tan \delta \leq 15 \times 10^{-4}$ ($C > 470$ nF)
Passive flammability: "IEC 60384-1"	class C	no burning
Endurance (DC): "IEC 60384-17"	2000 hours; $1.25 \times U_{Rdc}$; 85 °C $0.875 \times U_{Rdc}$; 105 °C	$ \Delta C/C \leq 3\%$ for 250 V $ \Delta C/C \leq 2\%$ for 400 to 2000 V $\Delta \tan \delta \leq 5 \times 10^{-4}$ ($C \leq 100$ nF) $\Delta \tan \delta \leq 10 \times 10^{-4}$ (100 nF < $C \leq 470$ nF) $\Delta \tan \delta \leq 15 \times 10^{-4}$ ($C > 470$ nF) $R_{ins} \geq 50\%$ of specified value

AC and pulse polypropylene film foil capacitors

KP 374

KP RADIAL EPOXY LACQUERED TYPE

 PITCH 5/7.5 mm (kinked bent back leads)
 PITCH 7.5/10/15 mm


FEATURES

- 5 to 15 mm terminal pitch
- Supplied loose in box; taped on reel and ammopack.

APPLICATIONS

- Consumer and industrial
- High currents and/or steep pulses occur
- Monitor applications.

DETAIL SPECIFICATION

For more detailed data and test requirements see "Type detail specification HQN-384-13/104".

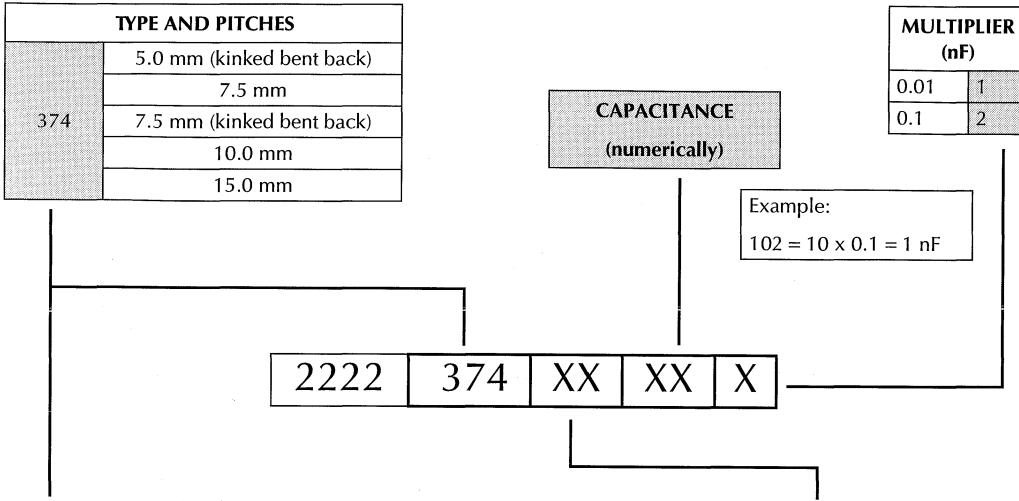
QUICK REFERENCE DATA

DESCRIPTION	VALUE
Capacitance range (E24 series)	680 to 82000 pF
Capacitance tolerance	±10%, ±5%
Rated (DC) voltage	250 V; 400 V; 630 V
Rated (AC) voltage	125 V; 160 V; 200 V
Rated peak-to-peak voltage	350 V; 450 V; 560 V
Climatic category	55/105/56
Rated temperature	85 °C
Maximum application temperature	105 °C
Reference specification	IEC 60384-13
Performance grade	grade 1
Stability grade	grade 2
Materials	qualified in accordance with UL94 V-0

AC and pulse polypropylene film foil capacitors

KP 374

COMPOSITION OF CATALOGUE NUMBER

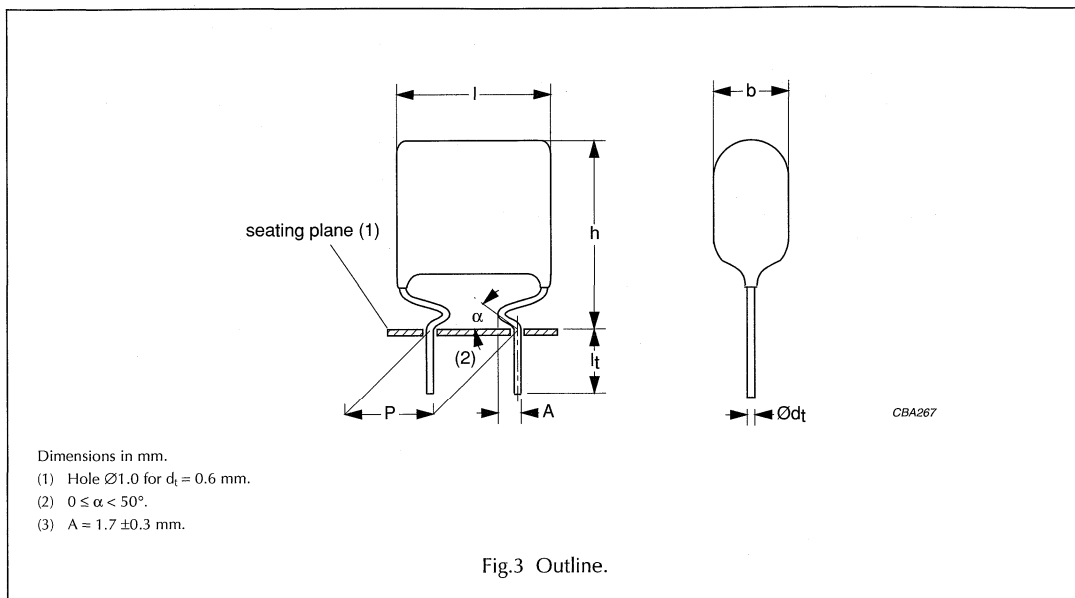


TYPE	PACKAGING	LEAD CONFIGURATION	PREFERRED TYPES			
			C-TOL	250 V	400 V	630 V
374	loose in box	short leads	±10%	40	50	60
	ammopack	bent back leads	±10%	42	52	62
	taped on reel	bent back leads	±10%	46	56	66
	taped on reel		±10%	44	54	64
			ON REQUEST			
374	loose in box	short leads	±5%	41	51	61
	ammopack	bent back leads	±5%	43	53	63
	taped on reel (kinked bent back)	bent back leads	±5%	47	57	67
	taped on reel		±5%	45	55	65

AC and pulse polypropylene film foil capacitors

KP 374

KP 374 GENERAL DATA

PITCH 5 mm (kinked bent back leads)


Specific reference data for the 250 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: $1500 \text{ pF} < C \leq 27000 \text{ pF}$	$\leq 5 \times 10^{-4}$	$\leq 10 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 250 V (DC)	$>10000 \text{ V}/\mu\text{s}$	
R between leads at 100 V; 1 minute	$>100000 \text{ M}\Omega$	
R between interconnected leads and case; at 100 V; 1 minute	$>100000 \text{ M}\Omega$	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	500 V; 1 minute	
Withstanding (DC) voltage between leads and case	500 V; 1 minute	

Available 250 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Ammopack (bent back)	$H = 16.0 \text{ mm}; P_0 = 12.7 \text{ mm}$	$\pm 10\%$	2222 374 42...	preferred
		$\pm 5\%$	2222 374 43...	on request
Taped on reel (bent back)	$H = 16.0 \text{ mm}; P_0 = 12.7 \text{ mm}$	$\pm 10\%$	2222 374 46...	preferred
		$\pm 5\%$	2222 374 47...	on request

AC and pulse polypropylene film foil capacitors

KP 374

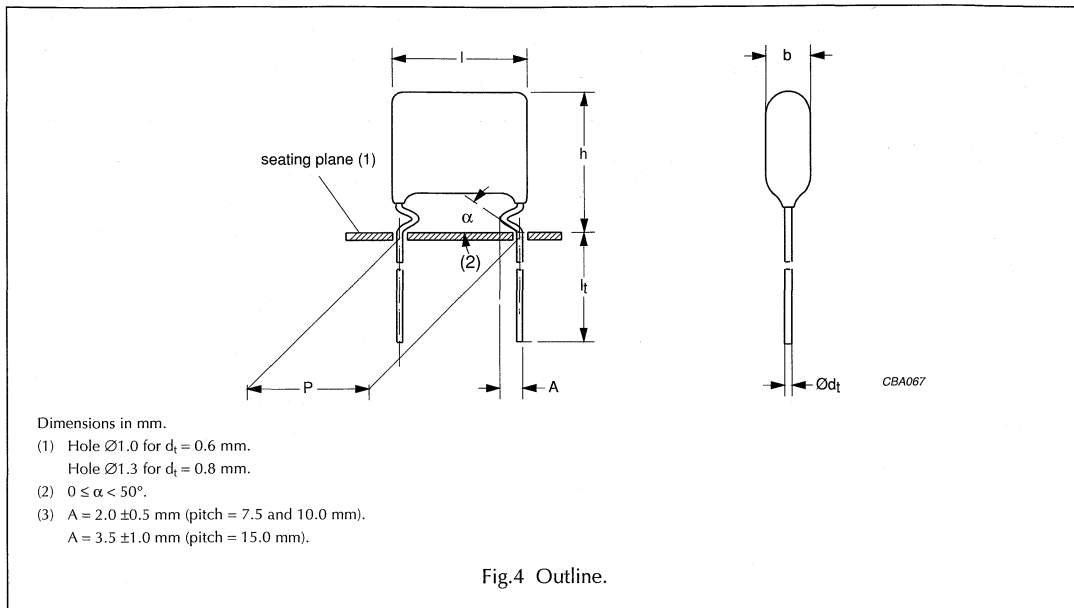
 $U_{Rdc} = 250 \text{ V}; U_{Rac} = 125 \text{ V}; U_{p-p} = 350 \text{ V}$

C (pF)	DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER	
			AMMOPACK	REEL
			H = 16.0 mm; P ₀ = 12.7 mm	H = 16.0 mm; P ₀ = 12.7 mm
			C-tol = ±10%	C-tol = ±10%
			catalogue number	last 5 digits
Pitch = 7.5 ±0.4 mm; d_t = 0.60 ±0.06 mm			pitch = 5.0 mm (bent back)	pitch = 5.0 mm (bent back)
1500	5.0 × 14.5 × 11.0	0.48	2222 374 42152	.. 46152
1800		0.48	2222 374 42182	.. 46182
2200		0.52	2222 374 42222	.. 46222
2700		0.52	2222 374 42272	.. 46272
3300		0.52	2222 374 42332	.. 46332
3900		0.52	2222 374 42392	.. 46392
4700		0.53	2222 374 42472	.. 46472
5600		0.50	2222 374 42562	.. 46562
6800		0.55	2222 374 42682	.. 46682
8200	5.5 × 15.0 × 11.0	0.60	2222 374 42822	.. 46822
10000	6.0 × 15.5 × 11.0	0.67	2222 374 42103	.. 46103
12000	6.5 × 16.0 × 11.0	0.74	2222 374 42123	.. 46123
Pitch = 10.0 ±0.4 mm; d_t = 0.60 ±0.06 mm			pitch = 5.0 mm (bent back)	pitch = 5.0 mm (bent back)
15000	5.5 × 15.0 × 13.5	0.68	not available	.. 46153
18000	6.0 × 15.5 × 13.5	0.76		.. 46183
22000	6.5 × 16.0 × 13.5	0.86		.. 46223
27000	7.0 × 16.5 × 13.5	0.98		.. 46273

AC and pulse polypropylene film foil capacitors

KP 374

KP 374 GENERAL DATA

PITCH 7.5/10/15 mm


Specific reference data for the 250 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: $1500 \text{ pF} < C \leq 82000 \text{ pF}$	$\leq 5 \times 10^{-4}$	$\leq 10 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 250 V (DC)	$>10000 \text{ V}/\mu\text{s}$	
R between leads at 100 V; 1 minute	$>100000 \text{ M}\Omega$	
R between interconnected leads and case; at 100 V; 1 minute	$>100000 \text{ M}\Omega$	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	500 V; 1 minute	
Withstanding (DC) voltage between leads and case	500 V; 1 minute	

Available 250 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 3.5 \pm 0.5$ mm; note 1	$\pm 10\%$	2222 374 40...	preferred
		$\pm 5\%$	2222 374 41...	on request

Note

1. Lead length 3.5 ± 0.5 mm for pitch = 7.5 mm and $4 +1/-0.5$ mm for pitch = 10.0 and 15.0 mm.

AC and pulse polypropylene film foil capacitors

KP 374

 $U_{Rdc} = 250 \text{ V}; U_{Rac} = 125 \text{ V}; U_{p-p} = 350 \text{ V}$

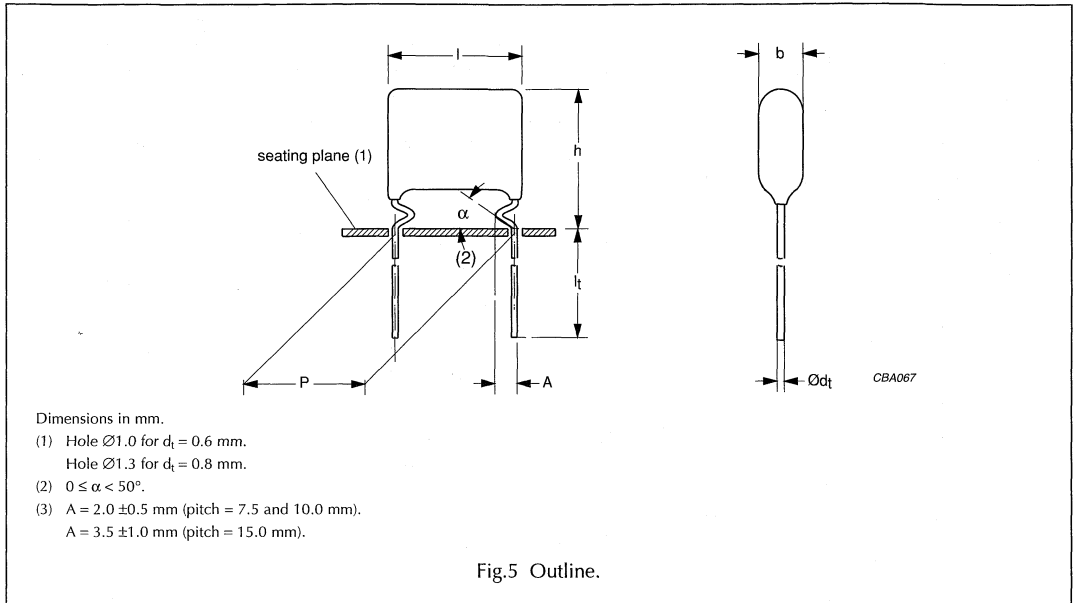
C (pF)	DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			C-tol = $\pm 10\%$
Pitch = $7.5 \pm 0.4 \text{ mm}; d_t = 0.60 \pm 0.06 \text{ mm}$			
1500	5.0 × 13.5 × 11.0	0.48	2222 374 40152
1800		0.48	2222 374 40182
2200		0.52	2222 374 40222
2700		0.52	2222 374 40272
3300		0.52	2222 374 40332
3900		0.52	2222 374 40392
4700		0.53	2222 374 40472
5600		0.50	2222 374 40562
6800		0.55	2222 374 40682
8200		5.5 × 14.0 × 11.0	0.60
10000	6.0 × 14.5 × 11.0	0.67	2222 374 40103
12000	6.5 × 15.0 × 11.0	0.74	2222 374 40123
Pitch = $10.0 \pm 0.4 \text{ mm}; d_t = 0.60 \pm 0.06 \text{ mm}$			
15000	5.5 × 15.0 × 13.5	0.68	2222 374 40153
18000	6.0 × 15.5 × 13.5	0.76	2222 374 40183
22000	6.5 × 16.0 × 13.5	0.86	2222 374 40223
27000	7.0 × 16.5 × 13.5	0.98	2222 374 40273
Pitch = $15.0 \pm 0.4 \text{ mm}; d_t = 0.80 \pm 0.08 \text{ mm}$			
33000	5.5 × 14.5 × 19.0	1.03	2222 374 40333
39000	6.0 × 15.0 × 19.0	1.14	2222 374 40393
47000	6.5 × 15.5 × 19.0	1.29	2222 374 40473
56000	7.0 × 16.0 × 19.0	1.46	2222 374 40563
68000	7.5 × 16.5 × 19.0	1.67	2222 374 40683
82000	8.0 × 17.0 × 19.0	1.93	2222 374 40823

AC and pulse polypropylene film foil capacitors

KP 374

KP 374 GENERAL DATA

PITCH 7.5/10/15 mm



Specific reference data for the 250 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: $1500 \text{ pF} < C \leq 82000 \text{ pF}$	$\leq 5 \times 10^{-4}$	$\leq 10 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 250 V (DC)	$>10000 \text{ V}/\mu\text{s}$	
R between leads at 100 V; 1 minute	$>100000 \text{ M}\Omega$	
R between interconnected leads and case; at 100 V; 1 minute	$>100000 \text{ M}\Omega$	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	500 V; 1 minute.	
Withstanding (DC)voltage between leads and case	500 V; 1 minute	

Available 250 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Taped on reel	$H = 16.0 \text{ mm}; P_0 = 12.7 \text{ mm}$	$\pm 10\%$	2222 374 44...	preferred
		$\pm 5\%$	2222 374 45...	on request
Ammopack	$H = 16.0 \text{ mm}; P_0 = 12.7 \text{ mm}$	$\pm 10\%$	2222 374 48...	preferred
		$\pm 5\%$	2222 374 49...	on request

AC and pulse polypropylene film foil capacitors

KP 374

 $U_{Rdc} = 250 \text{ V}; U_{Rac} = 125 \text{ V}; U_{p-p} = 350 \text{ V}$

C (pF)	DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER	
			AMMOPACK	REEL
			C-tol = $\pm 10\%$	C-tol = $\pm 10\%$
			catalogue number	last 5 digits
Pitch = 7.5 \pm 0.4 mm; $d_t = 0.60 \pm 0.06$ mm				
1500	5.0 \times 14.5 \times 11.0	0.48	2222 374 48152	.. 44152
1800		0.48	2222 374 48182	.. 44182
2200		0.52	2222 374 48222	.. 44222
2700		0.52	2222 374 48272	.. 44272
3300		0.52	2222 374 48332	.. 44332
3900		0.52	2222 374 48392	.. 44392
4700		0.53	2222 374 48472	.. 44472
5600		0.50	2222 374 48562	.. 44562
6800		0.55	2222 374 48682	.. 44682
8200		5.5 \times 15.0 \times 11.0	0.60	2222 374 48822
10000	6.0 \times 15.5 \times 11.0	0.67	2222 374 48103	.. 44103
12000	6.5 \times 16.0 \times 11.0	0.74	2222 374 48123	.. 44123
Pitch = 10.0 \pm 0.4 mm; $d_t = 0.60 \pm 0.06$ mm				
15000	5.5 \times 15.0 \times 13.5	0.68	not available	.. 44153
18000	6.0 \times 15.5 \times 13.5	0.76		.. 44183
22000	6.5 \times 16.0 \times 13.5	0.86		.. 44223
27000	7.0 \times 16.5 \times 13.5	0.98		.. 44273
Pitch = 15.0 \pm 0.4 mm; $d_t = 0.80 \pm 0.08$ mm				
33000	5.5 \times 14.5 \times 19.0	1.03	not available	.. 44333
39000	6.0 \times 15.0 \times 19.0	1.14		.. 44393
47000	6.5 \times 15.5 \times 19.0	1.29		.. 44473
56000	7.0 \times 16.0 \times 19.0	1.46		.. 44563
68000	7.5 \times 16.5 \times 19.0	1.67		.. 44683
82000	8.0 \times 17.0 \times 19.0	1.93		.. 44823

AC and pulse polypropylene film foil capacitors

KP 374

KP 374 GENERAL DATA

PITCH 7.5 mm (bent back leads)

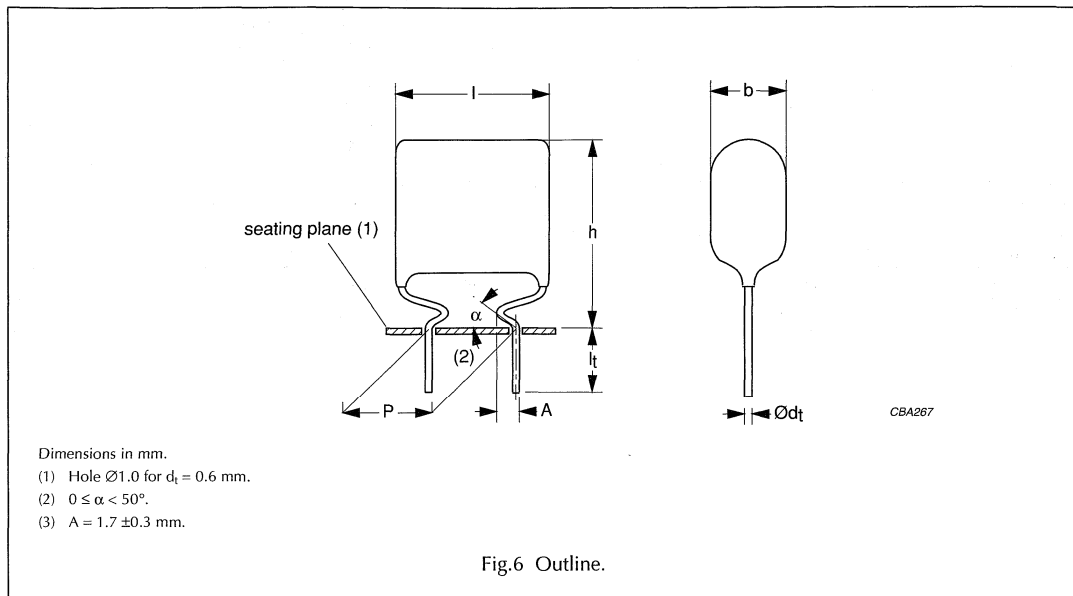


Fig.6 Outline.

Specific reference data for the 250 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: 15000 pF < C ≤ 27000 pF	≤ 5 × 10 ⁻⁴	≤ 10 × 10 ⁻⁴
Rated voltage pulse slope (dU/dt) _R at 250 V (DC)	>10000 V/μs	
R between leads at 100 V; 1 minute	>100000 MΩ	
R between interconnected leads and case; at 100 V; 1 minute	>100000 MΩ	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	500 V; 1 minute	
Withstanding (DC)voltage between leads and case	500 V; 1 minute	

Available 250 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Taped on reel (bent back)	H = 16.0 mm; P ₀ = 12.7 mm	±10%	2222 374 48...	preferred
		±5%	2222 374 49...	on request

AC and pulse polypropylene film foil capacitors

KP 374

$U_{Rdc} = 250 \text{ V}$; $U_{Rac} = 125 \text{ V}$; $U_{p-p} = 350 \text{ V}$

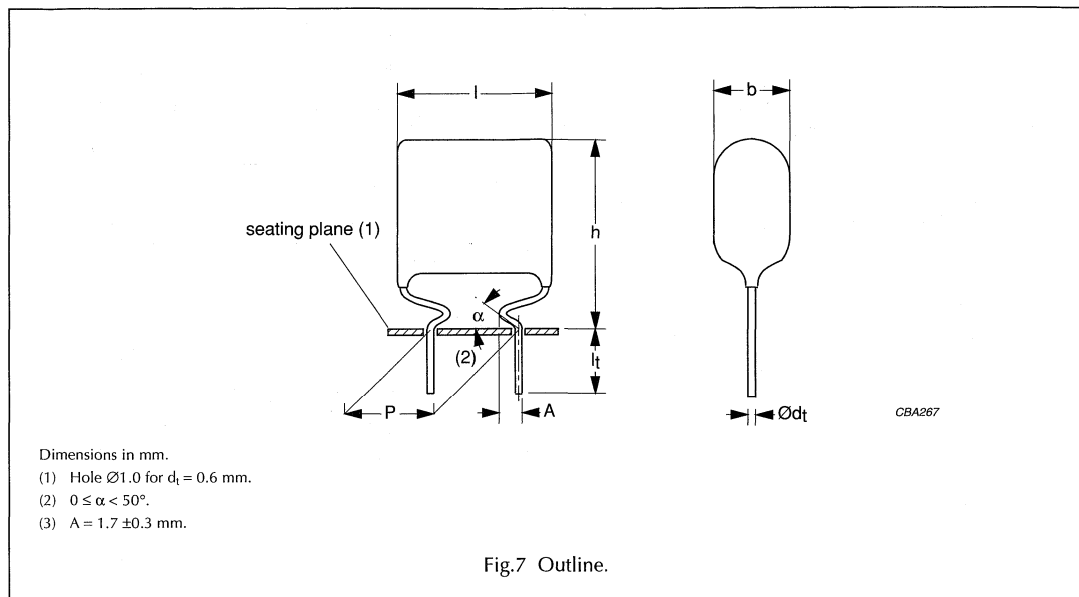
C (pF)	DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER
			REEL
			H = 16.0 mm; P ₀ = 12.7 mm
			C-tol = ±10%
Pitch = 10.0 ±0.4 mm; d _t = 0.60 ±0.06 mm		pitch = 7.5 mm (bent back)	
15000	5.5 × 15.0 × 13.5	0.68	2222 374 48153
18000	6.0 × 15.5 × 13.5	0.76	2222 374 48183
22000	6.5 × 16.0 × 13.5	0.86	2222 374 48223
27000	7.0 × 16.5 × 13.5	0.98	2222 374 48273

AC and pulse polypropylene film foil capacitors

KP 374

KP 374 GENERAL DATA

PITCH 5 mm (kinked bent back leads)



Specific reference data for the 400 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: $1\,500\text{ pF} < C \leq 8\,200\text{ pF}$	$\leq 5 \times 10^{-4}$	$\leq 10 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 400 V (DC)	$> 10\,000\text{ V}/\mu\text{s}$	
R between leads at 100 V; 1 minute	$> 100\,000\text{ M}\Omega$	
R between interconnected leads and case; at 100 V; 1 minute	$> 100\,000\text{ M}\Omega$	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	800 V; 1 minute	
Withstanding (DC) voltage between leads and case	800 V; 1 minute	

Available 400 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Ammopack	$H = 16.0\text{ mm}; P_0 = 12.7\text{ mm}$	$\pm 10\%$	2222 374 52...	preferred
		$\pm 5\%$	2222 374 53...	on request
Taped on reel	$H = 16.0\text{ mm}; P_0 = 12.7\text{ mm}$	$\pm 10\%$	2222 374 56...	preferred
		$\pm 5\%$	2222 374 57...	on request

AC and pulse polypropylene film foil capacitors

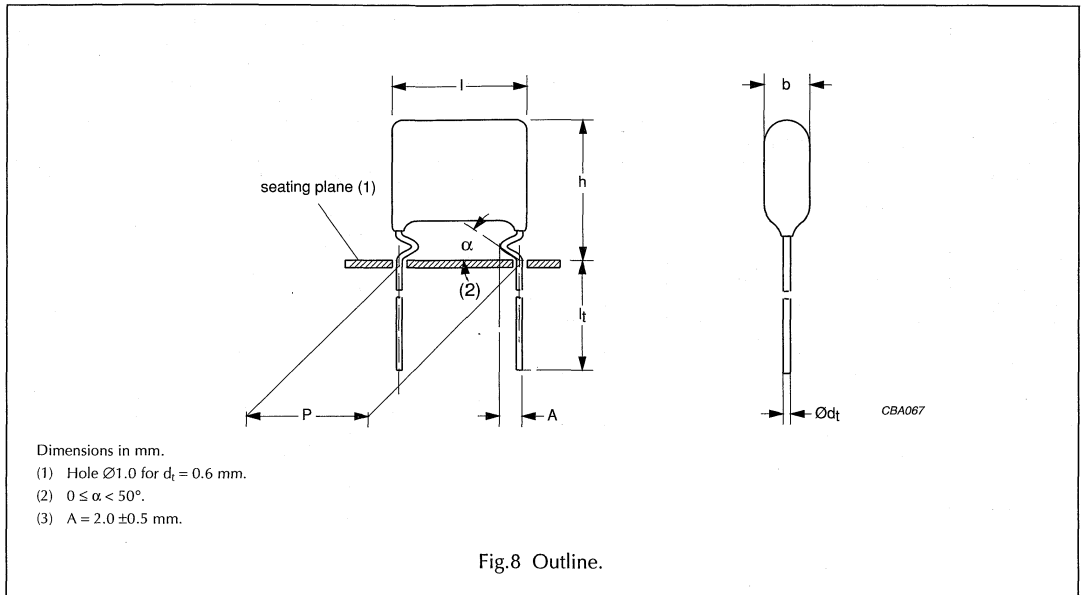
KP 374

 $U_{Rdc} = 400 \text{ V}; U_{Rac} = 160 \text{ V}; U_{p-p} = 450 \text{ V}$

C (pF)	DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER	
			AMMOPACK	REEL
			H = 16.0 mm; P ₀ = 12.7 mm	H = 16.0 mm; P ₀ = 12.7 mm
			C-tol = ±10%	C-tol = ±10%
			catalogue number	last 5 digits
Pitch = 7.5 ±0.4 mm; d_t = 0.60 ±0.06 mm			pitch = 5.0 mm (bent back)	pitch = 5.0 mm (bent back)
1500	5.0 × 14.5 × 11.0	0.48	2222 374 52152	.. 56152
1800		0.48	2222 374 52182	.. 56182
2200		0.52	2222 374 52222	.. 56222
2700	5.5 × 15.0 × 11.0	0.57	2222 374 52272	.. 56272
3300	6.0 × 15.5 × 11.0	0.63	2222 374 52332	.. 56332
3900	6.5 × 16.0 × 11.0	0.69	2222 374 52392	.. 56392
Pitch = 10.0 ±0.4 mm; d_t = 0.60 ±0.06 mm			pitch = 5.0 mm (bent back)	pitch = 5.0 mm (bent back)
4700	5.5 × 15.0 × 13.5	0.63	not available	.. 56472
5600	6.0 × 15.5 × 13.5	0.69		.. 56562
6800	6.5 × 16.0 × 13.5	0.77		.. 56682
8200	7.0 × 16.5 × 13.5	0.86		.. 56822

AC and pulse polypropylene film foil capacitors

KP 374

KP 374 GENERAL DATA
PITCH 7.5/10 mm

Specific reference data for the 400 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: 1 500 pF < C ≤ 8200 pF	$\leq 5 \times 10^{-4}$	$\leq 10 \times 10^{-4}$
Rated voltage pulse slope (dU/dt) _R at 400 V (DC)	>10000 V/μs	
R between leads at 100 V; 1 minute	>100000 MΩ	
R between interconnected leads and case; at 100 V; 1 minute	>100000 MΩ	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	800 V; 1 minute	
Withstanding (DC) voltage between leads and case	800 V; 1 minute	

Available 400 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 3.5 \pm 0.5$ mm; note 1	$\pm 10\%$	2222 374 50...	preferred
		$\pm 5\%$	2222 374 51...	on request

Note

1. Lead length 3.5 ± 0.5 mm for pitch = 7.5 mm and $4 +1/-0.5$ mm for pitch = 10.0 mm.

AC and pulse polypropylene film foil capacitors

KP 374

$U_{Rdc} = 400 \text{ V}$; $U_{Rac} = 160 \text{ V}$; $U_{p-p} = 450 \text{ V}$

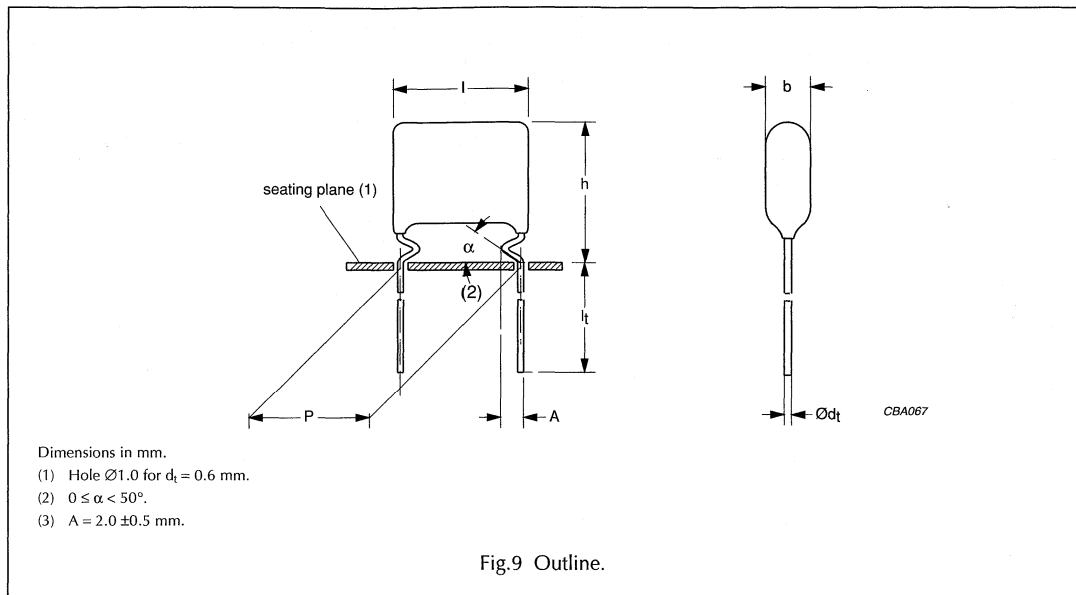
C (pF)	DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			C-tol = $\pm 10\%$
Pitch = $7.5 \pm 0.4 \text{ mm}$; $d_t = 0.60 \pm 0.06 \text{ mm}$			
1500	5.0 × 13.5 × 11.0	0.48	2222 374 50152
1800		0.48	2222 374 50182
2200		0.52	2222 374 50222
2700	5.5 × 14.0 × 11.0	0.57	2222 374 50272
3300	6.0 × 14.5 × 11.0	0.63	2222 374 50332
3900	6.5 × 15.0 × 11.0	0.69	2222 374 50392
Pitch = $10.0 \pm 0.4 \text{ mm}$; $d_t = 0.60 \pm 0.06 \text{ mm}$			
4700	5.5 × 15.0 × 13.5	0.63	2222 374 50472
5600	6.0 × 15.5 × 13.5	0.69	2222 374 50562
6800	6.5 × 16.0 × 13.5	0.77	2222 374 50682
8200	7.0 × 16.5 × 13.5	0.86	2222 374 50822

AC and pulse polypropylene film foil capacitors

KP 374

KP 374 GENERAL DATA

PITCH 7.5/10 mm



Specific reference data for the 400 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: $1500 \text{ pF} < C \leq 8200 \text{ pF}$	$\leq 5 \times 10^{-4}$	$\leq 10 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 400 V (DC)	$>10000 \text{ V}/\mu\text{s}$	
R between leads at 100 V; 1 minute	$>100000 \text{ M}\Omega$	
R between interconnected leads and case; at 100 V; 1 minute	$>100000 \text{ M}\Omega$	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	800 V; 1 minute	
Withstanding (DC)voltage between leads and case	800 V; 1 minute	

Available 400 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Taped on reel	$H = 16.0 \text{ mm}; P_0 = 12.7 \text{ mm}$	$\pm 10\%$	2222 374 54...	preferred
		$\pm 5\%$	2222 374 55...	on request
Ammopack	$H = 16.0 \text{ mm}; P_0 = 12.7 \text{ mm}$	$\pm 10\%$	2222 374 58...	preferred
		$\pm 5\%$	2222 374 59...	on request

AC and pulse polypropylene film foil capacitors

KP 374

 $U_{Rdc} = 400 \text{ V}; U_{Rac} = 160 \text{ V}; U_{p-p} = 450 \text{ V}$

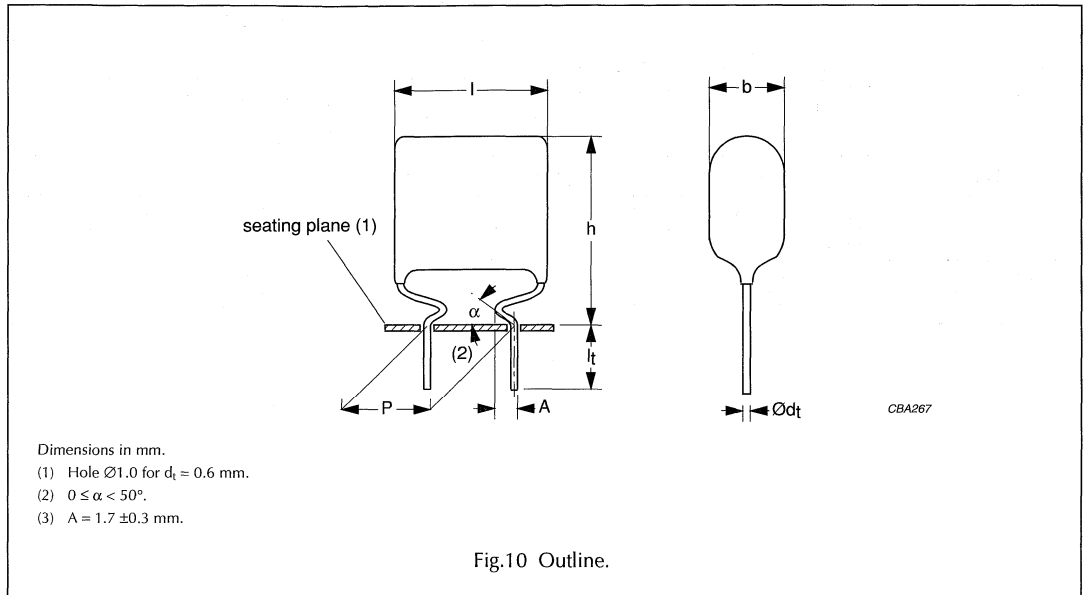
C (pF)	DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER	
			AMMOPACK	REEL
			C-tol = $\pm 10\%$	C-tol = $\pm 10\%$
			catalogue number	last 5 digits
Pitch = 7.5 ± 0.4 mm; $d_t = 0.60 \pm 0.06$ mm				
1500	5.0 \times 14.5 \times 11.0	0.48	2222 374 58152	.. 54152
1800		0.48	2222 374 58182	.. 54182
2200		0.52	2222 374 58222	.. 54222
2700	5.5 \times 15.0 \times 11.0	0.57	2222 374 58272	.. 54272
3300	6.0 \times 15.5 \times 11.0	0.63	2222 374 58332	.. 54332
3900	6.5 \times 16.0 \times 11.0	0.69	2222 374 58392	.. 54392
Pitch = 10.0 ± 0.4 mm; $d_t = 0.60 \pm 0.06$ mm				
4700	5.5 \times 15.0 \times 13.5	0.63	not available	.. 54472
5600	6.0 \times 15.5 \times 13.5	0.69		.. 54562
6800	6.5 \times 16.0 \times 13.5	0.77		.. 54682
8200	7.0 \times 16.5 \times 13.5	0.86		.. 54822

AC and pulse polypropylene film foil capacitors

KP 374

KP 374 GENERAL DATA

PITCH 7.5 mm (bent back leads)



Specific reference data for the 400 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: 4700 pF < C ≤ 8200 pF	≤ 5 × 10 ⁻⁴	≤ 10 × 10 ⁻⁴
Rated voltage pulse slope (dU/dt) _R at 400 V (DC)	> 10000 V/μs	
R between leads at 100 V; 1 minute	> 100000 MΩ	
R between interconnected leads and case; at 100 V; 1 minute	> 100000 MΩ	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	800 V; 1 minute	
Withstanding (DC)voltage between leads and case	800 V; 1 minute	

Available 400 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Taped on reel (bent back)	H = 16.0 mm; P ₀ = 12.7 mm	±10%	2222 374 58...	preferred
		±5%	2222 374 59...	on request

AC and pulse polypropylene film foil capacitors

KP 374

 $U_{Rdc} = 400 \text{ V}; U_{Rac} = 160 \text{ V}; U_{p-p} = 450 \text{ V}$

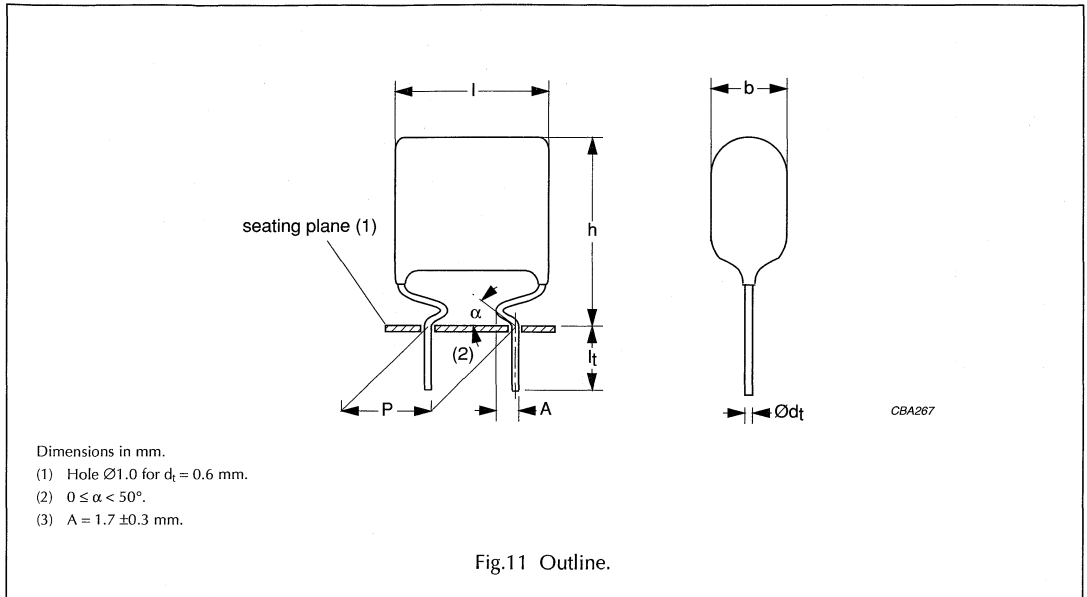
C (pF)	DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER
			REEL
			H = 16.0 mm; P ₀ = 12.7 mm
			C-tol = ±10%
Pitch = 10.0 ±0.4 mm; d _t = 0.60 ±0.06 mm		pitch = 7.5 mm (bent back)	
4700	5.5 × 15.0 × 13.5	0.63	2222 374 58472
5600	6.0 × 15.5 × 13.5	0.69	2222 374 58562
6800	6.5 × 16.0 × 13.5	0.77	2222 374 58682
8200	7.0 × 16.5 × 13.5	0.86	2222 374 58822

AC and pulse polypropylene film foil capacitors

KP 374

KP 374 GENERAL DATA

PITCH 5 mm (kinked bent back leads)



Specific reference data for the 630 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: 680 pF < C ≤ 3 900 pF	≤ 5 × 10 ⁻⁴	≤ 10 × 10 ⁻⁴
Rated voltage pulse slope (dU/dt) _R at 630 V (DC)	> 10000 V/μs	
R between leads at 500 V; 1 minute	> 100000 MΩ	
R between interconnected leads and case; at 500 V; 1 minute	> 100000 MΩ	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	1 260 V; 1 minute	
Withstanding (DC) voltage between leads and case	1 260 V; 1 minute	

Available 630 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Ammopack (bent back)	H = 16.0 mm; P ₀ = 12.7 mm	±10%	2222 374 62...	preferred
		±5%	2222 374 63...	on request
Taped on reel (bent back)	H = 16.0 mm; P ₀ = 12.7 mm	±10%	2222 374 66...	preferred
		±5%	2222 374 67...	on request

AC and pulse polypropylene film foil capacitors

KP 374

 $U_{Rdc} = 630 \text{ V}; U_{Rac} = 200 \text{ V}; U_{p-p} = 560 \text{ V}$

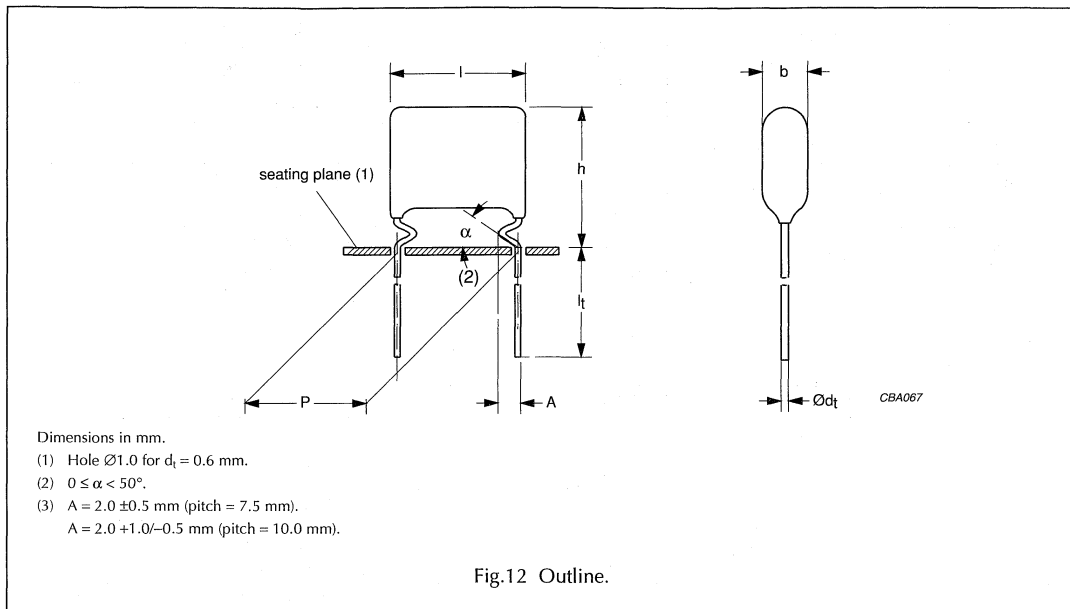
C (pF)	DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER	
			AMMOPACK	REEL
			H = 16.0 mm; P ₀ = 12.7 mm	H = 16.0 mm; P ₀ = 12.7 mm
			C-tol = ±10%	C-tol = ±10%
			catalogue number	last 5 digits
Pitch = 7.5 ±0.4 mm; d _t = 0.60 ±0.06 mm			pitch = 5.0 mm (bent back)	pitch = 5.0 mm (bent back)
680	4.5 × 14.0 × 11.0	0.40	2222 374 62681	.. 66681
750		0.45	2222 374 62751	.. 66751
820	5.0 × 14.5 × 11.0	0.45	2222 374 62821	.. 66821
1000		0.50	2222 374 62102	.. 66102
1200	5.5 × 15.0 × 11.0	0.50	2222 374 62122	.. 66122
1500		0.55	2222 374 62152	.. 98034
1800		0.60	2222 374 62182	.. 98035
2200		0.70	2222 374 62222	.. 98036
Pitch = 10.0 ±0.4 mm; d _t = 0.60 ±0.06 mm			pitch = 5.0 mm (bent back)	pitch = 5.0 mm (bent back)
2700	5.5 × 15.0 × 13.5	0.60	not available	.. 66272
3300	6.0 × 15.5 × 13.5	0.65		.. 66332
3900	6.5 × 16.0 × 13.5	0.70		.. 66392

AC and pulse polypropylene film foil capacitors

KP 374

KP 374 GENERAL DATA

PITCH 7.5/10 mm



Specific reference data for the 630 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: $680 \text{ pF} < C \leq 3900 \text{ pF}$	$\leq 5 \times 10^{-4}$	$\leq 10 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 630 V (DC)	$>10000 \text{ V}/\mu\text{s}$	
R between leads at 500 V; 1 minute	$>100000 \text{ M}\Omega$	
R between interconnected leads and case; at 500 V; 1 minute	$>100000 \text{ M}\Omega$	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	1260 V; 1 minute	
Withstanding (DC) voltage between leads and case	1260 V; 1 minute	

Available 630 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 3.5 \pm 0.5$ mm	$\pm 10\%$	2222 374 60...	preferred
		$\pm 5\%$	2222 374 61...	on request

AC and pulse polypropylene film foil capacitors

KP 374

$U_{Rdc} = 630 \text{ V}$; $U_{Rac} = 200 \text{ V}$; $U_{p-p} = 560 \text{ V}$

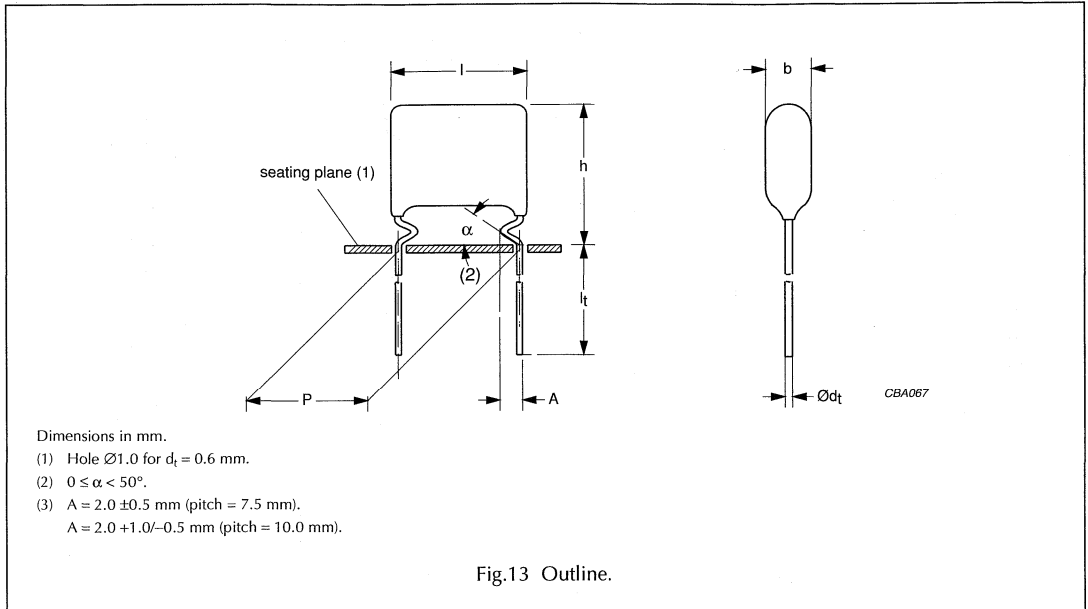
C (pF)	DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			C-tol = $\pm 10\%$
Pitch = $7.5 \pm 0.4 \text{ mm}$; $d_t = 0.60 \pm 0.06 \text{ mm}$			
680	$4.5 \times 12.5 \times 11.0$	0.40	2222 374 60681
750		0.45	2222 374 60751
820	$5.0 \times 13.0 \times 11.0$	0.45	2222 374 60821
1000		0.50	2222 374 60102
1200	$5.5 \times 13.5 \times 11.0$	0.50	2222 374 60122
1500			2222 374 98025
1800			2222 374 98026
2200	$6.0 \times 14.0 \times 11.0$	0.65	2222 374 98027
Pitch = $10.0 \pm 0.4 \text{ mm}$; $d_t = 0.60 \pm 0.06 \text{ mm}$			
1500	$4.5 \times 12.5 \times 13.5$	0.60	2222 374 60152
1800	$5.0 \times 13.0 \times 13.5$	0.70	2222 374 60182
2200	$5.5 \times 13.5 \times 13.5$	0.80	2222 374 60222
2700		0.60	2222 374 60272
3300	$6.0 \times 14.0 \times 13.5$	0.65	2222 374 60332
3900	$6.5 \times 14.5 \times 13.5$	0.70	2222 374 60392

AC and pulse polypropylene film foil capacitors

KP 374

KP 374 GENERAL DATA

PITCH 7.5/10 mm



Specific reference data for the 630 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: $680 \text{ pF} < C \leq 3900 \text{ pF}$	$\leq 5 \times 10^{-4}$	$\leq 10 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 630 V (DC)	$>10000 \text{ V}/\mu\text{s}$	
R between leads at 500 V; 1 minute	$>100000 \text{ M}\Omega$	
R between interconnected leads and case; at 500 V; 1 minute	$>100000 \text{ M}\Omega$	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	1260 V; 1 minute	
Withstanding (DC)voltage between leads and case	1260 V; 1 minute	

Available 630 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Taped on reel	$H = 16.0 \text{ mm}; P_0 = 12.7 \text{ mm}$	$\pm 10\%$	2222 374 64...	preferred
		$\pm 5\%$	2222 374 65...	on request
Ammopack	$H = 16.0 \text{ mm}; P_0 = 12.7 \text{ mm}$	$\pm 10\%$	2222 374 68...	preferred
		$\pm 5\%$	2222 374 69...	on request

AC and pulse polypropylene film foil capacitors

KP 374

 $U_{Rdc} = 630 \text{ V}; U_{Rac} = 200 \text{ V}; U_{p-p} = 560 \text{ V}$

C (pF)	DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER	
			AMMOPACK	REEL
			C-tol = $\pm 10\%$	C-tol = $\pm 10\%$
			catalogue number	last 5 digits
Pitch = $7.5 \pm 0.4 \text{ mm}$; $d_t = 0.60 \pm 0.06 \text{ mm}$				
680	$4.5 \times 14.0 \times 11.0$	0.40	2222 374 68681	.. 64681
750		0.45	2222 374 68751	.. 64751
820	$5.0 \times 14.5 \times 11.0$	0.45	2222 374 68821	.. 64821
1000		0.50	2222 374 68102	.. 64102
1200	$5.5 \times 15.0 \times 11.0$	0.50	2222 374 68122	.. 64122
1500		0.55	2222 374 98028	.. 64152
1800		0.60	2222 374 98029	.. 64182
2200		0.70	2222 374 98037	.. 64222
Pitch = $10.0 \pm 0.4 \text{ mm}$; $d_t = 0.60 \pm 0.06 \text{ mm}$				
1500	$4.5 \times 14.0 \times 13.5$	0.60	not available	.. 98031
1800	$5.0 \times 14.5 \times 13.5$	0.70		.. 98032
2200	$5.5 \times 15.0 \times 13.5$	0.80		.. 98033
2700		0.60		.. 64272
3300	$6.0 \times 15.5 \times 13.5$	0.65		.. 64332
3900	$6.5 \times 16.0 \times 13.5$	0.70		.. 64392

AC and pulse polypropylene film foil capacitors

KP 374

KP 374 GENERAL DATA

PITCH 7.5 mm (bent back leads)

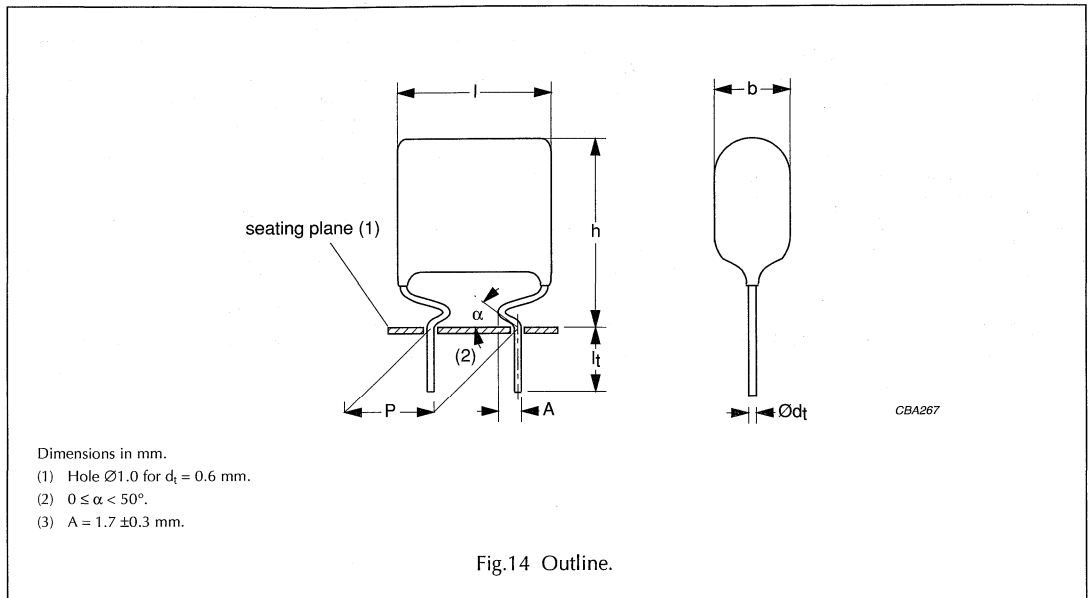


Fig.14 Outline.

Specific reference data for the 630 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: $1500 \text{ pF} < C \leq 3900 \text{ pF}$	$\leq 5 \times 10^{-4}$	$\leq 10 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 630 V (DC)	$>10000 \text{ V}/\mu\text{s}$	
R between leads at 500 V; 1 minute	$>100000 \text{ M}\Omega$	
R between interconnected leads and case; at 500 V; 1 minute	$>100000 \text{ M}\Omega$	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	1260 V; 1 minute	
Withstanding (DC)voltage between leads and case	1260 V; 1 minute	

Available 630 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Taped on reel (bent back)	$H = 16.0 \text{ mm}; P_0 = 12.7 \text{ mm}$	$\pm 10\%$	2222 374 68...	preferred
		$\pm 5\%$	2222 374 69...	on request

AC and pulse polypropylene film foil capacitors

KP 374

$U_{Rdc} = 630 \text{ V}$; $U_{Rac} = 200 \text{ V}$; $U_{p-p} = 560 \text{ V}$

C (pF)	DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER
			REEL
			H = 16.0 mm; P ₀ = 12.7 mm
			C-tol = ±10%
Pitch = 10.0 ±0.4 mm; d _t = 0.60 ±0.06 mm		pitch = 7.5 mm (bent back)	
1500	4.5 × 13.5 × 13.5	0.60	2222 374 68152
1800	5.0 × 14.0 × 13.5	0.70	2222 374 68182
2200	5.5 × 14.5 × 13.5	0.80	2222 374 68222
2700		0.60	2222 374 68272
3300	6.0 × 15.0 × 13.5	0.65	2222 374 68332
3900	6.5 × 15.5 × 13.5	0.70	2222 374 68392

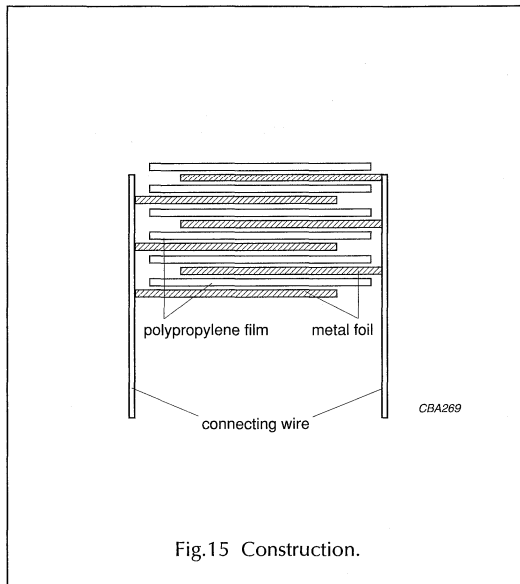
AC and pulse polypropylene film foil capacitors

KP 374

CONSTRUCTION

Description

- Low-inductive wound cell of metal foil and a polypropylene film
- Protected by a hard, water repellent, solvent resistant epoxy lacquer
- Radial leads, solder-coated.



Mounting

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

Storage temperature

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

RATINGS AND CHARACTERISTICS REFERENCE CONDITIONS

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 $50 \pm 2\%$.

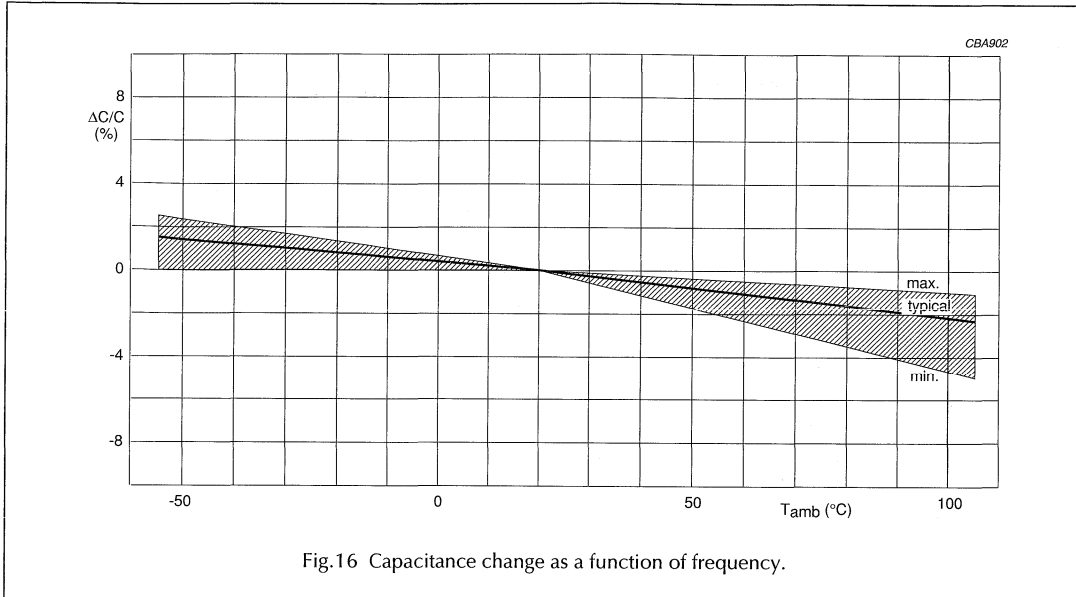
For reference testing, a conditioning period shall be applied over 96 ± 4 hours by heating the products in a circulating air oven at the rated temperature and a relative humidity not exceeding 20%.

AC and pulse polypropylene film foil capacitors

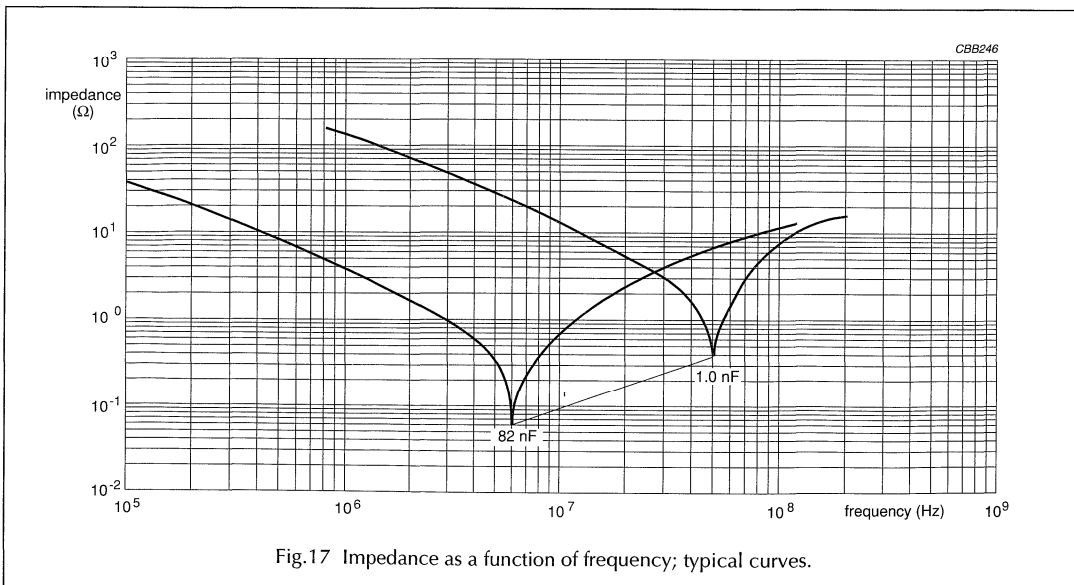
KP 374

CHARACTERISTICS

Capacitance



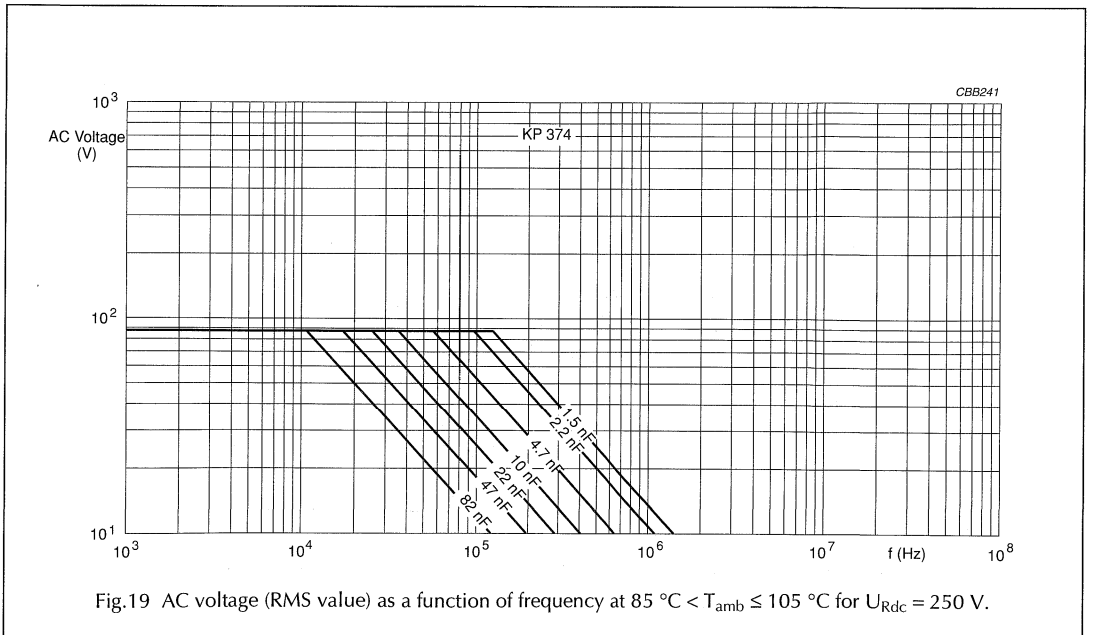
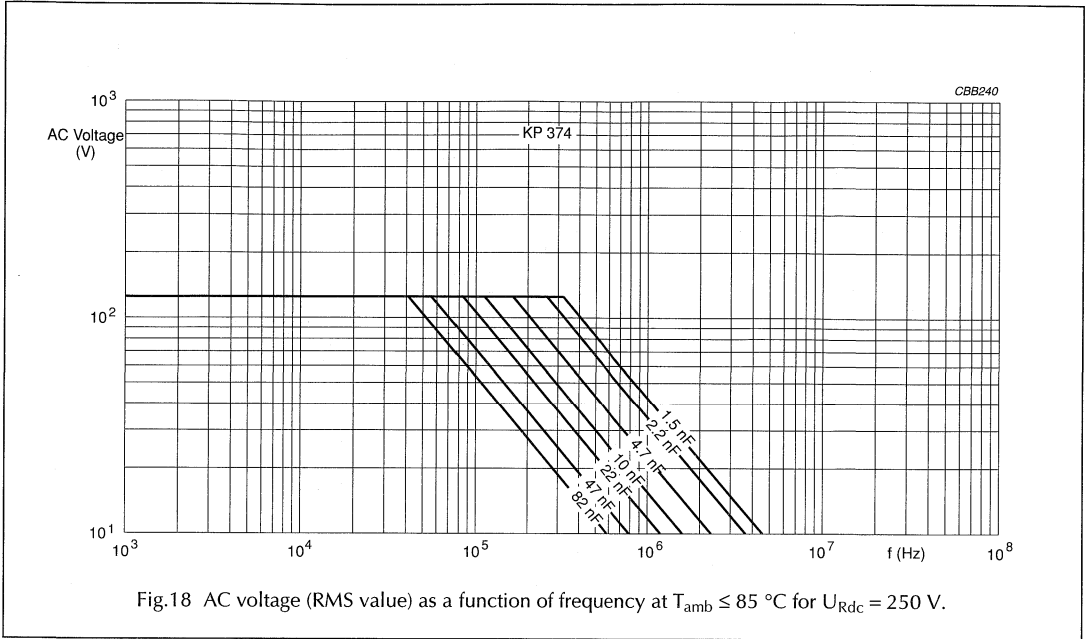
Impedance



AC and pulse polypropylene film foil capacitors

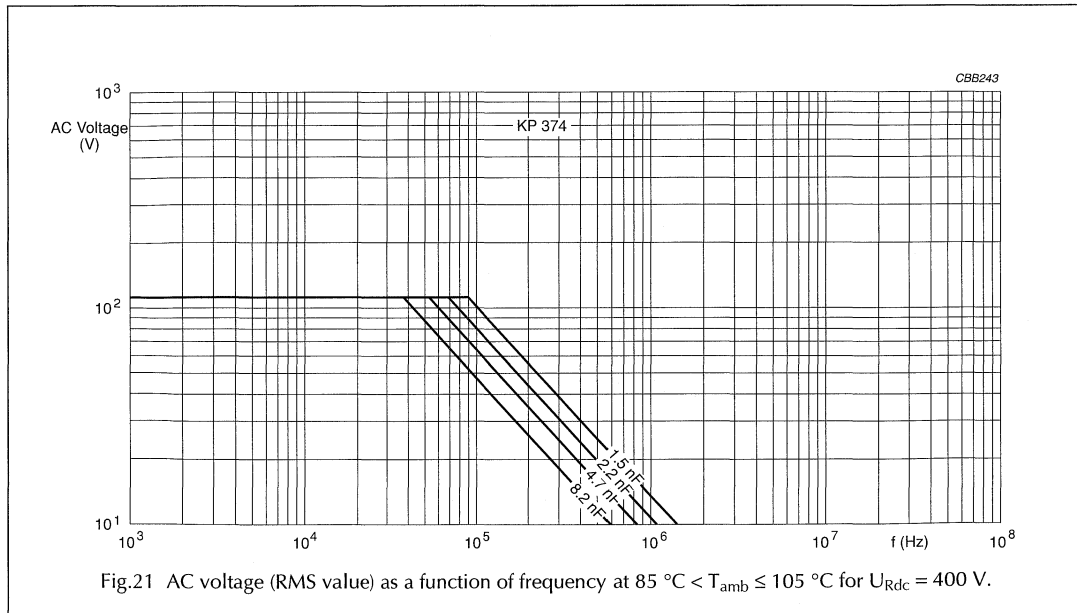
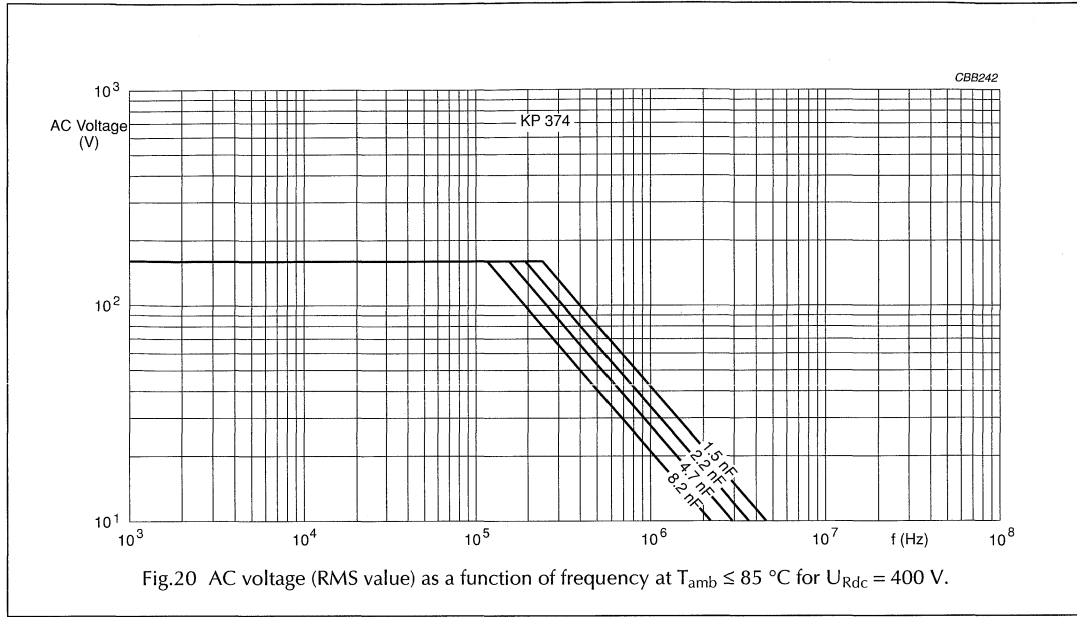
KP 374

Maximum RMS voltage (sinewave) as a function of frequency



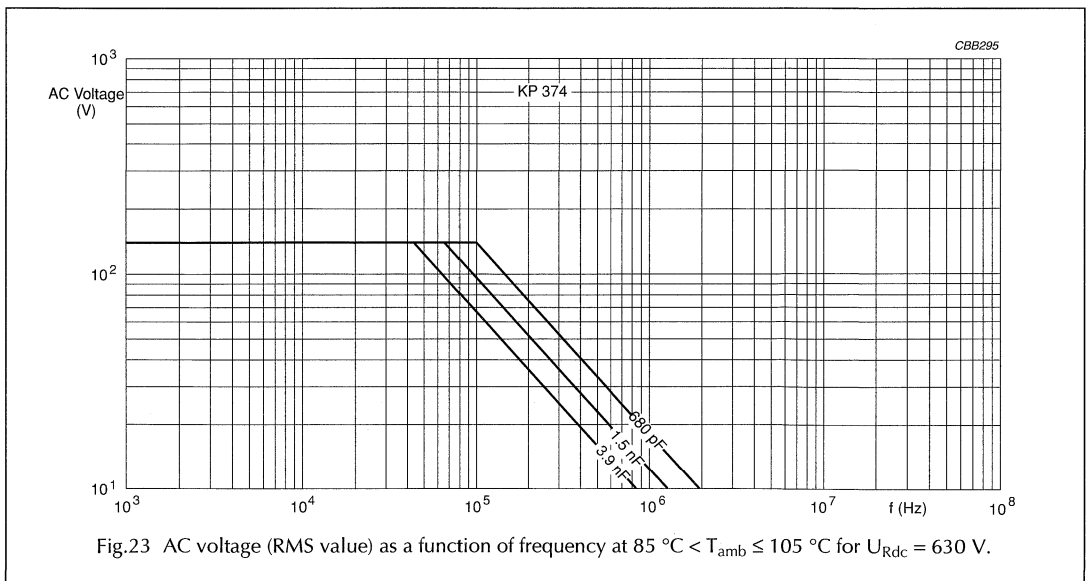
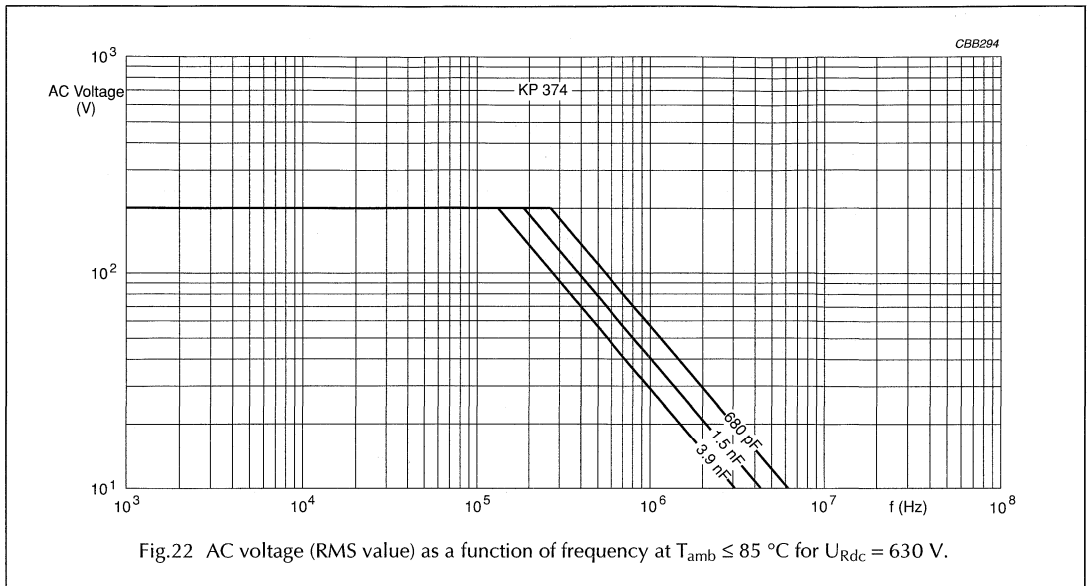
AC and pulse polypropylene film foil capacitors

KP 374



AC and pulse polypropylene film foil capacitors

KP 374



Maximum RMS current (sinewave) as a function of frequency

The maximum RMS current is defined by $I_{ac} = \omega \times C \times U_{ac}$.

U_{ac} is the maximum AC voltage depending on the ambient temperature in Figs 18 and 23.

AC and pulse polypropylene film foil capacitors

KP 374

Tangent of loss angle

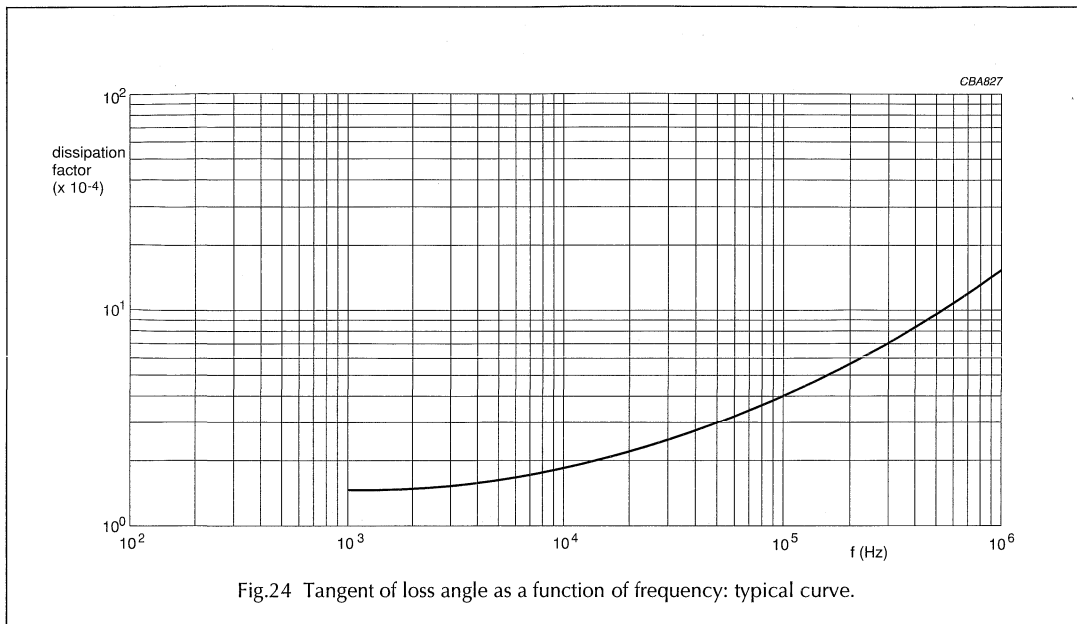


Fig.24 Tangent of loss angle as a function of frequency: typical curve.

Insulation Resistance

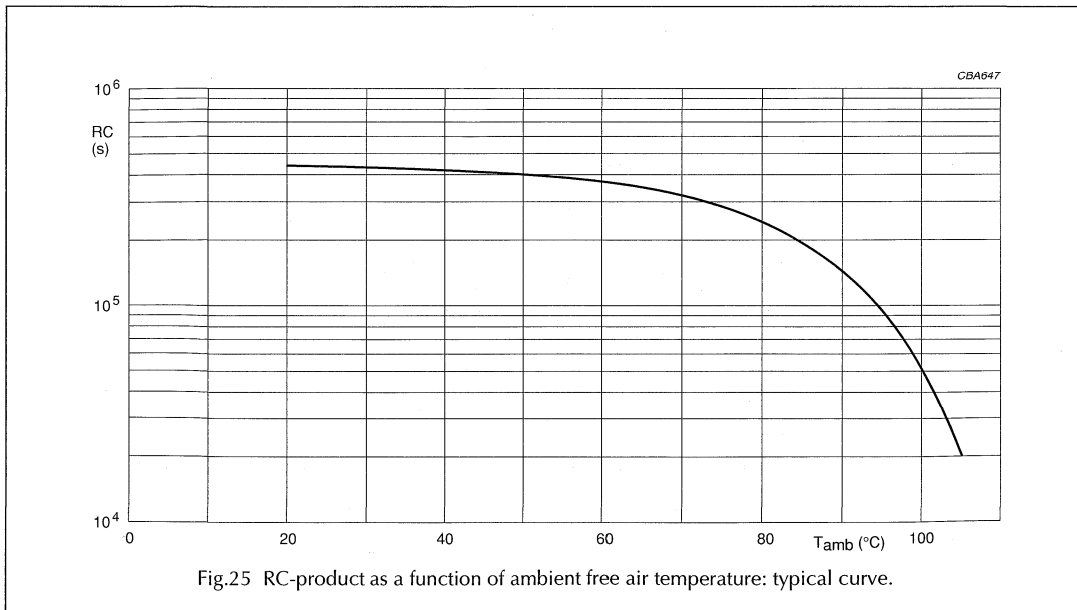


Fig.25 RC-product as a function of ambient free air temperature: typical curve.

AC and pulse polypropylene film foil capacitors

KP 374

Maximum allowed component temperature rise (ΔT) as a function of the ambient temperature (T_{amb})

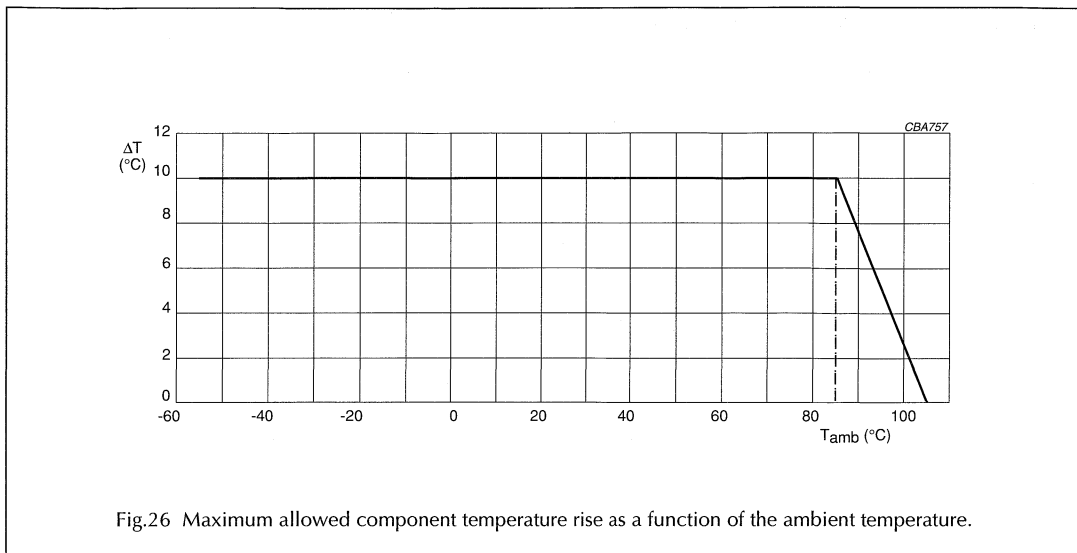


Fig.26 Maximum allowed component temperature rise as a function of the ambient temperature.

Heat conductivity (G) as a function of pitch and capacitor body thickness in mW/°C

Table 1 Heat conductivity

b _{max} (mm)	ORIGINAL PITCH (mm)		
	7.5	10	15
5.0	4.0	–	–
5.5	4.0	6.0	6.5
6.0	4.5	6.0	6.5
6.5	5.0	6.5	8.0
7.0	–	6.5	8.0
7.5	–	–	9.0
8.0	–	–	9.0

Power dissipation and maximum component temperature rise

The power dissipation must be limited in order not to exceed the maximum allowed component temperature rise as a function of the free air ambient temperature.

The power dissipation can be calculated according chapter "Introduction", section "Maximum power dissipation".

The component temperature rise (ΔT) can be measured (see Section "Measuring the component temperature" for more details) or calculated by $\Delta T = P/G$:

- ΔT = component temperature rise (°C).
- P = power dissipation of the component (mW).
- G = heat conductivity of the component (mW/°C).

AC and pulse polypropylene film foil capacitors

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Measuring the component temperature

A thermocouple must be attached to the capacitor body; see Fig.27.

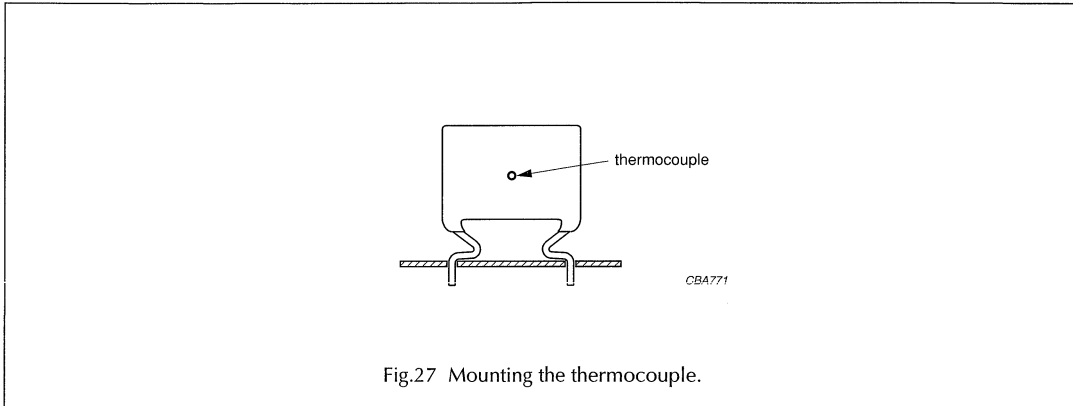


Fig.27 Mounting the thermocouple.

The temperature is measured in unloaded (T_{amb}) and maximum loaded condition (T_c).

The temperature rise is given by $\Delta T = T_c - T_{amb}$.

To avoid radiation or convection, the capacitor should be tested in a wind-free box.

Application note and limiting conditions

To select the capacitor for a certain application, the following 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 the maximum U_{p-p} to avoid the ionisation inception level.
3. The maximum component surface temperature rise must be lower than the limits in Fig.26.
4. The maximum application temperature must be lower than 105 °C.
5. There is no limit for the voltage pulse slope in the application.

Example

$C = 1 \text{ nF} - 630 \text{ V}$ used for 175 V (AC) sinewave at 125 kHz, at $T_{amb} = 70 \text{ °C}$.

Checking the conditions:

1. The peak voltage $U_p = 244 \text{ V}$ is lower than 630 V (DC).
2. The peak-to-peak voltage 488 V is lower than 560 V_{p-p}.
3. As this is a sinewave, the application can be checked in the Fig.18. We can verify that this 175 V (AC) at 125 kHz is allowed.
4. This is fulfilled.
5. Not applicable.

AC and pulse polypropylene film foil capacitors

KP 374

MARKING

Product marking

The capacitors are marked on the top (see Fig.28) with the following information:

1. Rated capacitance code in accordance with "IEC 60062"
2. Tolerance on rated capacitance: J = $\pm 5\%$; K = $\pm 10\%$
3. Rated (DC) voltage (e.g. 630 V)
4. Manufacturer's type designation (374)
5. Code for dielectric material (KP).

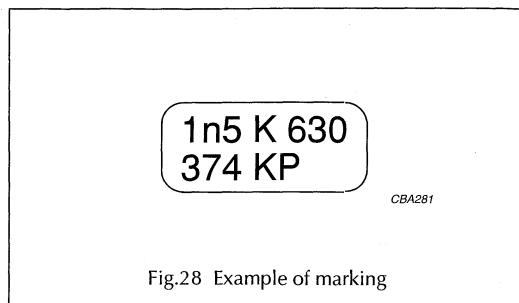


Fig.28 Example of marking

QUICK REFERENCE TEST REQUIREMENTS

TEST	PROCEDURE (quick reference)	REQUIREMENTS
Robustness of leads		
Tensile: "IEC 60068-2-21"	load 10 N; 10 s	no visible damage legible marking $ \Delta C/C \leq 2\%$
Bending: "IEC 60068-2-21"	load 5 N; $4 \times 90^\circ$	
Resistance to soldering heat: "IEC 60068-2-20"	solder bath: 260 °C; 5 s	
Robustness of component		
Vibration: "IEC 60068-2-6"	10 to 55 Hz; amplitude 0.75 mm or acceleration 98 m/s ² ; 6 hours	$ \Delta C/C \leq 2\%$
Shock: "IEC 60068-2-27"	half sinewave; 490 m/s ² ; 11 ms	
Climatic sequence		
Dry heat: "IEC 60068-2-2"	16 hours; 105 °C	$ \Delta C/C \leq 2\%$ $\Delta \tan \delta$: as specified in General data or ≤ 1.4 times the measured initial value $R_{ins} \geq 50\%$ of specified value
Damp heat, cyclic, test Db, first cycle: "IEC 60068-2-30"		
Cold: "IEC 60068-2-1"	2 hours; -55 °C	
Damp heat, cyclic, test Db, remaining cycles: "IEC 60068-2-30"		

AC and pulse polypropylene film foil capacitors

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TEST	PROCEDURE (quick reference)	REQUIREMENTS
Other applicable tests		
Damp heat, steady state: "IEC 60068-2-3"	56 days; 40 °C; 90 to 95% RH	$ \Delta C/C \leq 1\%$ $\Delta \tan \delta$: as specified in General data or ≤ 1.4 times the measured initial value $R_{ins} \geq 50\%$ of specified value
Endurance (DC): "IEC 60384-13"	2000 hours; $1.5 \times U_{Rdc}$; 85 °C $1.05 \times U_{Rdc}$; 105 °C	$ \Delta C/C \leq 2\%$ $\Delta \tan \delta$: as specified in General data or ≤ 1.4 times the measured initial value
Heat storage: "IEC 60384-13"	2000 hours; 105 °C	$ \Delta C/C \leq 2\%$ $\Delta \tan \delta$: as specified in General data or ≤ 1.4 times the measured initial value
Endurance (AC): "IEC 60384-13"	1000 hours; $1.25 \times U_{Rac}$; 85 °C	$ \Delta C/C \leq 2\%$ $\Delta \tan \delta$: as specified in General data or ≤ 1.4 times the measured initial value
Resistance to detergents: "IEC 60384-13"		$ \Delta C/C \leq 1\%$ $\Delta \tan \delta$: as specified in General data or ≤ 1.4 times the measured initial value $R_{ins} \geq 50\%$ of specified value
Resistance to soldering heat with preheating: "IEC 60384-13"	body temperature: 100 °C; bath temperature: 260 °C; dwell time: 5 s	$ \Delta C/C \leq 2\%$

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

KP/MKP RADIAL EPOXY LACQUERED TYPE

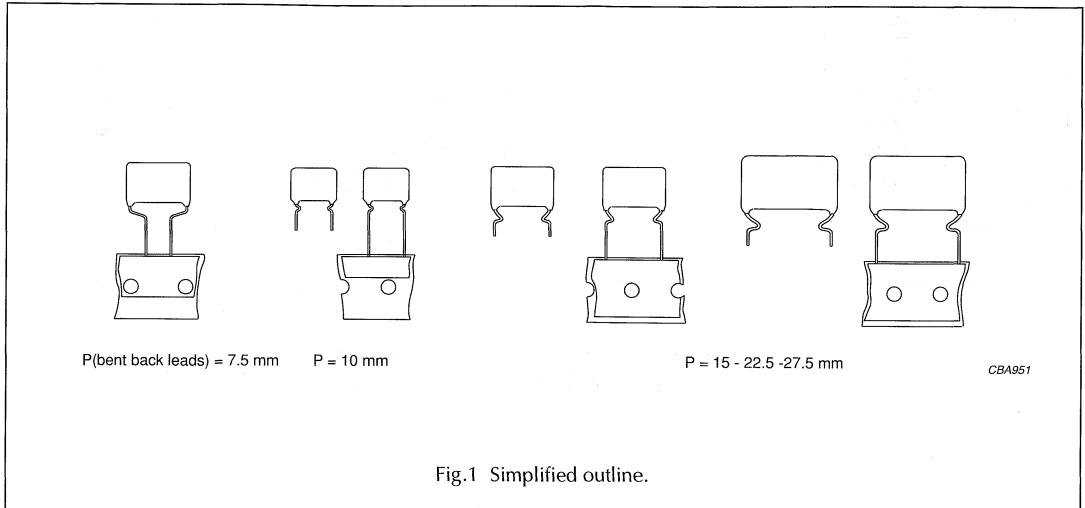
 PITCH 10/15/22.5/27.5 mm
 PITCH 7.5 mm (bent back leads)


Fig.1 Simplified outline.

FEATURES

- 10 to 27.5 mm pitch
- Supplied loose (including lock lead versions) and taped
- Taped products available on request; bent back version for automatic insertion.

APPLICATIONS

- Where high currents and steep pulses occur
- For deflection circuits in television receivers and monitor sets.

DETAIL SPECIFICATION

For more detailed data and test requirements see "Type detail specification HQN-384-17/104".

QUICK REFERENCE DATA

DESCRIPTION	VALUE
Capacitance range (E24 series)	0.1 to 270 nF
Capacitance tolerance	±5%; ±3.5%
Rated (DC) voltage	630 V; 1 000 V; 1 600 V; 2 000 V; 2 500 V
Rated (AC) voltage	300 V; 400 V; 500 V; 600 V; 600 V
Rated peak-to-peak voltage	850 V; 1 100 V; 1 400 V; 1 700 V; 1 700 V
Climatic category	55/105/56
Rated temperature	85 °C
Maximum application temperature	105 °C
Reference specification	IEC 60384-17
Performance grade:	
for C > 5.6 nF	grade 1 (long life)
for C ≤ 5.6 nF	grade 2
Stability grade	grade 2
Materials	qualified in accordance with UL94 V-0

AC and pulse metallized polypropylene film capacitors

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COMPOSITION OF CATALOGUE NUMBER

TYPE AND PITCHES	
375	10.0/7.5 mm
	15.0/7.5 mm
	10.0 mm
	15.0 mm
	22.5 mm
	27.5 mm

CAPACITANCE
(numerically; but not for lock lead)

MULTIPLIER (nF)	
0.01	1
0.1	2
1	3
10	4

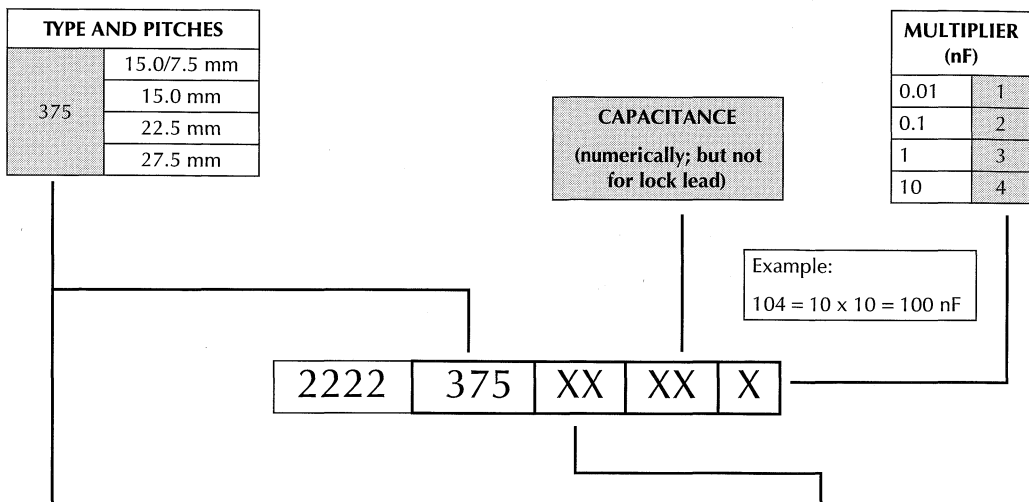
Example:
104 = 10 x 10 = 100 nF

2222 375 XX XX X

TYPE	PACKAGING	LEAD CONFIGURATION	PREFERRED TYPES				
			C-TOL	630 V	1000 V	1600 V	1600 V monitor type
375	loose in box	lead length 5.0 mm	±5%	14	24	34	64
		lock lead 4.0 mm	±5%	90	90	90	90
	taped on reel	bent back leads reel diameter 500 mm	±5%	16	26	36	66
			ON REQUEST				
375	loose in box	lead length 5.0 mm	±3.5%	15	25	35	65
			±5%	10	20	30	60
	taped on reel	lead length 3.5 mm	±3.5%	11	21	31	61
			±5%	12	22	32	62
		bent back leads reel diameter 500 mm	±3.5%	13	23	33	63
			±5%	17	27	37	67
taped on reel	bent back leads reel diameter 356 mm	±5%	18	28	38	68	

AC and pulse metallized polypropylene film capacitors

KP/MKP 375



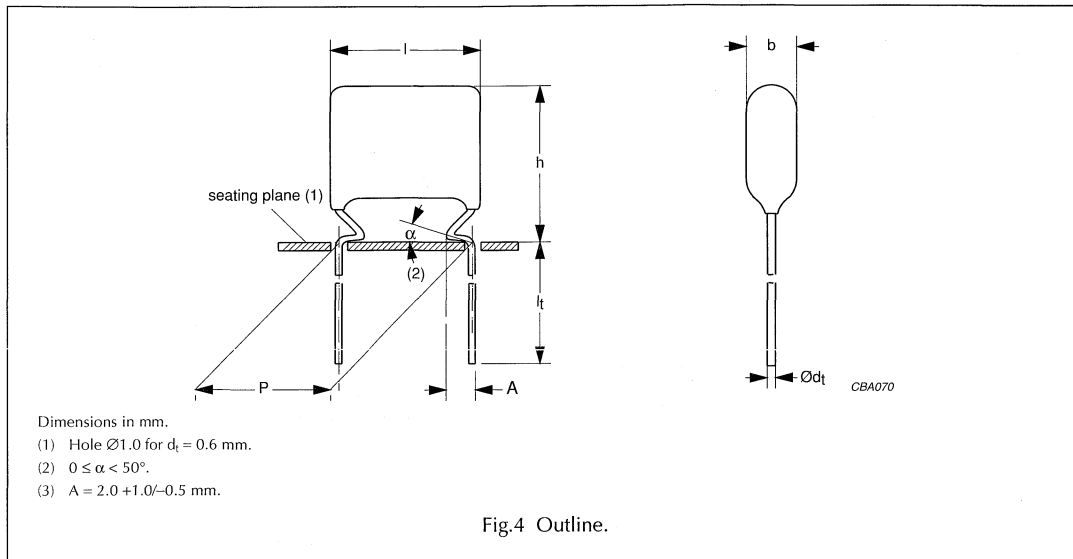
TYPE	PACKAGING	LEAD CONFIGURATION	PREFERRED TYPES			
			C-TOL	2000 V	2000 V monitor type	2500 V monitor type
375	loose in box	lead length 5.0 mm	±5%	44	74	84
		lock lead 4.0 mm	±5%	90	90	90
	taped on reel	bent back leads reel diameter 500 mm	±5%	46	—	—
			ON REQUEST			
375	loose in box	lead length 5.0 mm	±3.5%	45	75	85
		lead length 3.5 mm	±5%	40	70	80
	±3.5%		41	71	81	
	taped on reel		±5%	42	72	82
			±3.5%	43	73	83
	taped on reel	bent back leads reel diameter 500 mm	±3.5%	47	—	—
±5%			48	—	—	

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

KP/MKP 375 GENERAL DATA

PITCH 10 mm



Specific reference data for the 630 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle	$\leq 6 \times 10^{-4}$	$\leq 10 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 630 V (DC)	15 000 V/ μ s	
R between leads at 500 V; 1 minute	$> 100\,000$ M Ω	
R between interconnected leads and case; 500 V; 1 minute	$> 100\,000$ M Ω	
Ionization (AC) voltage (typical value) at 50 pC peak discharge	> 400 V	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	1 008 V; 1 minute	
Withstanding (DC) voltage between leads and case	2 840 V; 1 minute	

Available 630 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 5.0 \pm 1.0$ mm	$\pm 5\%$	2222 375 14...	preferred
		$\pm 3.5\%$	2222 375 15...	on request
	$l_t = 3.5 \pm 0.5$ mm	$\pm 5\%$	2222 375 10...	on request
		$\pm 3.5\%$	2222 375 11...	on request
Taped on reel	H = 16.0 mm; $P_0 = 12.7$ mm; reel diameter = 500 mm	$\pm 5\%$	2222 375 12...	on request
		$\pm 3.5\%$	2222 375 13...	on request

AC and pulse metallized polypropylene film capacitors

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$U_{Rdc} = 630 \text{ V}$; $U_{Rac} = 300 \text{ V}$; $U_{p-p} = 850 \text{ V}$

C (pF)	DIMENSIONS $b_{max} \times h (h')_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 5.0 \pm 1.0 \text{ mm}$
			C-tol = $\pm 5\%$
Pitch = $10.0 \pm 0.4 \text{ mm}$; $d_t = 0.60 \pm 0.06 \text{ mm}$			
680	5.0 × 13.0 × 14.5	0.65	2222 375 14681
750		0.65	2222 375 14751
820	5.5 × 13.5 × 14.5	0.70	2222 375 14821
910		0.70	2222 375 14911
1000		0.70	2222 375 14102
1100		0.75	2222 375 14112
1200		0.75	2222 375 14122
1300		0.75	2222 375 14132
1500		0.80	2222 375 14152
1600		0.85	2222 375 14162
1800	6.0 × 14.0 × 14.5	0.80	2222 375 14182
2000		0.85	2222 375 14202
2200		0.90	2222 375 14222
2400		1.0	2222 375 14242
2700	6.5 × 14.5 × 14.5	1.1	2222 375 14272

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

KP/MKP 375 GENERAL DATA

PITCH 15 mm
PITCH 7.5 mm (bent back leads)

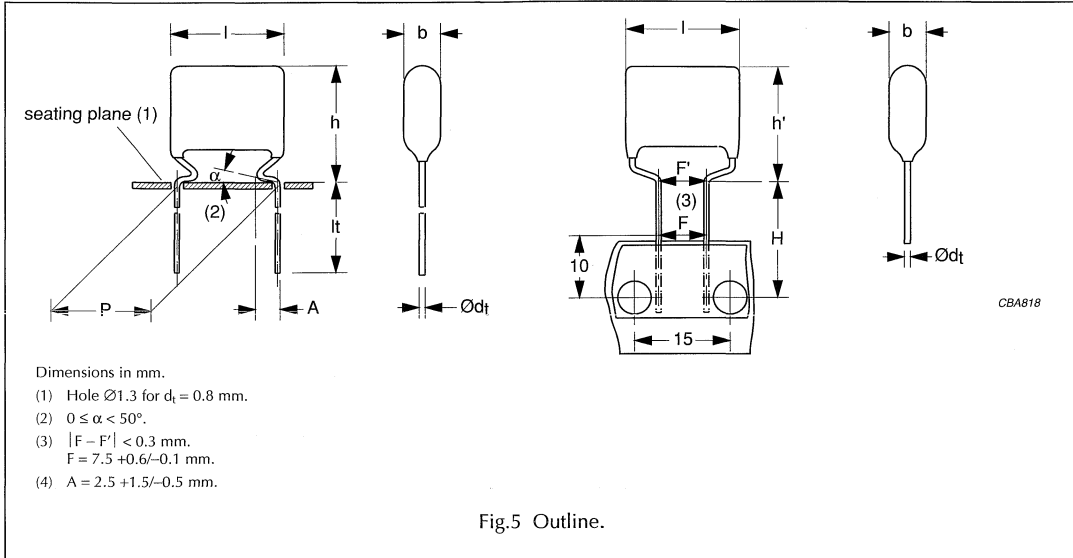


Fig.5 Outline.

Specific reference data for the 630 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle	$\leq 6 \times 10^{-4}$	$\leq 10 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 630 V (DC)	8000 V/ μ s	
R between leads at 500 V; 1 minute	>100000 M Ω	
R between interconnected leads and case; 500 V; 1 minute	>100000 M Ω	
Ionization (AC) voltage (typical value) at 50 pC peak discharge	>400 V	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	1008 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 630 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 5.0 \pm 1.0$ mm	$\pm 5\%$	2222 375 14...	preferred
		$\pm 3.5\%$	2222 375 15...	on request
	$l_t = 3.5 \pm 0.5$ mm	$\pm 5\%$	2222 375 10...	on request
		$\pm 3.5\%$	2222 375 11...	on request
Taped on reel	$H = 16.0$ mm; $P_0 = 12.7$ mm	$\pm 5\%$	2222 375 12...	on request
		$\pm 3.5\%$	2222 375 13...	on request
Taped on reel (bent back)	$H = 16.0$ mm; $P_0 = 15.0$ mm reel diameter = 500 mm	$\pm 5\%$	2222 375 16...	preferred
		$\pm 3.5\%$	2222 375 17...	on request
	$H = 16.0$ mm; $P_0 = 15.0$ mm reel diameter = 356 mm	$\pm 5\%$	2222 375 18...	on request

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

 $U_{Rdc} = 630 \text{ V}; U_{Rac} = 300 \text{ V}; U_{p-p} = 850 \text{ V}$

C (pF)	DIMENSIONS ⁽¹⁾ $b_{max} \times h (h')_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER	
			LOOSE IN BOX	REEL DIAMETER = 500 mm
			$l_t = 5.0 \pm 1.0 \text{ mm}$	H = 16.0 mm; P ₀ = 15.0 mm
			C-tol = ±5%	C-tol = ±5%
			catalogue number	last 5 digits
Pitch = 15.0 ±0.4 mm; d _t = 0.80 ±0.08 mm			pitch = 7.5 mm (bent back)	
3000	5.0 × 14.0 (15.5) × 18.5	1.0	2222 375 14302	.. 16302
3300			2222 375 14332	.. 16332
3600	5.5 × 14.5 (16.0) × 18.5	1.1	2222 375 14362	.. 16362
3900			2222 375 14392	.. 16392
4300			2222 375 14432	.. 16432
4700			2222 375 14472	.. 16472
5100			2222 375 14512	.. 16512
5600			2222 375 14562	.. 16562
6200	6.0 × 15.0 (16.5) × 18.5	1.2	2222 375 14622	.. 16622
6800			2222 375 14682	.. 16682
7500			2222 375 14752	.. 16752
8200			2222 375 14822	.. 16822
9100			2222 375 14912	.. 16912
10000			2222 375 14103	.. 16103
11000			2222 375 14113	.. 16113
12000			2222 375 14123	.. 16123
13000			2222 375 14133	.. 16133
15000			2222 375 14153	.. 16153
16000	2222 375 14163	.. 16163		
18000	6.5 × 15.5 (17.0) × 18.5	1.3	2222 375 14183	.. 16183
20000			2222 375 14203	.. 16203
22000	7.0 × 16.0 (17.5) × 18.5	1.5	2222 375 14223	.. 16223
24000	7.5 × 16.5 (18.0) × 18.5	1.6	2222 375 14243	.. 16243
27000	8.0 × 17.0 (18.5) × 18.5	1.9	2222 375 14273	.. 16273
30000			2222 375 14303	.. 16303
33000	8.5 × 17.5 (19.0) × 18.5	2.0	2222 375 14333	.. 16333
36000	9.5 × 18.5 (20.0) × 18.5	2.3	on request	on request
39000			on request	on request

Note

1. Dimensions in brackets for bent back leads.

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

KP/MKP 375 GENERAL DATA

PITCH 22.5/27.5 mm

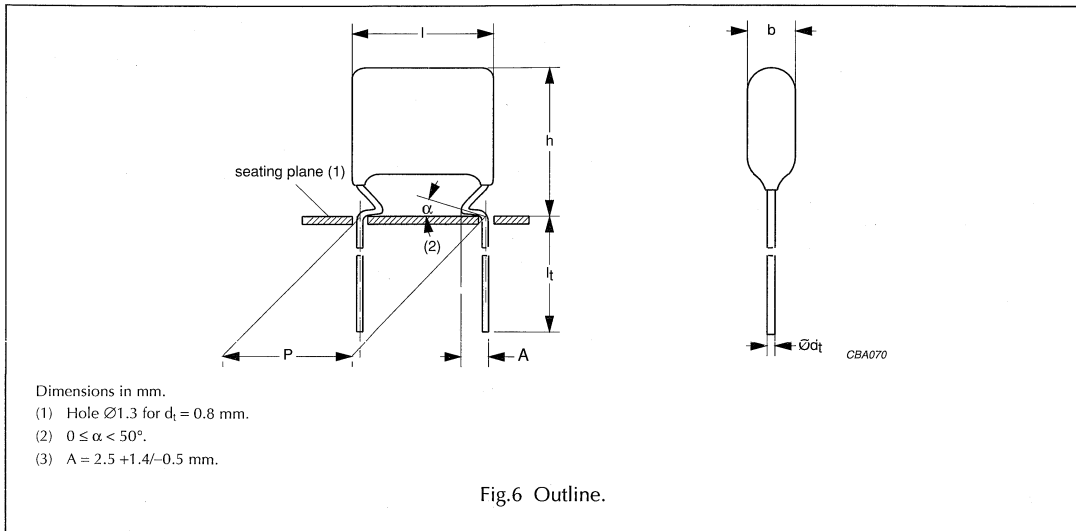


Fig.6 Outline.

Specific reference data for the 630 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: P = 22.5 mm P = 27.5 mm	$\leq 8 \times 10^{-4}$ $\leq 8 \times 10^{-4}$	$\leq 15 \times 10^{-4}$ $\leq 20 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 630 V (DC): P = 22.5 mm P = 27.5 mm	2800 V/ μ s 1900 V/ μ s	
R between leads at 500 V; 1 minute	$> 100000 \text{ M}\Omega$	
R between interconnected leads and case; 500 V; 1 minute	$> 100000 \text{ M}\Omega$	
Ionization (AC) voltage (typical value) at 50 pC peak discharge	$> 400 \text{ V}$	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	1008 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 630 V DC versions

PACKAGING ⁽¹⁾	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 5.0 \pm 1.0 \text{ mm}$	$\pm 5\%$	2222 375 14...	preferred
		$\pm 3.5\%$	2222 375 15...	on request
	$l_t = 3.5 \pm 0.5 \text{ mm}$	$\pm 5\%$	2222 375 10...	on request
		$\pm 3.5\%$	2222 375 11...	on request
Taped on reel	$H = 16.0 \text{ mm}; P_0 = 12.7 \text{ mm}$	$\pm 5\%$	2222 375 12...	on request
		$\pm 3.5\%$	2222 375 13...	on request

Note

1. Taped on reel pitch = 27.5 mm is not available.

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

 $U_{Rdc} = 630 \text{ V}; U_{Rac} = 300 \text{ V}; U_{p-p} = 850 \text{ V}$

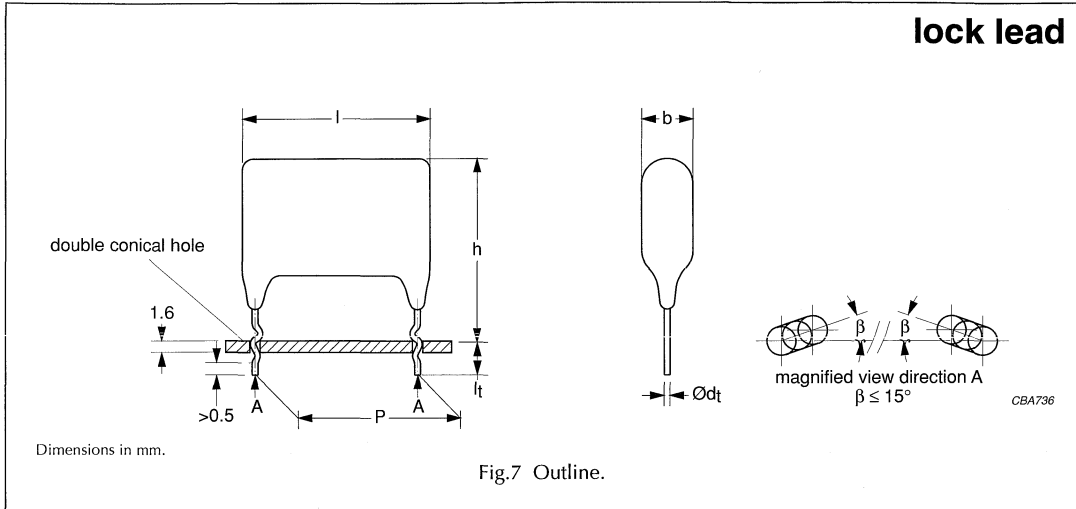
C (μF)	DIMENSIONS $b_{\max} \times h_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 5.0 \pm 1.0 \text{ mm}$
			C-tol = $\pm 5\%$
Pitch = $22.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.036	7.0 × 20.0 × 26.0	2.7	2222 375 14363
0.039			2222 375 14393
0.043			2222 375 14433
0.047			2222 375 14473
0.051			2222 375 14513
0.056			2222 375 14563
0.062			2222 375 14623
0.068			7.5 × 20.5 × 26.0
0.075	8.0 × 21.0 × 26.0	3.3	2222 375 14753
0.082			2222 375 14823
0.091	8.5 × 21.5 × 26.0	3.8	2222 375 14913
0.1	9.0 × 22.0 × 26.0	4.0	2222 375 14104
0.11	9.5 × 22.5 × 26.0	4.3	2222 375 14114
0.12	10.0 × 23.0 × 26.0	4.7	2222 375 14124
Pitch = $27.5 \pm 0.5 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.13	9.5 × 22.5 × 30.0	4.7	2222 375 14134
0.15	10.0 × 23.0 × 30.0	5.2	2222 375 14154
0.16	10.5 × 23.5 × 30.0	5.5	2222 375 14164
0.18	11.0 × 24.0 × 30.0	6.0	2222 375 14184
0.2	11.5 × 24.5 × 30.0	6.6	2222 375 14204
0.22	12.5 × 25.5 × 30.0	7.1	2222 375 14224
0.24	13.0 × 26.0 × 30.0	7.7	2222 375 14244
0.27	13.5 × 26.5 × 30.0	8.5	2222 375 14274

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

KP/MKP 375 GENERAL DATA

PITCH 10 mm (lock lead)



Specific reference data for the 630 V DC capacitors (lock lead)

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle	$\leq 6 \times 10^{-4}$	$\leq 10 \times 10^{-4}$
Rated voltage pulse slope (dU/dt) _R at 630 V (DC)	15 000 V/µs	
R between leads at 500 V; 1 minute	>100 000 MΩ	
R between interconnected leads and case; 500 V; 1 minute	>100 000 MΩ	
Ionization (AC) voltage (typical value) at 50 pC peak discharge	>400 V	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	1 008 V; 1 minute	
Withstanding (DC) voltage between leads and case	2 840 V; 1 minute	

Available 630 V DC versions (lock lead)

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 4.0 +1.0/-0.5$ mm	±5%	2222 375 90...	preferred

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

$U_{Rdc} = 630 \text{ V}$; $U_{Rac} = 300 \text{ V}$; $U_{p-p} = 850 \text{ V}$ (lock lead)

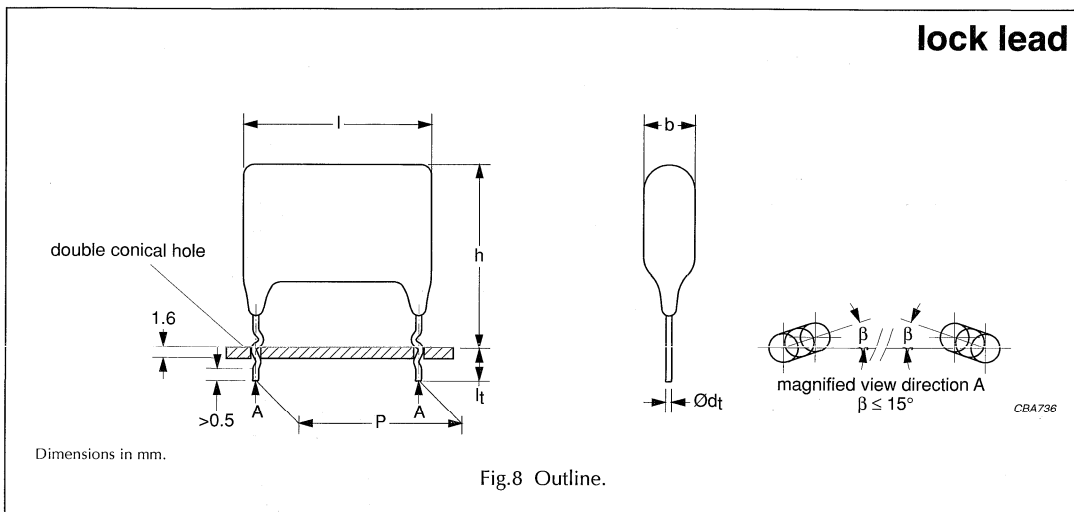
C (pF)	DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 4.0 +1.0/-0.5 \text{ mm}$
			C-tol = $\pm 5\%$
Pitch = $10.0 \pm 1.0 \text{ mm}$; $d_t = 0.60 \pm 0.06 \text{ mm}$			
680	$5.0 \times 16.0 \times 14.5$	0.65	2222 375 90308
750		0.65	2222 375 90309
820	$5.5 \times 16.5 \times 14.5$	0.70	2222 375 90311
910		0.70	2222 375 90312
1000		0.70	2222 375 90313
1100		0.75	2222 375 90314
1200		0.75	2222 375 90315
1300		0.75	2222 375 90316
1500		0.80	2222 375 90317
1600		0.85	2222 375 90318
1800		$6.0 \times 17.0 \times 14.5$	0.80
2000	0.85		2222 375 90321
2200	0.90		2222 375 90322
2400	1.0		2222 375 90323
2700	$6.5 \times 17.5 \times 14.5$	1.1	2222 375 90324

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

KP/MKP 375 GENERAL DATA

PITCH 15 mm (lock lead)



Specific reference data for the 630 V DC capacitors (lock lead)

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle	$\leq 6 \times 10^{-4}$	$\leq 10 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 630 V (DC)	8000 V/ μ s	
R between leads at 500 V; 1 minute	$>100\,000 \text{ M}\Omega$	
R between interconnected leads and case; 500 V; 1 minute	$>100\,000 \text{ M}\Omega$	
Ionization (AC) voltage (typical value) at 50 pC peak discharge	$>400 \text{ V}$	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	1 008 V; 1 minute	
Withstanding (DC) voltage between leads and case	2 840 V; 1 minute	

Available 630 V DC versions (lock lead)

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 4.0 +1.0/-0.5 \text{ mm}$	$\pm 5\%$	2222 375 90...	preferred

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

$U_{Rdc} = 630 \text{ V}$; $U_{Rac} = 300 \text{ V}$; $U_{p-p} = 850 \text{ V}$ (lock lead)

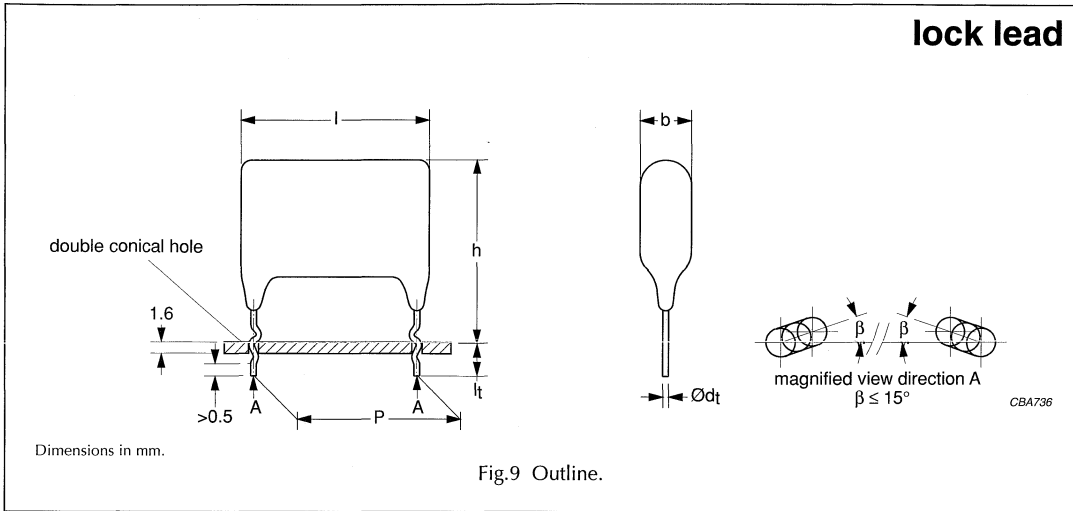
C (pF)	DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 4.0 +1.0/-0.5 \text{ mm}$
			C-tol = $\pm 5\%$
Pitch = $15.0 \pm 1.0 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
3000	$5.0 \times 17.0 \times 18.5$	1.0	2222 375 90325
3300			2222 375 90326
3600	$5.5 \times 17.5 \times 18.5$	1.1	2222 375 90327
3900			2222 375 90328
4300			2222 375 90329
4700			2222 375 90331
5100			2222 375 90332
5600			2222 375 90333
6200			$6.0 \times 18.0 \times 18.5$
6800	2222 375 90335		
7500	2222 375 90336		
8200	2222 375 90337		
9100	2222 375 90338		
10000	2222 375 90339		
11000	2222 375 90236		
12000	2222 375 90341		
13000	2222 375 90342		
15000	2222 375 90343		
16000	2222 375 90344		
18000	$6.5 \times 18.5 \times 18.5$	1.4	2222 375 90218
20000			2222 375 90345
22000	$7.0 \times 19.0 \times 18.5$	1.5	2222 375 90219
24000	$7.5 \times 19.5 \times 18.5$	1.7	2222 375 90221
27000	$8.0 \times 20.0 \times 18.5$	1.9	2222 375 90223
30000			2222 375 90346
33000	$8.5 \times 20.5 \times 18.5$	2.0	2222 375 90347
36000	$9.5 \times 21.5 \times 18.5$	2.3	on request
39000			on request

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

KP/MKP 375 GENERAL DATA

PITCH 22.5/27.5 mm (lock lead)



Specific reference data for the 630 V DC capacitors (lock lead)

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: P = 22.5 mm	≤ 8 × 10 ⁻⁴	≤ 15 × 10 ⁻⁴
P = 27.5 mm		≤ 20 × 10 ⁻⁴
Rated voltage pulse slope (dU/dt) _R at 630 V (DC): P = 22.5 mm	2800 V/μs	
P = 27.5 mm	1900 V/μs	
R between leads at 500 V; 1 minute	>100000 MΩ	
R between interconnected leads and case; 500 V; 1 minute	>100000 MΩ	
Ionization (AC) voltage (typical value) at 50 pC peak discharge	>400 V	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	1008 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 630 V DC versions (lock lead)

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	l _t = 4.0 +1.0/-0.5 mm	±5%	2222 375 90...	preferred

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

$U_{Rdc} = 630 \text{ V}$; $U_{Rac} = 300 \text{ V}$; $U_{p-p} = 850 \text{ V}$ (lock lead)

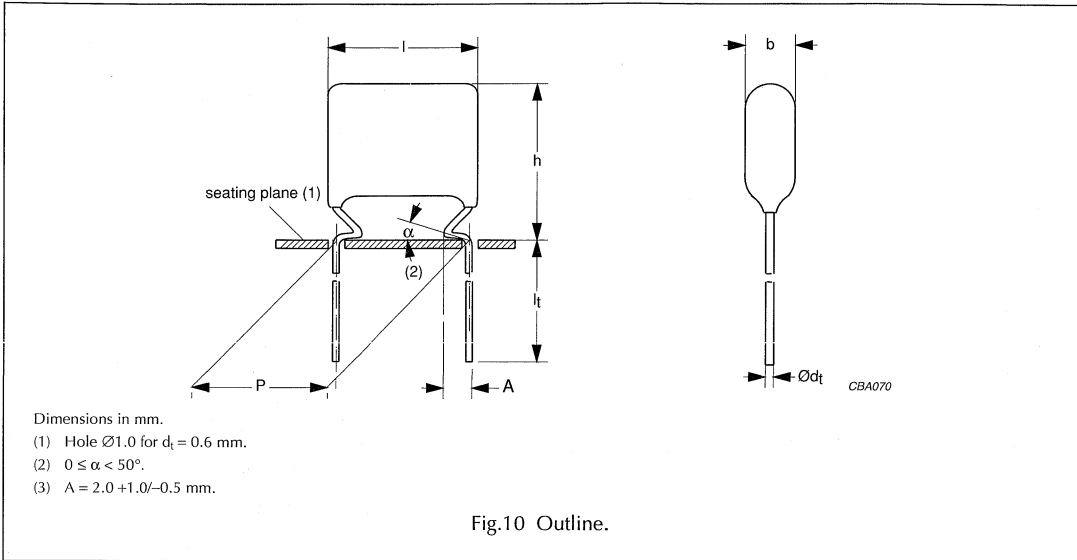
C (μF)	DIMENSIONS $b_{\max} \times h_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 4.0 +1.0/-0.5 \text{ mm}$
			C-tol = $\pm 5\%$
Pitch = $22.5 \pm 1.0 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.036	7.0 × 23.0 × 26.0	2.7	2222 375 90348
0.039			2222 375 90349
0.043			2222 375 90351
0.047			2222 375 90352
0.051			2222 375 90353
0.056			2222 375 90354
0.062			2222 375 90355
0.068			7.5 × 23.5 × 26.0
0.075	8.0 × 24.0 × 26.0	3.3	2222 375 90357
0.082			2222 375 90358
0.091	8.5 × 24.5 × 26.0	3.8	2222 375 90359
0.1	9.0 × 25.0 × 26.0	4.0	2222 375 90361
0.11	9.5 × 25.5 × 26.0	4.3	2222 375 90362
0.12	10.0 × 26.0 × 26.0	4.7	2222 375 90363
Pitch = $27.5 \pm 1.0 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.13	9.5 × 25.5 × 30.0	4.7	2222 375 90364
0.15	10.0 × 26.0 × 30.0	5.2	2222 375 90365
0.16	10.5 × 26.5 × 30.0	5.5	2222 375 90366
0.18	11.0 × 27.0 × 30.0	6.0	2222 375 90367
0.2	11.5 × 27.5 × 30.0	6.6	2222 375 90368
0.22	12.5 × 28.5 × 30.0	7.1	2222 375 90369
0.24	13.0 × 29.0 × 30.0	7.7	2222 375 90371
0.27	13.5 × 29.5 × 30.0	8.5	2222 375 90372

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

KP/MKP 375 GENERAL DATA

PITCH 10 mm



Specific reference data for the 1000 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle	$\leq 6 \times 10^{-4}$	$\leq 10 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 1000 V (DC)	27000 V/ μ s	
R between leads at 500 V; 1 minute	$>100000 \text{ M}\Omega$	
R between interconnected leads and case; 500 V; 1 minute	$>100000 \text{ M}\Omega$	
Ionization (AC) voltage (typical value) at 50 pC peak discharge	$>500 \text{ V}$	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	1600 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 1000 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 5.0 \pm 1.0 \text{ mm}$	$\pm 5\%$	2222 375 24...	preferred
		$\pm 3.5\%$	2222 375 25...	on request
	$l_t = 3.5 \pm 0.5 \text{ mm}$	$\pm 5\%$	2222 375 20...	on request
		$\pm 3.5\%$	2222 375 21...	on request
Taped on reel	$H = 16.0 \text{ mm}; P_0 = 12.7 \text{ mm};$ reel diameter = 500 mm	$\pm 5\%$	2222 375 22...	on request
		$\pm 3.5\%$	2222 375 23...	on request

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

 $U_{Rdc} = 1000 \text{ V}; U_{Rac} = 400 \text{ V}; U_{p-p} = 1100 \text{ V}$

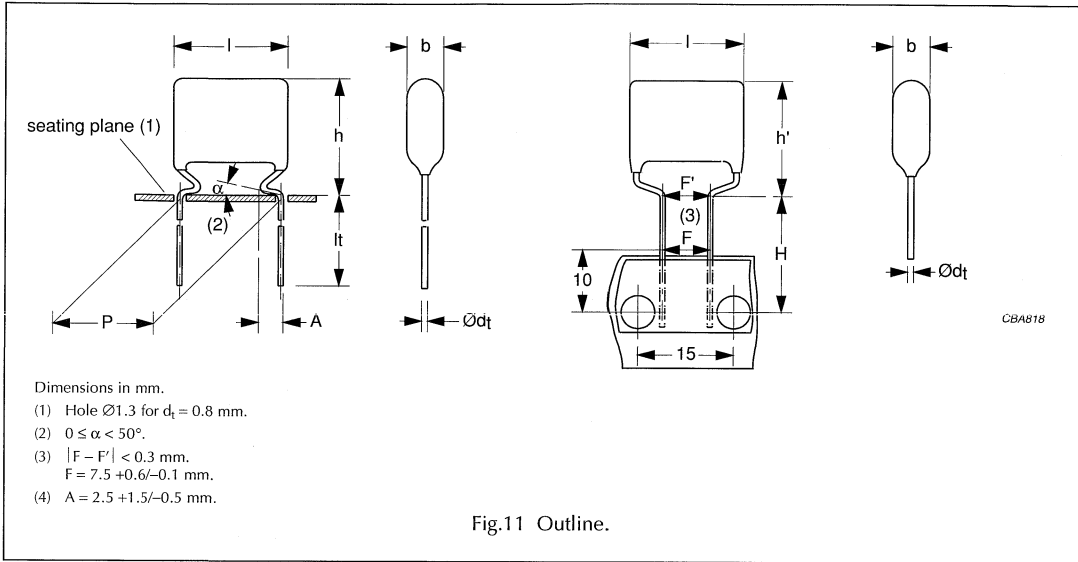
C (pF)	DIMENSIONS $b_{max} \times h (h')_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$I_t = 5.0 \pm 1.0 \text{ mm}$
			C-tol = $\pm 5\%$
Pitch = $10.0 \pm 0.4 \text{ mm}; d_t = 0.60 \pm 0.06 \text{ mm}$			
100	5.0 × 13.0 × 14.5	0.50	2222 375 24101
110			2222 375 24111
120			2222 375 24121
130			2222 375 24131
150	5.5 × 13.5 × 14.5	0.55	2222 375 24151
160		0.55	2222 375 24161
180		0.55	2222 375 24181
200		0.55	2222 375 24201
220		0.60	2222 375 24221
240		0.60	2222 375 24241
270		0.60	2222 375 24271
300		0.60	2222 375 24301
330		0.60	2222 375 24331
360		0.60	2222 375 24361
390		0.65	2222 375 24391
430		0.70	2222 375 24431
470		0.75	2222 375 24471
510		0.75	2222 375 24511
560		0.80	2222 375 24561
620		0.80	2222 375 24621
680	0.80	2222 375 24681	
750	0.70	2222 375 24751	
820	0.70	2222 375 24821	
910	0.70	2222 375 24911	
1000	6.0 × 14.0 × 14.5	0.75	2222 375 24102
1100		0.85	2222 375 24112
1200		0.90	2222 375 24122
1300		0.85	2222 375 24132
1500		0.90	2222 375 24152

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

KP/MKP 375 GENERAL DATA

PITCH 15 mm
PITCH 7.5 mm (bent back leads)



Specific reference data for the 1000 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle	$\leq 6 \times 10^{-4}$	$\leq 10 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 1000 V (DC)	15000 V/ μ s	
R between leads at 500 V; 1 minute	>100000 M Ω	
R between interconnected leads and case; 500 V; 1 minute	>100000 M Ω	
Ionization (AC) voltage (typical value) at 50 pC peak discharge	>500 V	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	1600 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 1000 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 5.0 \pm 1.0$ mm	$\pm 5\%$	2222 375 24...	preferred
		$\pm 3.5\%$	2222 375 25...	on request
	$l_t = 3.5 \pm 0.5$ mm	$\pm 5\%$	2222 375 20...	on request
		$\pm 3.5\%$	2222 375 21...	on request
Taped on reel	$H = 16.0$ mm; $P_0 = 12.7$ mm	$\pm 5\%$	2222 375 22...	on request
		$\pm 3.5\%$	2222 375 23...	on request
Taped on reel (bent back)	$H = 16.0$ mm; $P_0 = 15.0$ mm reel diameter = 500 mm	$\pm 5\%$	2222 375 26...	preferred
		$\pm 3.5\%$	2222 375 27...	on request
	$H = 16.0$ mm; $P_0 = 15.0$ mm reel diameter = 356 mm	$\pm 5\%$	2222 375 28...	on request

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

 $U_{Rdc} = 1000 \text{ V}; U_{Rac} = 400 \text{ V}; U_{p-p} = 1100 \text{ V}$

C (pF)	DIMENSIONS ⁽¹⁾ $b_{max} \times h (h')_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER	
			LOOSE IN BOX	REEL DIAMETER = 500 mm
			$l_t = 5.0 \pm 1.0 \text{ mm}$	$H = 16.0 \text{ mm}; P_0 = 15.0 \text{ mm}$
			C-tol = $\pm 5\%$	C-tol = $\pm 5\%$
			catalogue number	last 5 digits
Pitch = $15.0 \pm 0.4 \text{ mm}; d_t = 0.80 \pm 0.08 \text{ mm}$			pitch = 7.5 mm (bent back)	
1600	5.5 × 14.5 (16.0) × 18.5	1.1	2222 375 24162	.. 26162
1800			2222 375 24182	.. 26182
2000			2222 375 24202	.. 26202
2200			2222 375 24222	.. 26222
2400			2222 375 24242	.. 26242
2700	6.0 × 15.0 (16.5) × 18.5	1.2	2222 375 24272	.. 26272
3000			2222 375 24302	.. 26302
3300			2222 375 24332	.. 26332
3600			2222 375 24362	.. 26362
3900			2222 375 24392	.. 26392
4300			2222 375 24432	.. 26432
4700			2222 375 24472	.. 26472
5100			2222 375 24512	.. 26512
5600			2222 375 24562	.. 26562
6200			2222 375 24622	.. 26622
6800	2222 375 24682	.. 26682		
7500	7.0 × 16.0 (17.5) × 18.5	1.4	2222 375 24752	.. 26752
8200			2222 375 24822	.. 26822
9100			2222 375 24912	.. 26912
10000	7.5 × 16.5 (18.0) × 18.5	1.6	2222 375 24103	.. 26103
11000	8.0 × 17.0 (18.5) × 18.5	1.8	2222 375 24113	.. 26113
12000			2222 375 24123	.. 26123
13000	8.5 × 17.5 (19.0) × 18.5	1.9	2222 375 24133	.. 26133
15000	9.0 × 18.0 (19.5) × 18.5	2.1	2222 375 24153	.. 26153

Note

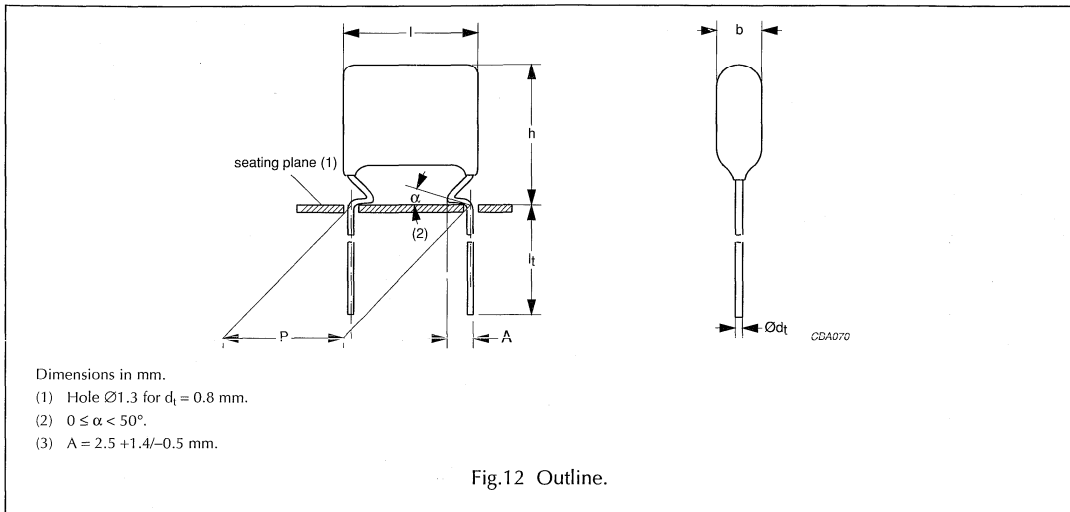
- Dimensions in brackets for bent back leads.

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

KP/MKP 375 GENERAL DATA

PITCH 22.5/27.5 mm



Specific reference data for the 1000 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: P = 22.5 mm P = 27.5 mm	$\leq 6 \times 10^{-4}$ $\leq 6 \times 10^{-4}$	$\leq 10 \times 10^{-4}$ $\leq 15 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 1000 V (DC): P = 22.5 mm P = 27.5 mm	5000 V/ μ s 3300 V/ μ s	
R between leads at 500 V; 1 minute	>100000 M Ω	
R between interconnected leads and case; 500 V; 1 minute	>100000 M Ω	
Ionization (AC) voltage (typical value) at 50 pC peak discharge	>500 V	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s for $C \leq 47$ nF for $C > 47$ nF	1600 V; 1 minute 1200 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 1000 V DC versions

PACKAGING ⁽¹⁾	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 5.0 \pm 1.0$ mm	$\pm 5\%$	2222 375 24...	preferred
		$\pm 3.5\%$	2222 375 25...	on request
	$l_t = 3.5 \pm 0.5$ mm	$\pm 5\%$	2222 375 20...	on request
		$\pm 3.5\%$	2222 375 21...	on request
Taped on reel	$H = 16.0$ mm; $P_0 = 12.7$ mm	$\pm 5\%$	2222 375 22...	on request
		$\pm 3.5\%$	2222 375 23...	on request

Note

1. Taped on reel pitch = 27.5 mm is not available.

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

 $U_{Rdc} = 1000 \text{ V}; U_{Rac} = 400 \text{ V}; U_{p-p} = 1100 \text{ V}$

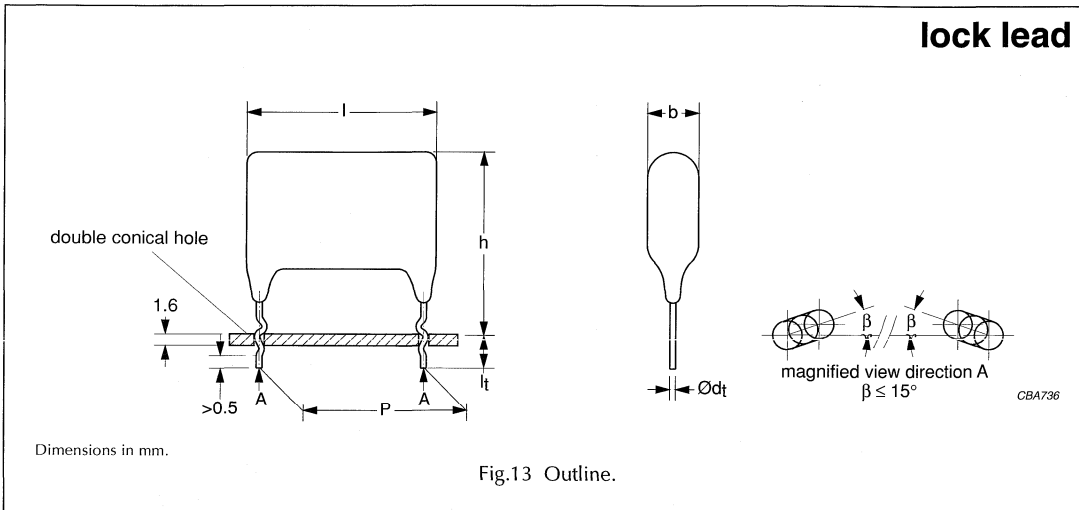
C (μF)	DIMENSIONS $b_{\max} \times h_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 5.0 \pm 1.0 \text{ mm}$
			C-tol = $\pm 5\%$
Pitch = $22.5 \pm 0.4 \text{ mm}; d_t = 0.80 \pm 0.08 \text{ mm}$			
0.016	6.0 × 19.0 × 26.0	2.2	2222 375 24163
0.018			2222 375 24183
0.02	6.5 × 19.5 × 26.0	2.5	2222 375 24203
0.022			2222 375 24223
0.024	7.0 × 20.0 × 26.0	2.7	2222 375 24243
0.027	7.5 × 20.5 × 26.0	3.1	2222 375 24273
0.03			2222 375 24303
0.033	8.0 × 21.0 × 26.0	3.4	2222 375 24333
0.036	8.5 × 21.5 × 26.0	3.7	2222 375 24363
0.039			2222 375 24393
0.043	9.0 × 22.0 × 26.0	4.1	2222 375 24433
Pitch = $27.5 \pm 0.5 \text{ mm}; d_t = 0.80 \pm 0.08 \text{ mm}$			
0.047	7.0 × 20.0 × 30.0	3.1	2222 375 24473
0.051	7.5 × 20.5 × 30.0	3.4	2222 375 24513
0.056			2222 375 24563
0.062	8.0 × 21.0 × 30.0	3.8	2222 375 24623
0.068	8.5 × 21.5 × 30.0	4.0	2222 375 24683
0.075	9.0 × 22.0 × 30.0	4.4	2222 375 24753
0.082	9.5 × 22.5 × 30.0	4.7	2222 375 24823
0.091	10.0 × 23.0 × 30.0	5.1	2222 375 24913
0.1	10.5 × 23.5 × 30.0	5.5	2222 375 24104
0.11	11.0 × 24.0 × 30.0	5.9	2222 375 24114
0.12	11.5 × 24.5 × 30.0	6.3	2222 375 24124
0.13	12.0 × 25.0 × 30.0	6.8	2222 375 24134
0.15	12.5 × 25.5 × 30.0	7.6	2222 375 24154

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

KP/MKP 375 GENERAL DATA

PITCH 10 mm (lock lead)



Specific reference data for the 1000 V DC capacitors (lock lead)

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle	$\leq 6 \times 10^{-4}$	$\leq 10 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 1000 V (DC)	27000 V/ μ s	
R between leads at 500 V; 1 minute	$>100000 \text{ M}\Omega$	
R between interconnected leads and case; 500 V; 1 minute	$>100000 \text{ M}\Omega$	
Ionization (AC) voltage (typical value) at 50 pC peak discharge	$>500 \text{ V}$	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	1600 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 1000 V DC versions (lock lead)

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 4.0 +1.0/-0.5 \text{ mm}$	$\pm 5\%$	2222 375 90...	preferred

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

$U_{Rdc} = 1000 \text{ V}$; $U_{Rac} = 400 \text{ V}$; $U_{p-p} = 1100 \text{ V}$ (lock lead)

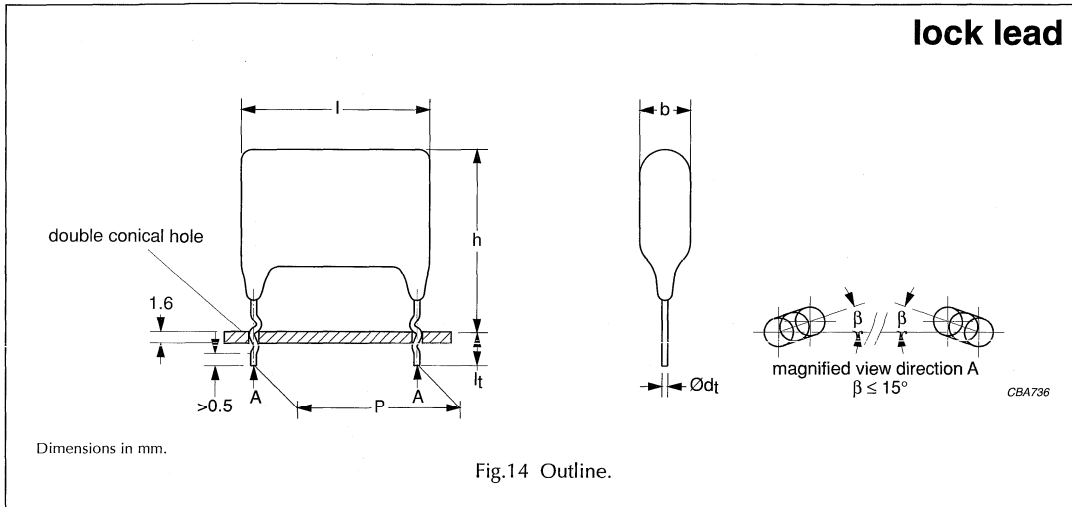
C (pF)	DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 4.0 +1.0/-0.5 \text{ mm}$
			C-tol = $\pm 5\%$
Pitch = $10.0 \pm 1.0 \text{ mm}$; $d_t = 0.60 \pm 0.06 \text{ mm}$			
100	5.0 × 16.0 × 14.5	0.50	2222 375 90373
110			2222 375 90374
120			2222 375 90375
130			2222 375 90376
150	5.5 × 16.5 × 14.5	0.55	2222 375 90377
160		0.55	2222 375 90378
180		0.55	2222 375 90379
200		0.55	2222 375 90381
220		0.60	2222 375 90382
240		0.60	2222 375 90383
270		0.60	2222 375 90384
300		0.60	2222 375 90385
330		0.60	2222 375 90386
360		0.60	2222 375 90387
390		0.65	2222 375 90388
430		0.70	2222 375 90389
470		0.75	2222 375 90391
510		0.75	2222 375 90392
560		0.80	2222 375 90393
620		0.80	2222 375 90394
680		0.80	2222 375 90395
750	0.70	2222 375 90396	
820	0.70	2222 375 90397	
910	0.70	2222 375 90398	
1000	6.0 × 17.0 × 14.5	0.75	2222 375 90399
1100		0.85	2222 375 90401
1200		0.90	2222 375 90402
1300		0.85	2222 375 90403
1500		0.90	2222 375 90404

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

KP/MKP 375 GENERAL DATA

PITCH 15 mm (lock lead)



Specific reference data for the 1000 V DC capacitors (lock lead)

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle	$\leq 6 \times 10^{-4}$	$\leq 10 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 1000 V (DC)	15 000 V/ μ s	
R between leads at 500 V; 1 minute	$>100\,000 \text{ M}\Omega$	
R between interconnected leads and case; 500 V; 1 minute	$>100\,000 \text{ M}\Omega$	
Ionization (AC) voltage (typical value) at 50 pC peak discharge	$>500 \text{ V}$	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	1 600 V; 1 minute	
Withstanding (DC) voltage between leads and case	2 840 V; 1 minute	

Available 1000 V DC versions (lock lead)

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 4.0 +1.0/-0.5 \text{ mm}$	$\pm 5\%$	2222 375 90...	preferred

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

 $U_{Rdc} = 1000 \text{ V}; U_{Rac} = 400 \text{ V}; U_{p-p} = 1100 \text{ V}$

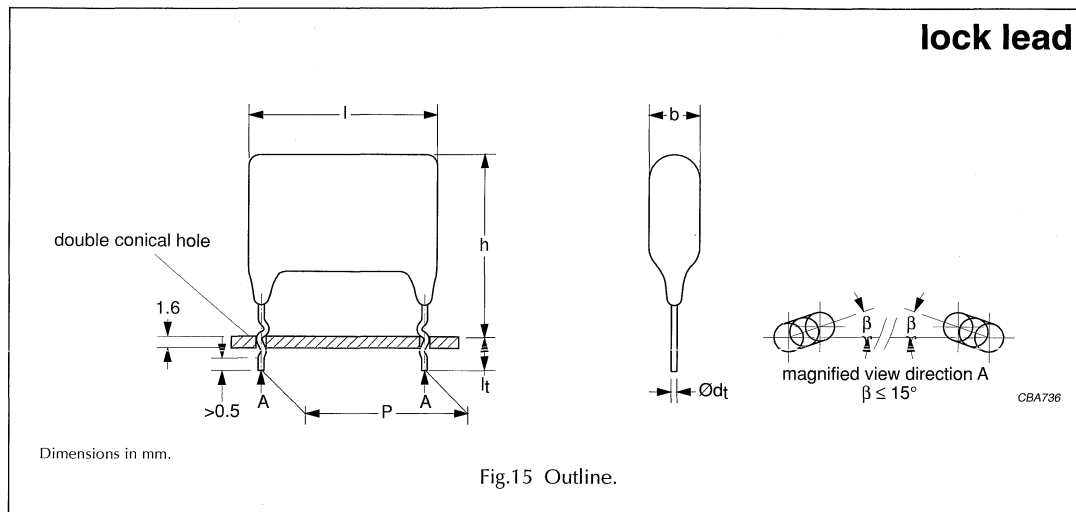
C (pF)	DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 4.0 +1.0/-0.5 \text{ mm}$
			C-tol = $\pm 5\%$
Pitch = 15.0 \pm1.0 mm; $d_t = 0.80 \pm 0.08 \text{ mm}$			
1600	5.5 \times 17.5 \times 18.5	1.1	2222 375 90405
1800			2222 375 90406
2000			2222 375 90407
2200			2222 375 90408
2400			2222 375 90409
2700	6.0 \times 18.0 \times 18.5	1.2	2222 375 90411
3000			2222 375 90412
3300			2222 375 90413
3600			2222 375 90414
3900			2222 375 90415
4300			2222 375 90416
4700			2222 375 90417
5100			2222 375 90418
5600			2222 375 90419
6200			2222 375 90421
6800	2222 375 90422		
7500	7.0 \times 19.0 \times 18.5	1.5	2222 375 90232
8200			2222 375 90423
9100			2222 375 90424
10000	7.5 \times 19.5 \times 18.5	1.6	2222 375 90425
11000	8.0 \times 20.0 \times 18.5	1.8	2222 375 90426
12000			2222 375 90427
13000	8.5 \times 20.5 \times 18.5	1.9	2222 375 90428
15000	9.0 \times 21.0 \times 18.5	2.1	2222 375 90429

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

KP/MKP 375 GENERAL DATA

PITCH 22.5/27.5 mm (lock lead)



Specific reference data for the 1000 V DC capacitors (lock lead)

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: P = 22.5 mm P = 27.5 mm	≤ 6 × 10 ⁻⁴ ≤ 6 × 10 ⁻⁴	≤ 10 × 10 ⁻⁴ ≤ 15 × 10 ⁻⁴
Rated voltage pulse slope (dU/dt) _R at 1000 V (DC): P = 22.5 mm P = 27.5 mm	5000 V/μs 3300 V/μs	
R between leads at 500 V; 1 minute	>100000 MΩ	
R between interconnected leads and case; 500 V; 1 minute	>100000 MΩ	
Ionization (AC) voltage (typical value) at 50 pC peak discharge	>500 V	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s for C ≤ 47 nF for C > 47 nF	1600 V; 1 minute 1200 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 1000 V DC versions (lock lead)

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	l _t = 4.0 +1.0/-0.5 mm	±5%	2222 375 90...	preferred

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

$U_{Rdc} = 1000 \text{ V}$; $U_{Rac} = 400 \text{ V}$; $U_{p-p} = 1100 \text{ V}$ (lock lead)

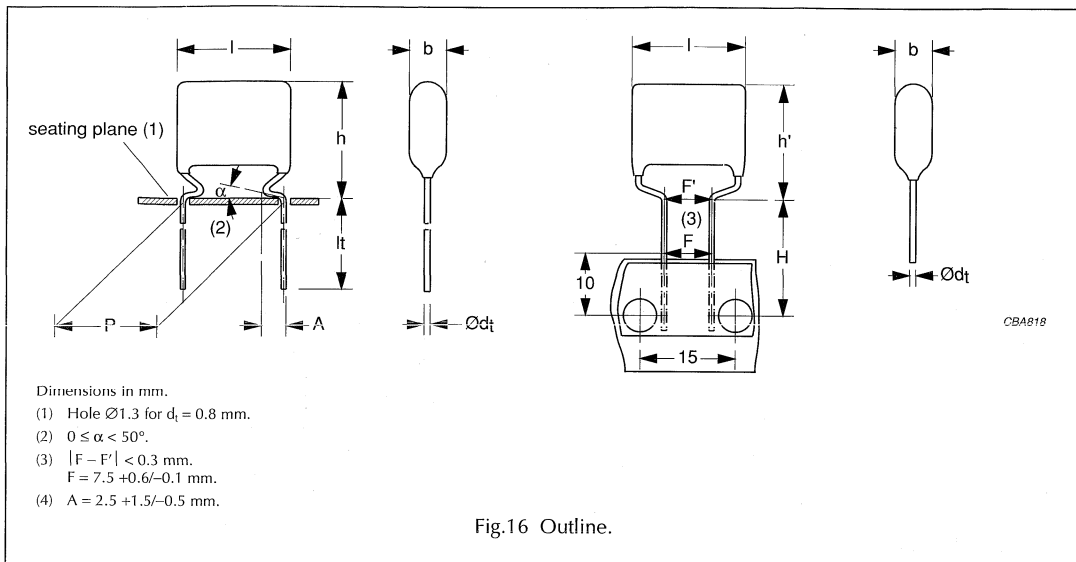
C (μF)	DIMENSIONS $b_{\max} \times h_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 4.0 +1.0/-0.5 \text{ mm}$
			C-tol = $\pm 5\%$
Pitch = $22.5 \pm 1.0 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.016	$6.0 \times 22.0 \times 26.0$	2.2	2222 375 90431
0.018			2222 375 90432
0.02	$6.5 \times 22.5 \times 26.0$	2.5	2222 375 90433
0.022			2222 375 90434
0.024	$7.0 \times 23.0 \times 26.0$	2.7	2222 375 90435
0.027			2222 375 90436
0.03	$7.5 \times 23.5 \times 26.0$	3.1	2222 375 90437
0.033			2222 375 90438
0.036	$8.0 \times 24.0 \times 26.0$	3.4	2222 375 90439
0.039			2222 375 90224
0.043	$9.0 \times 25.0 \times 26.0$	4.1	2222 375 90441
Pitch = $27.5 \pm 1.0 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.047	$7.0 \times 23.0 \times 30.0$	3.1	2222 375 90442
0.051	$7.5 \times 23.5 \times 30.0$	3.4	2222 375 90443
0.056			2222 375 90444
0.062	$8.0 \times 24.0 \times 30.0$	3.8	2222 375 90445
0.068	$8.5 \times 24.5 \times 30.0$	4.0	2222 375 90446
0.075	$9.0 \times 25.0 \times 30.0$	4.4	2222 375 90447
0.082	$9.5 \times 25.5 \times 30.0$	4.7	2222 375 90448
0.091	$10.0 \times 26.0 \times 30.0$	5.1	2222 375 90449
0.1	$10.5 \times 26.5 \times 30.0$	5.5	2222 375 90451
0.11	$11.0 \times 27.0 \times 30.0$	5.9	2222 375 90452
0.12	$11.5 \times 27.5 \times 30.0$	6.3	2222 375 90453
0.13	$12.0 \times 28.0 \times 30.0$	6.8	2222 375 90454
0.15	$12.5 \times 28.5 \times 30.0$	7.6	2222 375 90455

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

KP/MKP 375 GENERAL DATA

PITCH 15 mm
PITCH 7.5 mm (bent back leads)



Specific reference data for the 1600 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle	$\leq 6 \times 10^{-4}$	$\leq 10 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 1600 V (DC)	21 000 V/ μ s	
R between leads at 500 V; 1 minute	>100000 M Ω	
R between interconnected leads and case; 500 V; 1 minute	>100000 M Ω	
Ionization (AC) voltage (typical value) at 20 pC peak discharge	>550 V	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	2560 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 1600 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 5.0 \pm 1.0$ mm	$\pm 5\%$	2222 375 34...	preferred
		$\pm 3.5\%$	2222 375 35...	on request
	$l_t = 3.5 \pm 0.5$ mm	$\pm 5\%$	2222 375 30...	on request
		$\pm 3.5\%$	2222 375 31...	on request
Taped on reel	$H = 16.0$ mm; $P_0 = 12.7$ mm	$\pm 5\%$	2222 375 32...	on request
		$\pm 3.5\%$	2222 375 33...	on request
Taped on reel (bent back)	$H = 16.0$ mm; $P_0 = 15.0$ mm reel diameter = 500 mm	$\pm 5\%$	2222 375 36...	preferred
		$\pm 3.5\%$	2222 375 37...	on request
	$H = 16.0$ mm; $P_0 = 15.0$ mm reel diameter = 356 mm	$\pm 5\%$	2222 375 38...	on request

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

 $U_{Rdc} = 1600 \text{ V}; U_{Rac} = 500 \text{ V}; U_{p-p} = 1400 \text{ V}$

C (pF)	DIMENSIONS ⁽¹⁾ $b_{max} \times h (h')_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER	
			LOOSE IN BOX	REEL DIAMETER = 500 mm
			$l_t = 5.0 \pm 1.0 \text{ mm}$	H = 16.0 mm; P ₀ = 15.0 mm
			C-tol = ±5%	C-tol = ±5%
Pitch = 15.0 ±0.4 mm; d _t = 0.80 ±0.08 mm			pitch = 7.5 mm (bent back)	
680	5.5 × 14.5 (15.0) × 18.5	0.75	2222 375 34681	.. 36681
750			2222 375 34751	.. 36751
820			2222 375 34821	.. 36821
910	6.0 × 15.0 (15.5) × 18.5	0.80	2222 375 34911	.. 36911
1000		0.85	2222 375 34102	.. 36102
1100		0.85	2222 375 34112	.. 36112
1200		0.90	2222 375 34122	.. 36122
1300		0.95	2222 375 34132	.. 36132
1500		5.5 × 14.5 (16.0) × 18.5	1.1	2222 375 34152
1600	2222 375 34162			.. 36162
1800	6.0 × 15.0 (16.5) × 18.5	1.2	2222 375 34182	.. 36182
2000	6.5 × 15.5 (17.0) × 18.5	1.3	2222 375 34202	.. 36202
2200			2222 375 34222	.. 36222
2400	7.0 × 16.0 (17.5) × 18.5	1.4	2222 375 34242	.. 36242
2700	7.5 × 16.5 (18.0) × 18.5	1.6	2222 375 34272	.. 36272
3000			2222 375 34302	.. 36302
3300	8.0 × 17.0 (18.5) × 18.5	1.7	2222 375 34332	.. 36332
3600	8.5 × 17.5 (19.0) × 18.5	1.8	2222 375 34362	.. 36362
3900	9.0 × 18.0 (19.5) × 18.5	2.0	2222 375 34392	.. 36392
4300			2222 375 34432	.. 36432

Note

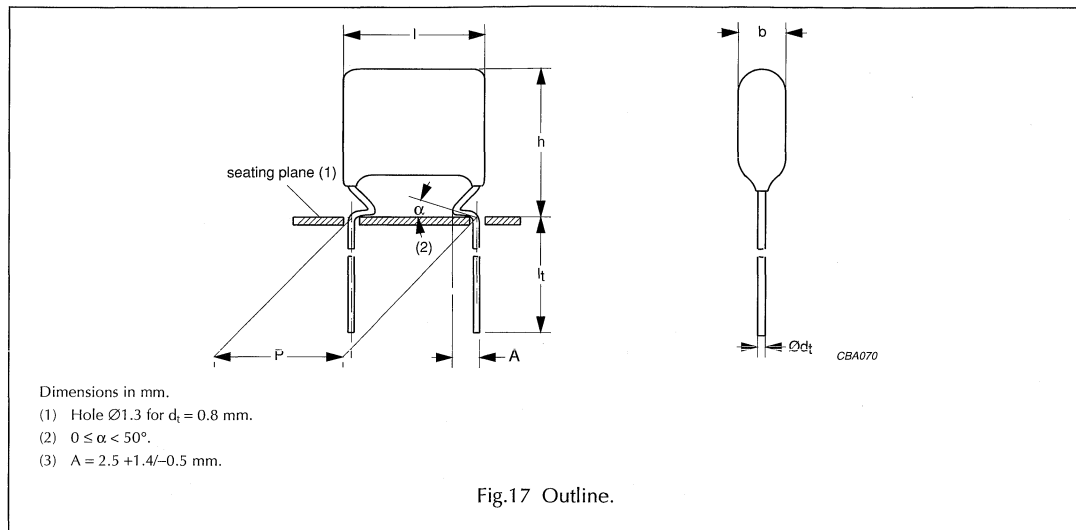
- Dimensions in brackets for bent back leads.

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

KP/MKP 375 GENERAL DATA

PITCH 22.5/27.5 mm



Specific reference data for the 1600 V DC capacitors

DESCRIPTION	VALUE	
Tangent of loss angle: P = 22.5 mm P = 27.5 mm	at 10 kHz	at 100 kHz
	$\leq 6 \times 10^{-4}$	$\leq 10 \times 10^{-4}$
Rated voltage pulse slope (dU/dt) _R at 1 600 V (DC): P = 22.5 mm P = 27.5 mm	7 000 V/ μ s	
	4 700 V/ μ s	
R between leads at 500 V; 1 minute	>100 000 M Ω	
R between interconnected leads and case; 500 V; 1 minute	>100 000 M Ω	
Ionization (AC) voltage (typical value) at 20 pC peak discharge	>550 V	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	2 560 V; 1 minute	
Withstanding (DC) voltage between leads and case	2 840 V; 1 minute	

Available 1600 V DC versions

PACKAGING ⁽¹⁾	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 5.0 \pm 1.0$ mm	$\pm 5\%$	2222 375 34...	preferred
		$\pm 3.5\%$	2222 375 35...	on request
	$l_t = 3.5 \pm 0.5$ mm	$\pm 5\%$	2222 375 30...	on request
		$\pm 3.5\%$	2222 375 31...	on request
Taped on reel	$H = 16.0$ mm; $P_0 = 12.7$ mm	$\pm 5\%$	2222 375 32...	on request
		$\pm 3.5\%$	2222 375 33...	on request

Note

1. Taped on reel pitch = 27.5 mm is not available.

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

$U_{Rdc} = 1600 \text{ V}$; $U_{Rac} = 500 \text{ V}$; $U_{p-p} = 1400 \text{ V}$

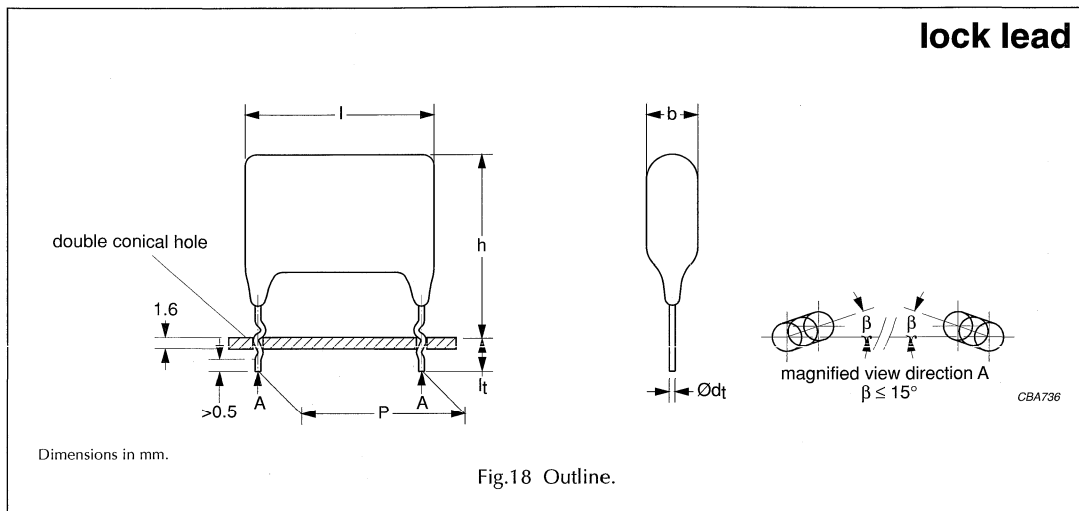
C (μF)	DIMENSIONS $b_{\text{max}} \times h_{\text{max}} \times l_{\text{max}}$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_1 = 5.0 \pm 1.0 \text{ mm}$
			C-tol = $\pm 5\%$
Pitch = $22.5 \pm 0.4 \text{ mm}$; $d_1 = 0.80 \pm 0.08 \text{ mm}$			
0.0047	6.0 × 19.0 × 26.0	2.0	2222 375 34472
0.0051			2222 375 34512
0.0056			2222 375 34562
0.0062	6.5 × 19.5 × 26.0	2.1	2222 375 34622
0.0068			2222 375 34682
0.0075	7.0 × 20.0 × 26.0	2.3	2222 375 34752
0.0082			2222 375 34822
0.0091	7.5 × 20.5 × 26.0	2.5	2222 375 34912
0.01	8.0 × 21.0 × 26.0	2.6	2222 375 34103
0.011	8.5 × 21.5 × 26.0	2.9	2222 375 34113
0.012			2222 375 34123
0.013	9.0 × 22.0 × 26.0	3.1	2222 375 34133
0.015	9.5 × 22.5 × 26.0	3.5	2222 375 34153
0.016	10.0 × 23.0 × 26.0	3.6	2222 375 34163
0.018	10.5 × 23.5 × 26.0	4.0	2222 375 34183
Pitch = $27.5 \pm 0.5 \text{ mm}$; $d_1 = 0.80 \pm 0.08 \text{ mm}$			
0.02	9.0 × 22.0 × 30.0	4.2	2222 375 34203
0.022	9.5 × 22.5 × 30.0	4.4	2222 375 34223
0.024	10.0 × 23.0 × 30.0	4.7	2222 375 34243
0.027	10.5 × 23.5 × 30.0	5.2	2222 375 34273
0.03	11.0 × 24.0 × 30.0	5.6	2222 375 34303
0.033	11.5 × 24.5 × 30.0	6.0	2222 375 34333
0.036	12.0 × 25.0 × 30.0	6.5	2222 375 34363
0.039	12.5 × 25.5 × 30.0	6.9	2222 375 34393

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

KP/MKP 375 GENERAL DATA

PITCH 15 mm (lock lead)



Specific reference data for the 1600 V DC capacitors (lock lead)

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle	$\leq 6 \times 10^{-4}$	$\leq 10 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 1600 V (DC)	21 000 V/ μ s	
R between leads at 500 V; 1 minute	$>100\,000\text{ M}\Omega$	
R between interconnected leads and case; 500 V; 1 minute	$>100\,000\text{ M}\Omega$	
Ionization (AC) voltage (typical value) at 20 pC peak discharge	$>550\text{ V}$	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	2560 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 1600 V DC versions (lock lead)

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 4.0 + 1.0 / -0.5\text{ mm}$	$\pm 5\%$	2222 375 90...	preferred

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

$U_{Rdc} = 1600 \text{ V}$; $U_{Rac} = 500 \text{ V}$; $U_{p-p} = 1400 \text{ V}$ (lock lead)

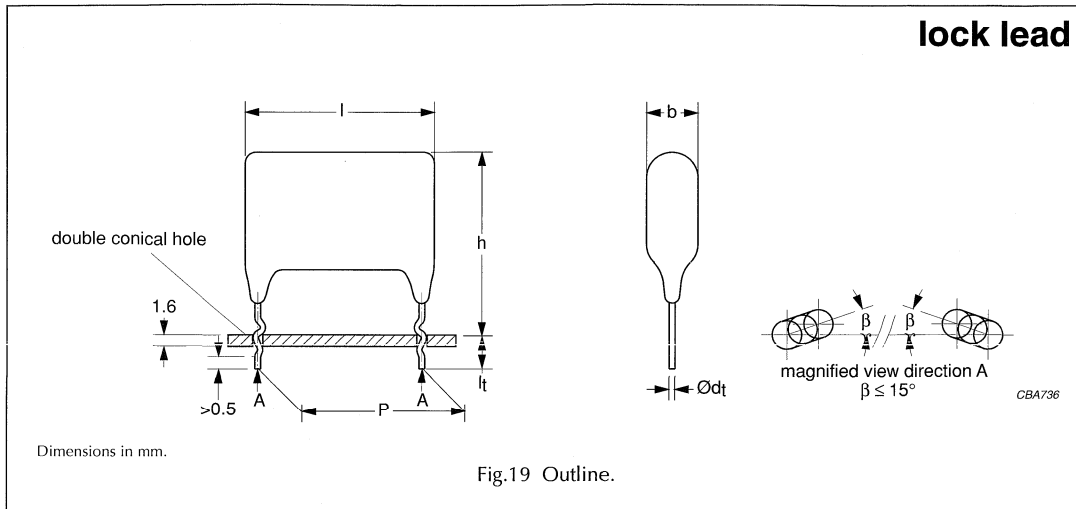
C (pF)	DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 4.0 +1.0/-0.5 \text{ mm}$
			C-tol = $\pm 5\%$
Pitch = $15.0 \pm 1.0 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
680	$5.5 \times 17.5 \times 18.5$	0.75	2222 375 90456
750			2222 375 90457
820			2222 375 90458
910	$6.0 \times 18.0 \times 18.5$	0.80	2222 375 90459
1000		0.85	2222 375 90461
1100		0.85	2222 375 90462
1200		0.90	2222 375 90463
1300		0.95	2222 375 90464
1500		$5.5 \times 17.5 \times 18.5$	1.1
1600	2222 375 90466		
1800	$6.0 \times 18.0 \times 18.5$	1.2	2222 375 90467
2000	$6.5 \times 18.5 \times 18.5$	1.3	2222 375 90468
2200			2222 375 90469
2400	$7.0 \times 19.0 \times 18.5$	1.4	2222 375 90471
2700	$7.5 \times 19.5 \times 18.5$	1.6	2222 375 90472
3000			2222 375 90473
3300	$8.0 \times 20.0 \times 18.5$	1.9	2222 375 90141
3600	$8.5 \times 20.5 \times 18.5$	2.3	2222 375 90142
3900	$9.0 \times 21.0 \times 18.5$	2.5	2222 375 90143
4300			2222 375 90144

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

KP/MKP 375 GENERAL DATA

PITCH 22.5/27.5 mm (lock lead)



Specific reference data for the 1600 V DC capacitors (lock lead)

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: P = 22.5 mm	$\leq 6 \times 10^{-4}$	$\leq 10 \times 10^{-4}$
P = 27.5 mm	$\leq 6 \times 10^{-4}$	$\leq 15 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 1600 V (DC): P = 22.5 mm	7000 V/ μ s	
P = 27.5 mm	4700 V/ μ s	
R between leads at 500 V; 1 minute	$>100\,000\ M\Omega$	
R between interconnected leads and case; 500 V; 1 minute	$>100\,000\ M\Omega$	
Ionization (AC) voltage (typical value) at 20 pC peak discharge	$>550\ V$	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	2560 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 1600 V DC versions (lock lead)

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 4.0 +1.0/-0.5\ mm$	$\pm 5\%$	2222 375 90...	preferred

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

$U_{Rdc} = 1600 \text{ V}$; $U_{Rac} = 500 \text{ V}$; $U_{p-p} = 1400 \text{ V}$ (lock lead)

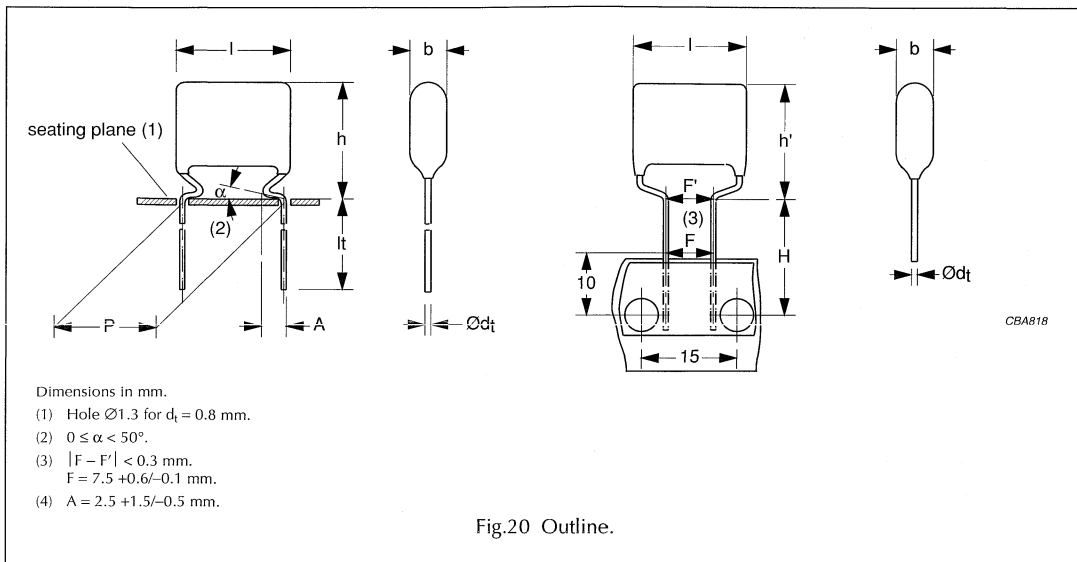
C (μF)	DIMENSIONS $b_{\max} \times h_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 4.0 +1.0/-0.5 \text{ mm}$
			C-tol = $\pm 5\%$
Pitch = $22.5 \pm 1.0 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.0047	6.0 × 22.0 × 26.0	2.4	2222 375 90145
0.0051			2222 375 90146
0.0056			2222 375 90147
0.0062	6.5 × 22.5 × 26.0	2.6	2222 375 90148
0.0068			2222 375 90149
0.0075	7.0 × 23.0 × 26.0	2.8	2222 375 90151
0.0082			2222 375 90152
0.0083			2222 375 90202
0.0091	7.5 × 23.5 × 26.0	2.9	2222 375 90153
0.01	8.0 × 24.0 × 26.0	3.2	2222 375 90154
0.011	8.5 × 24.5 × 26.0	3.4	2222 375 90155
0.012			2222 375 90156
0.013	9.0 × 25.0 × 26.0	3.6	2222 375 90157
0.015	9.5 × 25.5 × 26.0	4.0	2222 375 90158
0.016	10.0 × 26.0 × 26.0	4.3	2222 375 90159
0.018	10.5 × 26.5 × 26.0	4.7	2222 375 90161
Pitch = $27.5 \pm 1.0 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.02	9.0 × 25.0 × 30.0	4.2	2222 375 90474
0.022	9.5 × 25.5 × 30.0	4.4	2222 375 90475
0.024	10.0 × 26.0 × 30.0	4.7	2222 375 90476
0.027	10.5 × 26.5 × 30.0	5.2	2222 375 90477
0.03	11.0 × 27.0 × 30.0	5.6	2222 375 90478
0.033	11.5 × 27.5 × 30.0	6.0	2222 375 90479
0.036	12.0 × 28.0 × 30.0	6.5	2222 375 90481
0.039	12.5 × 28.5 × 30.0	6.9	2222 375 90482

AC and pulse metallized polypropylene film capacitors

KP/MKP 375 monitor

KP/MKP 375 GENERAL DATA

PITCH 15 mm
PITCH 7.5 mm (bent back leads)



Specific reference data for the 1600 V DC capacitors (monitor type)

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle	$\leq 6 \times 10^{-4}$	$\leq 10 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 1600 V (DC)	21 000 V/ μ s	
R between leads at 500 V; 1 minute	>100 000 M Ω	
R between interconnected leads and case; 500 V; 1 minute	>100 000 M Ω	
Ionization (AC) voltage (typical value) at 20 pC peak discharge	>550 V	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	2560 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 1600 V DC versions (monitor type)

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 5.0 \pm 1.0$ mm	$\pm 5\%$	2222 375 64...	preferred
		$\pm 3.5\%$	2222 375 65...	on request
	$l_t = 3.5 \pm 0.5$ mm	$\pm 5\%$	2222 375 60...	on request
		$\pm 3.5\%$	2222 375 61...	on request
Taped on reel	$H = 16.0$ mm; $P_0 = 12.7$ mm	$\pm 5\%$	2222 375 62...	on request
		$\pm 3.5\%$	2222 375 63...	on request
Taped on reel (bent back)	$H = 16.0$ mm; $P_0 = 15.0$ mm reel diameter = 500 mm	$\pm 5\%$	2222 375 66...	preferred
		$\pm 3.5\%$	2222 375 67...	on request
	$H = 16.0$ mm; $P_0 = 15.0$ mm reel diameter = 356 mm	$\pm 5\%$	2222 375 68...	on request

AC and pulse metallized polypropylene film capacitors

KP/MKP 375 monitor

$U_{Rdc} = 1600 \text{ V}$; $U_{Rac} = 500 \text{ V}$; $U_{p-p} = 1400 \text{ V}$ (monitor type)

C ⁽¹⁾ (pF)	DIMENSIONS ⁽²⁾ $b_{max} \times h (h')_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER	
			LOOSE IN BOX	REEL DIAMETER = 500 mm
			$l_t = 5.0 \pm 1.0 \text{ mm}$	H = 16.0 mm; P ₀ = 15.0 mm
			C-tol = $\pm 5\%$	C-tol = $\pm 5\%$
			catalogue number	last 5 digits
Pitch = 15.0 \pm 0.4 mm; d _t = 0.80 \pm 0.08 mm			pitch = 7.5 mm (bent back)	
1000	7.5 \times 16.5 (18.0) \times 18.5	1.6	2222 375 64102	.. 66102
1100	8.0 \times 17.0 (18.5) \times 18.5	1.7	2222 375 64112	.. 66112
1200			2222 375 64122	.. 66122
1300	8.5 \times 17.5 (19.0) \times 18.5	1.8	2222 375 64132	.. 66132
1500	9.0 \times 18.0 (19.5) \times 18.5	2.0	2222 375 64152	.. 66152
1600	9.5 \times 18.5 (20.0) \times 18.5	2.3	2222 375 64162	.. 66162

Notes

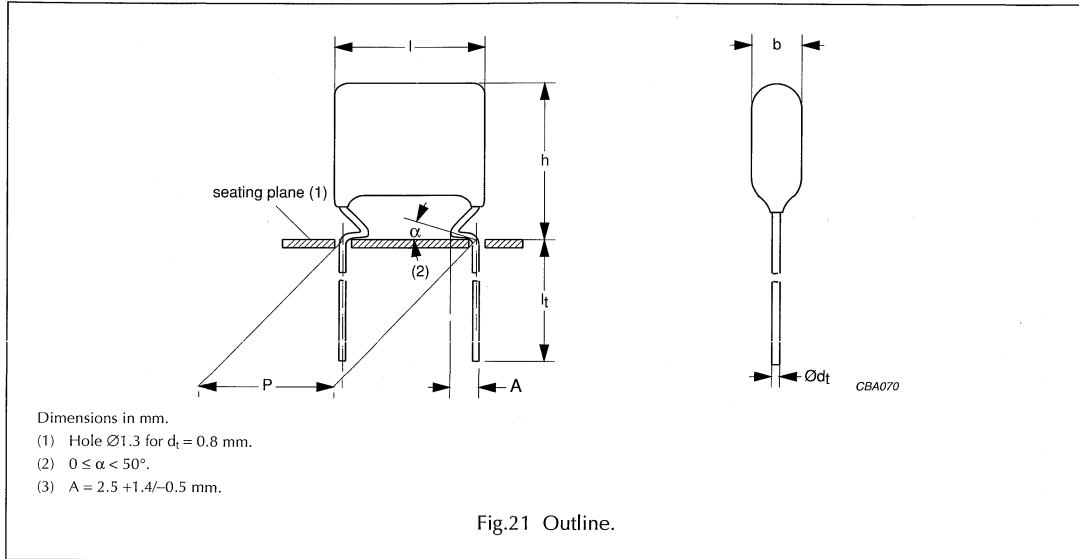
- Under development.
- Dimensions in brackets for bent back leads.

AC and pulse metallized polypropylene film capacitors

KP/MKP 375 monitor

KP/MKP 375 GENERAL DATA

PITCH 22.5 mm



Specific reference data for the 1600 V DC capacitors (monitor type)

DESCRIPTION	VALUE	
Tangent of loss angle:	at 10 kHz	at 100 kHz
	$\leq 6 \times 10^{-4}$	$\leq 10 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 1600 V (DC)	7000 V/ μ s	
R between leads at 500 V; 1 minute	$> 100000 \text{ M}\Omega$	
R between interconnected leads and case; 500 V; 1 minute	$> 100000 \text{ M}\Omega$	
Ionization (AC) voltage (typical value) at 20 pC peak discharge	$> 550 \text{ V}$	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	2560 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 1600 V DC versions (monitor type)

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 5.0 \pm 1.0 \text{ mm}$	$\pm 5\%$	2222 375 64...	preferred
		$\pm 3.5\%$	2222 375 65...	on request
	$l_t = 3.5 \pm 0.5 \text{ mm}$	$\pm 5\%$	2222 375 60...	on request
		$\pm 3.5\%$	2222 375 61...	on request
Taped on reel	$H = 16.0 \text{ mm}; P_0 = 12.7 \text{ mm}$	$\pm 5\%$	2222 375 62...	on request
		$\pm 3.5\%$	2222 375 63...	on request

AC and pulse metallized polypropylene film capacitors

KP/MKP 375 monitor

$U_{Rdc} = 1600 \text{ V}$; $U_{Rac} = 500 \text{ V}$; $U_{p-p} = 1400 \text{ V}$ (monitor type)

$C^{(1)}$ (μF)	DIMENSIONS $b_{\max} \times h_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 5.0 \pm 1.0 \text{ mm}$
			C-tol = $\pm 5\%$
Pitch = $22.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.0018	6.0 × 19.0 × 26.0	2.0	2222 375 64182
0.002			2222 375 64202
0.0022	6.5 × 19.5 × 26.0	2.1	2222 375 64222
0.0024	7.0 × 20.0 × 26.0	2.3	2222 375 64242
0.0027			2222 375 64272
0.003	7.5 × 20.5 × 26.0	2.5	2222 375 64302
0.0033	8.0 × 21.0 × 26.0	2.6	2222 375 64332
0.0036			2222 375 64362
0.0039			2222 375 64392
0.0043	8.5 × 21.5 × 26.0	2.9	2222 375 64432
0.0047			2222 375 64472
0.0051			2222 375 64512
0.0056			2222 375 64562
0.0062	9.0 × 22.0 × 26.0	3.1	2222 375 64622
0.0068	9.5 × 22.5 × 26.0	3.5	2222 375 64682
0.0075	10.0 × 23.0 × 26.0	3.6	2222 375 64752
0.0082	10.5 × 23.5 × 26.0	4.0	2222 375 64822

Note

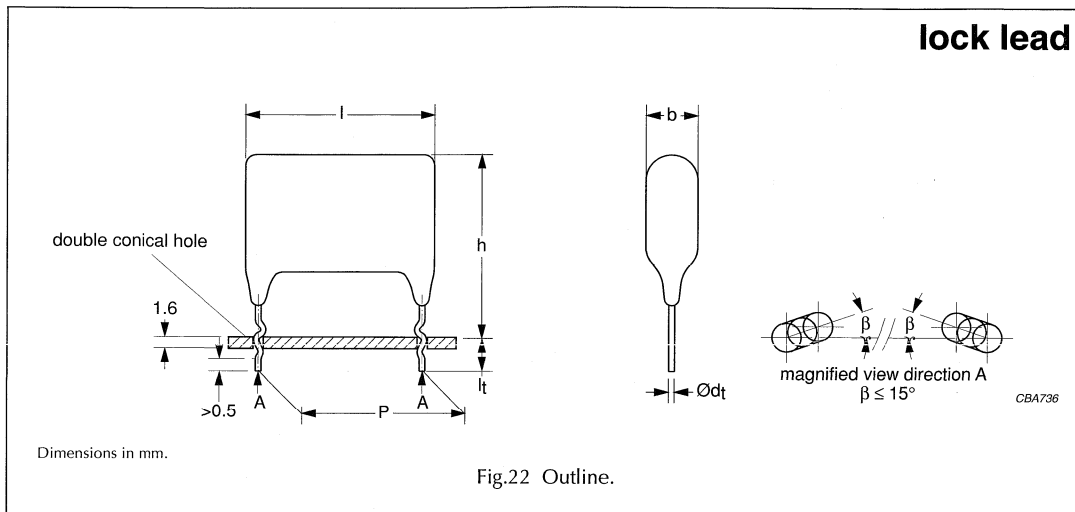
- Under development.

AC and pulse metallized polypropylene film capacitors

KP/MKP 375 monitor

KP/MKP 375 GENERAL DATA

PITCH 15 mm



Specific reference data for the 1600 V DC capacitors (monitor type - lock lead)

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle	$\leq 6 \times 10^{-4}$	$\leq 10 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 1 600 V (DC)	21 000 V/ μ s	
R between leads at 500 V; 1 minute	$>100\,000 \text{ M}\Omega$	
R between interconnected leads and case; 500 V; 1 minute	$>100\,000 \text{ M}\Omega$	
Ionization (AC) voltage (typical value) at 20 pC peak discharge	$>550 \text{ V}$	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	2 560 V; 1 minute	
Withstanding (DC) voltage between leads and case	2 840 V; 1 minute	

Available 1600 V DC versions (monitor type - lock lead)

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 4.0 +1.0/-0.5 \text{ mm}$	$\pm 5\%$	2222 375 90...	preferred

AC and pulse metallized polypropylene film capacitors

KP/MKP 375 monitor

$U_{Rdc} = 1600 \text{ V}$; $U_{Rac} = 500 \text{ V}$; $U_{p-p} = 1400 \text{ V}$ (monitor type - lock lead)

C ⁽¹⁾ (pF)	DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER
			$l_t = 4.0 +1.0/-0.5 \text{ mm}$
			C-tol = $\pm 5\%$
Pitch = $15.0 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
1 000	$7.5 \times 19.5 \times 18.5$	1.6	2222 375 90646
1 100	$8.0 \times 20.0 \times 18.5$	1.7	2222 375 90647
1 200			2222 375 90648
1 300	$8.5 \times 20.5 \times 18.5$	1.8	2222 375 90649
1 500	$9.0 \times 21.0 \times 18.5$	2.0	2222 375 90651
1 600	$9.5 \times 21.5 \times 18.5$	2.3	2222 375 90652

Note

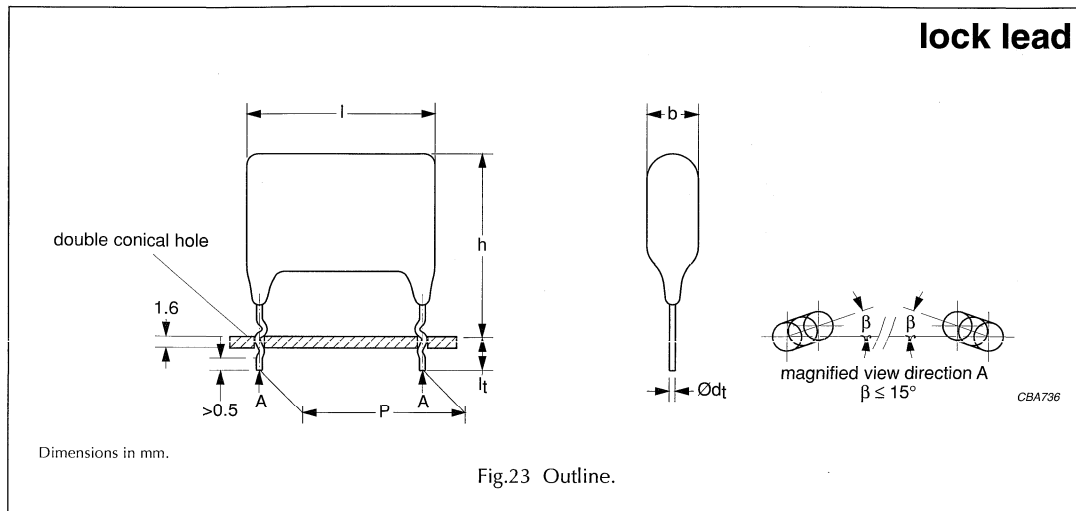
- Under development.

AC and pulse metallized polypropylene film capacitors

KP/MKP 375 monitor

KP/MKP 375 GENERAL DATA

PITCH 22.5 mm



Specific reference data for the 1600 V DC capacitors (monitor type - lock lead)

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle	≤ 6 × 10 ⁻⁴	≤ 10 × 10 ⁻⁴
Rated voltage pulse slope (dU/dt) _R at 1600 V (DC)	7000 V/μs	
R between leads at 500 V; 1 minute	>100000 MΩ	
R between interconnected leads and case; 500 V; 1 minute	>100000 MΩ	
Ionization (AC) voltage (typical value) at 20 pC peak discharge	>550 V	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	2560 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 1600 V DC versions (monitor type - lock lead)

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	l _t = 4.0 +1.0/-0.5 mm	±5%	2222 375 90...	preferred

AC and pulse metallized polypropylene film capacitors

KP/MKP 375 monitor

$U_{Rdc} = 1600 \text{ V}$; $U_{Rac} = 500 \text{ V}$; $U_{p-p} = 1400 \text{ V}$ (monitor type - lock lead)

C ⁽¹⁾ (μF)	DIMENSIONS $b_{\max} \times h_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 4.0 +1.0/-0.5 \text{ mm}$
			C-tol = $\pm 5\%$
Pitch = $22.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.0018	$6.0 \times 22.0 \times 26.0$	2.0	2222 375 90653
0.002			2222 375 90654
0.0022	$6.5 \times 22.5 \times 26.0$	2.1	2222 375 90655
0.0024	$7.0 \times 23.0 \times 26.0$	2.3	2222 375 90656
0.0027			2222 375 90657
0.003	$7.5 \times 23.5 \times 26.0$	2.5	2222 375 90658
0.0033	$8.0 \times 24.0 \times 26.0$	2.6	2222 375 90659
0.0036			2222 375 90661
0.0039			2222 375 90662
0.0043	$8.5 \times 24.5 \times 26.0$	2.9	2222 375 90663
0.0047			2222 375 90664
0.0051			2222 375 90665
0.0056			2222 375 90666
0.0062	$9.0 \times 25.0 \times 26.0$	3.1	2222 375 90667
0.0068	$9.5 \times 25.5 \times 26.0$	3.5	2222 375 90668
0.0075	$10.0 \times 26.0 \times 26.0$	3.6	2222 375 90669
0.0082	$10.5 \times 26.5 \times 26.0$	4.0	2222 375 90671

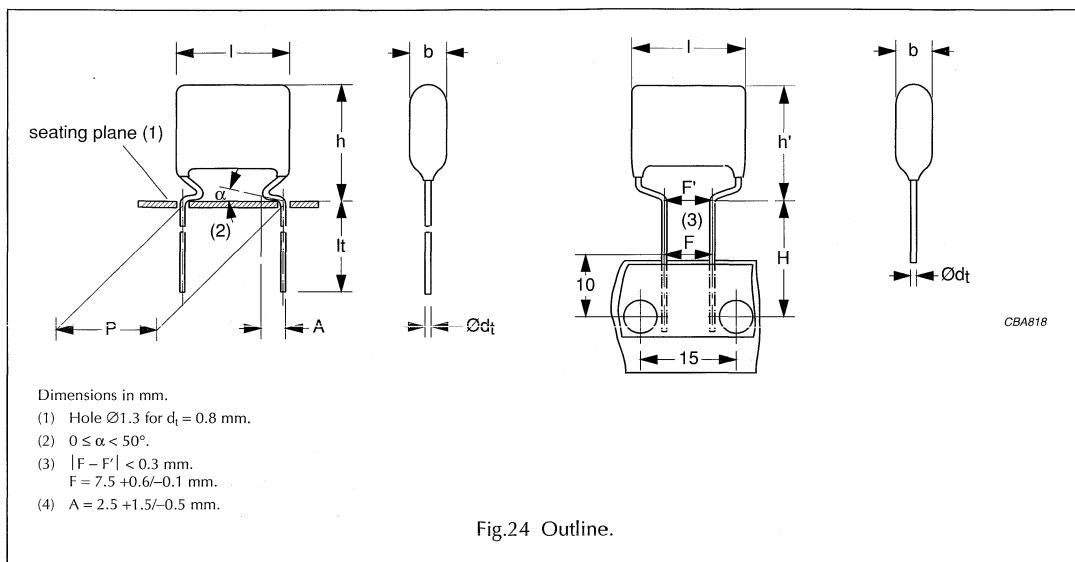
Note

- Under development.

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

KP/MKP 375 GENERAL DATA

 PITCH 15 mm
 PITCH 7.5 mm (bent back leads)


Specific reference data for the 2000 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle	$\leq 6 \times 10^{-4}$	$\leq 10 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 2000 V (DC)	30000 V/ μ s	
R between leads at 500 V; 1 minute	>100000 M Ω	
R between interconnected leads and case; 500 V; 1 minute	>100000 M Ω	
Ionization (AC) voltage (typical value) at 20 pC peak discharge	>600 V	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	3200 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 2000 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 5.0 \pm 1.0$ mm	$\pm 5\%$	2222 375 44...	preferred
		$\pm 3.5\%$	2222 375 45...	on request
	$l_t = 3.5 \pm 0.5$ mm	$\pm 5\%$	2222 375 40...	on request
		$\pm 3.5\%$	2222 375 41...	on request
Taped on reel	$H = 16.0$ mm; $P_0 = 12.7$ mm	$\pm 5\%$	2222 375 42...	on request
		$\pm 3.5\%$	2222 375 43...	on request
Taped on reel (bent back)	$H = 16.0$ mm; $P_0 = 15.0$ mm reel diameter = 500 mm	$\pm 5\%$	2222 375 46...	preferred
		$\pm 3.5\%$	2222 375 47...	on request
	$H = 16.0$ mm; $P_0 = 15.0$ mm reel diameter = 356 mm	$\pm 5\%$	2222 375 48...	on request

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

 $U_{Rdc} = 2000 \text{ V}; U_{Rac} = 600 \text{ V}; U_{p-p} = 1700 \text{ V}$

C (pF)	DIMENSIONS ⁽¹⁾ $b_{max} \times h (h')_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER	
			LOOSE IN BOX	REEL DIAMETER = 500 mm
			$l_t = 5.0 \pm 1.0 \text{ mm}$	H = 16.0 mm; $P_0 = 15.0 \text{ mm}$
			C-tol = $\pm 5\%$	C-tol = $\pm 5\%$
			catalogue number	last 5 digits
Pitch = $15.0 \pm 0.4 \text{ mm}; d_t = 0.80 \pm 0.08 \text{ mm}$			pitch = 7.5 mm (bent back)	
100	5.5 × 14.5 (15.0) × 18.5	0.75	2222 375 44101	.. 46101
110		0.75	2222 375 44111	.. 46111
120		0.75	2222 375 44121	.. 46121
130		0.75	2222 375 44131	.. 46131
150		0.75	2222 375 44151	.. 46151
160		0.75	2222 375 44161	.. 46161
180		0.75	2222 375 44181	.. 46181
200		0.75	2222 375 44201	.. 46201
220		0.75	2222 375 44221	.. 46221
240		0.75	2222 375 44241	.. 46241
270		0.75	2222 375 44271	.. 46271
300		0.75	2222 375 44301	.. 46301
330		0.75	2222 375 44331	.. 46331
360		0.75	2222 375 44361	.. 46361
390		0.75	2222 375 44391	.. 46391
430		0.75	2222 375 44431	.. 46431
470		0.80	2222 375 44471	.. 46471
510		0.80	2222 375 44511	.. 46511
560		0.80	2222 375 44561	.. 46561
620		6.0 × 15.0 (15.5) × 18.5	0.85	2222 375 44621
680	0.85		2222 375 44681	.. 46681
750	0.90		2222 375 44751	.. 46751
820	6.5 × 15.5 (16.0) × 18.5	0.95	2222 375 44821	.. 46821
910	5.5 × 14.5 (16.0) × 18.5	1.1	2222 375 44911	.. 46911
1000	6.0 × 15.0 (16.5) × 18.5		2222 375 44102	.. 46102
1100			2222 375 44112	.. 46112
1200			2222 375 44122	.. 46122
1300			2222 375 44132	.. 46132
1500			2222 375 44152	.. 46152
1600			2222 375 44162	.. 46162
1800			2222 375 44182	.. 46182
2000			2222 375 44202	.. 46202
2200		2222 375 44222	.. 46222	
2400		2222 375 44242	.. 46242	
2700	9.5 × 18.5 (20.0) × 18.5	2.0	2222 375 44272	.. 46272

Note

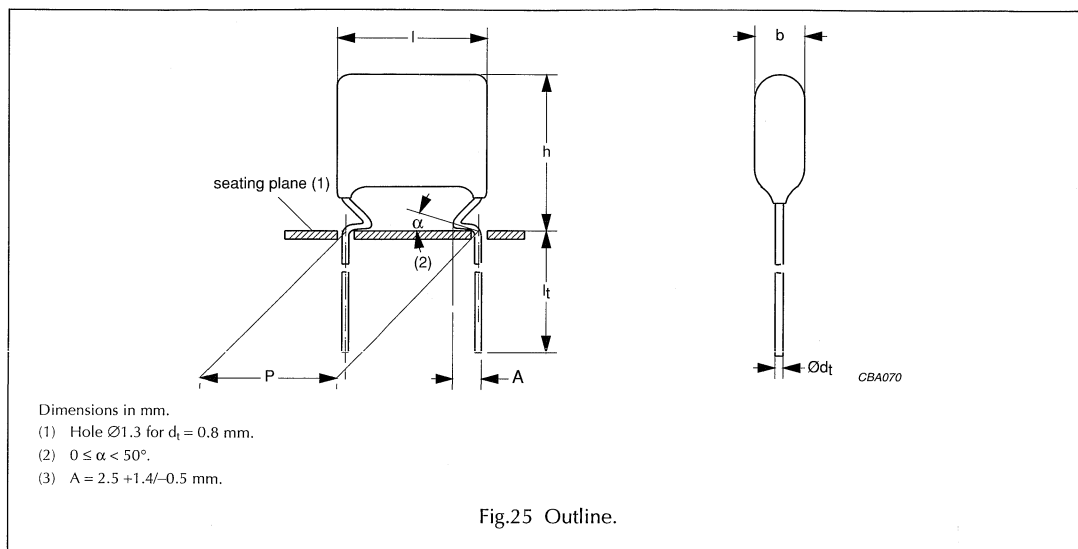
1. Dimensions in brackets for bent back leads.

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

KP/MKP 375 GENERAL DATA

PITCH 22.5/27.5 mm



Specific reference data for the 2000 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
P = 22.5 mm	$\leq 6 \times 10^{-4}$	$\leq 10 \times 10^{-4}$
P = 27.5 mm	$\leq 6 \times 10^{-4}$	$\leq 15 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 2000 V (DC):		
P = 22.5 mm	10000 V/ μ s	
P = 27.5 mm	6700 V/ μ s	
R between leads at 500 V; 1 minute	>100000 M Ω	
R between interconnected leads and case; 500 V; 1 minute	>100000 M Ω	
Ionization (AC) voltage (typical value) at 20 pC peak discharge	>600 V	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	3200 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 2000 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 5.0 \pm 1.0$ mm	$\pm 5\%$	2222 375 44...	preferred
		$\pm 3.5\%$	2222 375 45...	on request
	$l_t = 3.5 \pm 0.5$ mm	$\pm 5\%$	2222 375 40...	on request
		$\pm 3.5\%$	2222 375 41...	on request
Taped on reel	$H = 16.0$ mm; $P_0 = 12.7$ mm	$\pm 5\%$	2222 375 42...	on request
		$\pm 3.5\%$	2222 375 43...	on request

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

$U_{Rdc} = 2000 \text{ V}$; $U_{Rac} = 600 \text{ V}$; $U_{p-p} = 1700 \text{ V}$

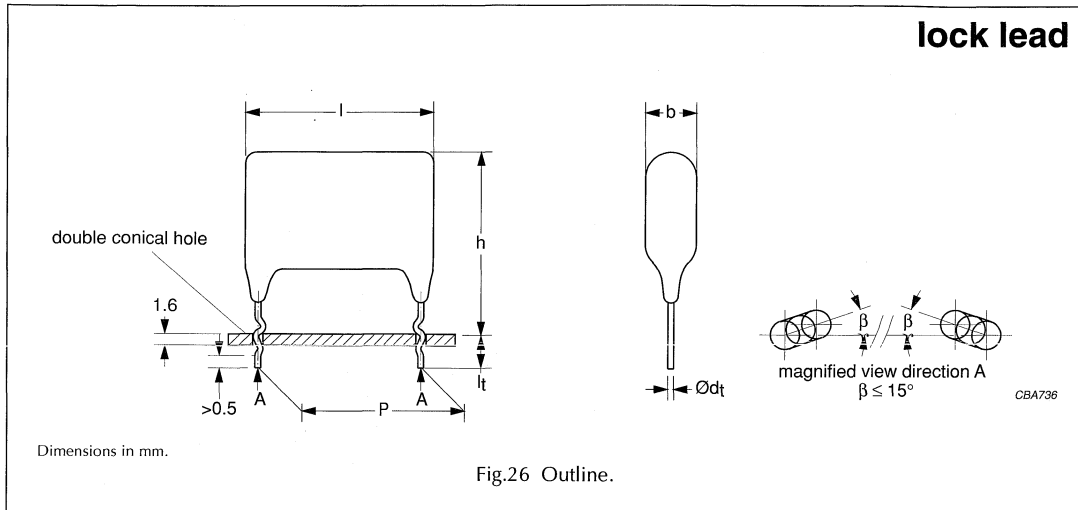
C (μF)	DIMENSIONS $b_{\max} \times h_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 5.0 \pm 1.0 \text{ mm}$
			C-tol = $\pm 5\%$
Pitch = $22.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.003	6.0 × 19.0 × 26.0	2.1	2222 375 44302
0.0033			2222 375 44332
0.0036			2222 375 44362
0.0039			2222 375 44392
0.0043	6.5 × 19.5 × 26.0	2.3	2222 375 44432
0.0047			2222 375 44472
0.0051	7.0 × 20.0 × 26.0	2.6	2222 375 44512
0.0056			2222 375 44562
0.0062	7.5 × 20.5 × 26.0	2.8	2222 375 44622
0.0068	8.0 × 21.0 × 26.0	3.0	2222 375 44682
0.0075			2222 375 44752
0.0082	8.5 × 21.5 × 26.0	3.3	2222 375 44822
0.0091	9.0 × 22.0 × 26.0	3.6	2222 375 44912
0.01	9.5 × 22.5 × 26.0	3.8	2222 375 44103
Pitch = $27.5 \pm 0.5 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.011	9.0 × 22.0 × 30.0	3.8	2222 375 44113
0.012	9.5 × 22.5 × 30.0	4.1	2222 375 44123
0.013	10.0 × 23.0 × 30.0	4.4	2222 375 44133
0.015	10.5 × 23.5 × 30.0	4.9	2222 375 44153
0.016	11.0 × 24.0 × 30.0	5.1	2222 375 44163
0.018	11.5 × 24.5 × 30.0	5.6	2222 375 44183
0.02	12.5 × 25.5 × 30.0	6.1	2222 375 44203
0.022	13.0 × 26.0 × 30.0	6.5	2222 375 44223

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

KP/MKP 375 GENERAL DATA

PITCH 15 mm (lock lead)



Specific reference data for the 2000 V DC capacitors (lock lead)

DESCRIPTION	VALUE	
	Tangent of loss angle	at 10 kHz
	$\leq 6 \times 10^{-4}$	$\leq 10 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 2000 V (DC)	30000 V/ μ s	
R between leads at 500 V; 1 minute	$>100000 \text{ M}\Omega$	
R between interconnected leads and case; 500 V; 1 minute	$>100000 \text{ M}\Omega$	
Ionization (AC) voltage (typical value) at 20 pC peak discharge	$>600 \text{ V}$	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	3200 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 2000 V DC versions (lock lead)

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 4.0 +1.0/-0.5 \text{ mm}$	$\pm 5\%$	2222 375 90...	preferred

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

$U_{Rdc} = 2000 \text{ V}$; $U_{Rac} = 600 \text{ V}$; $U_{p-p} = 1700 \text{ V}$ (lock lead)

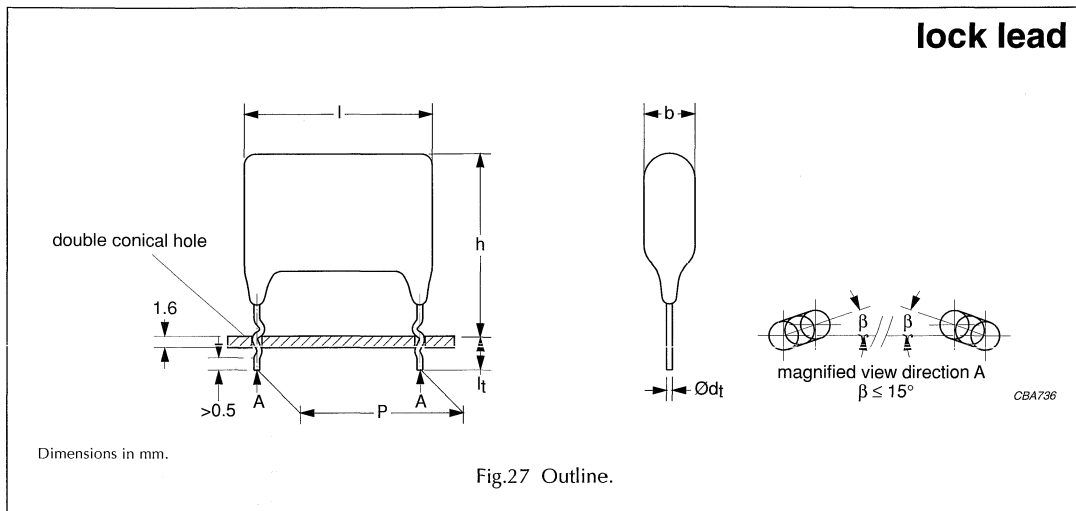
C (pF)	DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 4.0 +1.0/-0.5 \text{ mm}$
			C-tol = $\pm 5\%$
Pitch = $15.0 \pm 1.0 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
100	5.5 × 17.5 × 18.5	0.75	2222 375 90483
110		0.75	2222 375 90484
120		0.75	2222 375 90485
130		0.75	2222 375 90486
150		0.75	2222 375 90487
160		0.75	2222 375 90488
180		0.75	2222 375 90489
200		0.75	2222 375 90491
220		0.75	2222 375 90276
240		0.75	2222 375 90492
270		0.75	2222 375 90493
300		0.75	2222 375 90494
330		0.75	2222 375 90495
360		0.75	2222 375 90496
390		0.75	2222 375 90188
430		0.75	2222 375 90497
470		0.80	2222 375 90498
510		0.80	2222 375 90499
560	0.80	2222 375 90501	
620	6.0 × 18.0 × 18.5	0.85	2222 375 90502
680		0.85	2222 375 90229
750		0.90	2222 375 90503
820	6.5 × 18.5 × 18.5	0.95	2222 375 90504
910	5.5 × 17.5 × 18.5	1.1	2222 375 90505
1000	6.0 × 18.0 × 18.5		2222 375 90225
1100		1.3	2222 375 90506
1200			2222 375 90226
1300	6.5 × 18.5 × 18.5	1.3	2222 375 90507
1500	7.0 × 19.0 × 18.5	1.5	2222 375 90266
1600	7.5 × 19.5 × 18.5		2222 375 90508
1800		1.7	2222 375 90237
2000	8.0 × 20.0 × 18.5	1.7	2222 375 90509
2200	8.5 × 20.5 × 18.5	2.3	2222 375 90227
2400	9.0 × 21.0 × 18.5	1.8	2222 375 90511
2700	9.5 × 21.5 × 18.5	2.7	2222 375 90228

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

KP/MKP 375 GENERAL DATA

PITCH 22.5/27.5 mm (lock lead)



Specific reference data for the 2000 V DC capacitors (lock lead)

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: P = 22.5 mm P = 27.5 mm	$\leq 6 \times 10^{-4}$ $\leq 6 \times 10^{-4}$	$\leq 10 \times 10^{-4}$ $\leq 15 \times 10^{-4}$
Rated voltage pulse slope (dU/dt) _R at 2000 V (DC): P = 22.5 mm P = 27.5 mm	10000 V/µs 6700 V/µs	
R between leads at 500 V; 1 minute	>100000 MΩ	
R between interconnected leads and case; 500 V; 1 minute	>100000 MΩ	
Ionization (AC) voltage (typical value) at 20 pC peak discharge	>600 V	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	3200 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 2000 V DC versions (lock lead)

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 4.0 +1.0/-0.5$ mm	±5%	2222 375 90...	preferred

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

$U_{Rdc} = 2000 \text{ V}$; $U_{Rac} = 600 \text{ V}$; $U_{p-p} = 1700 \text{ V}$ (lock lead)

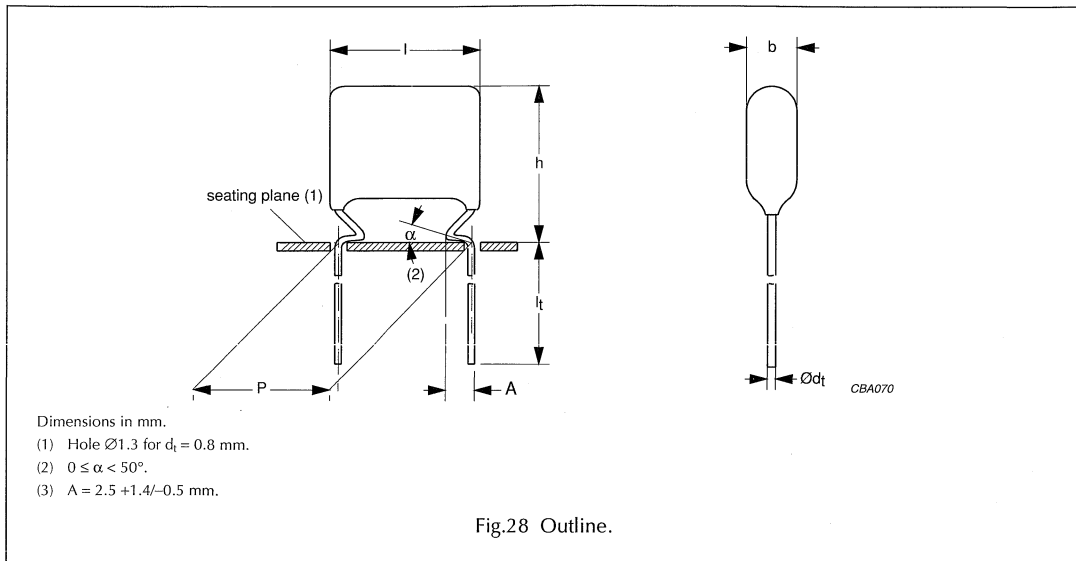
C (μF)	DIMENSIONS $b_{\max} \times h_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_1 = 4.0 +1.0/-0.5 \text{ mm}$
			C-tol = $\pm 5\%$
Pitch = $22.5 \pm 1.0 \text{ mm}$; $d_1 = 0.80 \pm 0.08 \text{ mm}$			
0.003	6.0 × 22.0 × 26.0	2.2	2222 375 90512
0.0033			2222 375 90162
0.0036			2222 375 90163
0.0039			2222 375 90164
0.0043	6.5 × 22.5 × 26.0	2.4	2222 375 90165
0.0047			2222 375 90166
0.0051	7.0 × 23.0 × 26.0	2.6	2222 375 90167
0.0056			2222 375 90168
0.0062	7.5 × 23.5 × 26.0	2.8	2222 375 90169
0.0068	8.0 × 24.0 × 26.0	3.0	2222 375 90171
0.0075			2222 375 90172
0.0082	8.5 × 24.5 × 26.0	3.2	2222 375 90173
0.0091	9.0 × 25.0 × 26.0	3.5	2222 375 90174
0.01	9.5 × 25.5 × 26.0	3.8	2222 375 90175
Pitch = $27.5 \pm 1.0 \text{ mm}$; $d_1 = 0.80 \pm 0.08 \text{ mm}$			
0.011	9.0 × 25.0 × 30.0	4.4	2222 375 90176
0.012	9.5 × 25.5 × 30.0	4.6	2222 375 90177
0.013	10.0 × 26.0 × 30.0	5.0	2222 375 90178
0.015	10.5 × 26.5 × 30.0	5.4	2222 375 90179
0.016	11.0 × 27.0 × 30.0	5.8	2222 375 90181
0.018	11.5 × 27.5 × 30.0	6.2	2222 375 90182
0.02	12.5 × 28.5 × 30.0	6.1	2222 375 90513
0.022	13.0 × 29.0 × 30.0	6.5	2222 375 90514

AC and pulse metallized polypropylene film capacitors

KP/MKP 375 monitor

KP/MKP 375 GENERAL DATA

PITCH 22.5 mm



Specific reference data for the 2000 V DC capacitors (monitor type)

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:	$\leq 6 \times 10^{-4}$	$\leq 10 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 2000 V (DC)	10000 V/ μ s	
R between leads at 500 V; 1 minute	>100000 M Ω	
R between interconnected leads and case; 500 V; 1 minute	>100000 M Ω	
Ionization (AC) voltage (typical value) at 20 pC peak discharge	>600 V	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	3200 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 2000 V DC versions (monitor type)

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 5.0 \pm 1.0$ mm	$\pm 5\%$	2222 375 74...	preferred
		$\pm 3.5\%$	2222 375 75...	on request
	$l_t = 3.5 \pm 0.5$ mm	$\pm 5\%$	2222 375 70...	on request
		$\pm 3.5\%$	2222 375 71...	on request
Taped on reel	$H = 16.0$ mm; $P_0 = 12.7$ mm	$\pm 5\%$	2222 375 72...	on request
		$\pm 3.5\%$	2222 375 73...	on request

AC and pulse metallized polypropylene film capacitors

KP/MKP 375 monitor

$U_{Rdc} = 2000 \text{ V}$; $U_{Rac} = 600 \text{ V}$; $U_{p-p} = 1700 \text{ V}$ (monitor type)

C ⁽¹⁾ (μF)	DIMENSIONS $b_{\max} \times h_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 5.0 \pm 1.0 \text{ mm}$
			C-tol = $\pm 5\%$
Pitch = $22.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.001 0.0011	6.0 × 19.0 × 26.0	2.1	2222 375 74102 2222 375 74112
0.0012 0.0013	6.5 × 19.5 × 26.0	2.3	2222 375 74122 2222 375 74132
0.0015 0.0016	7.0 × 20.0 × 26.0	2.6	2222 375 74152 2222 375 74162
0.0018 0.002	7.5 × 20.5 × 26.0 8.0 × 21.0 × 26.0	2.8 3.0	2222 375 74182 2222 375 74202
0.0022 0.0024	8.5 × 21.5 × 26.0 9.0 × 22.0 × 26.0	3.3 3.6	2222 375 74222 2222 375 74242
0.0027 0.003	9.5 × 22.5 × 26.0 10.0 × 23.0 × 26.0	3.8 4.2	2222 375 74272 2222 375 74302
0.0033 0.0036	10.5 × 23.5 × 26.0	4.5	2222 375 74332 2222 375 74362
0.0039 0.0043	11.0 × 24.0 × 26.0	4.9	2222 375 74392 2222 375 74432
0.0047 0.0051	11.5 × 24.5 × 26.0	5.3	2222 375 74472 2222 375 74512

Note

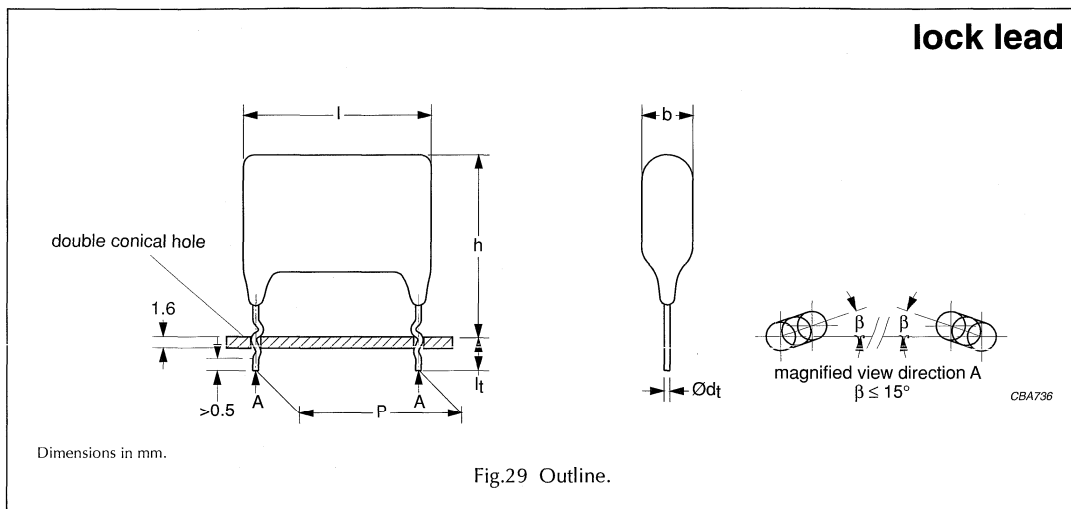
- Under development.

AC and pulse metallized polypropylene film capacitors

KP/MKP 375 monitor

KP/MKP 375 GENERAL DATA

PITCH 22.5 mm



Specific reference data for the 2000 V DC capacitors (monitor type - lock lead)

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle	$\leq 6 \times 10^{-4}$	$\leq 10 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 2000 V (DC)	10000 V/ μ s	
R between leads at 500 V; 1 minute	$>100000 \text{ M}\Omega$	
R between interconnected leads and case; 500 V; 1 minute	$>100000 \text{ M}\Omega$	
Ionization (AC) voltage (typical value) at 20 pC peak discharge	$>600 \text{ V}$	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	3200 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 2000 V DC versions (monitor type - lock lead)

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 4.0 +1.0/-0.5 \text{ mm}$	$\pm 5\%$	2222 375 90...	preferred

AC and pulse metallized polypropylene film capacitors

KP/MKP 375 monitor

$U_{Rdc} = 2000 \text{ V}$; $U_{Rac} = 600 \text{ V}$; $U_{p-p} = 1700 \text{ V}$ (monitor type - lock lead)

C ⁽¹⁾ (μF)	DIMENSIONS $b_{\max} \times h_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 4.0 +1.0/-0.5 \text{ mm}$
			C-tol = $\pm 5\%$
Pitch = $22.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.001 0.0011	6.0 × 22.0 × 26.0	2.1	2222 375 90672 2222 375 90673
0.0012 0.0013	6.5 × 22.5 × 26.0	2.3	2222 375 90674 2222 375 90675
0.0015 0.0016	7.0 × 23.0 × 26.0	2.6	2222 375 90676 2222 375 90677
0.0018	7.5 × 23.5 × 26.0	2.8	2222 375 90678
0.002	8.0 × 24.0 × 26.0	3.0	2222 375 90679
0.0022	8.5 × 24.5 × 26.0	3.3	2222 375 90681
0.0024	9.0 × 25.0 × 26.0	3.6	2222 375 90682
0.0027	9.5 × 25.5 × 26.0	3.8	2222 375 90683
0.003	10.0 × 26.0 × 26.0	4.2	2222 375 90684
0.0033	10.5 × 26.5 × 26.0	4.5	2222 375 90685
0.0036 0.0039 0.0043	11.0 × 27.0 × 26.0	4.9	2222 375 90686 2222 375 90687 2222 375 90688
0.0047 0.0051	11.5 × 27.5 × 26.0	5.3	2222 375 90689 2222 375 90691

Note

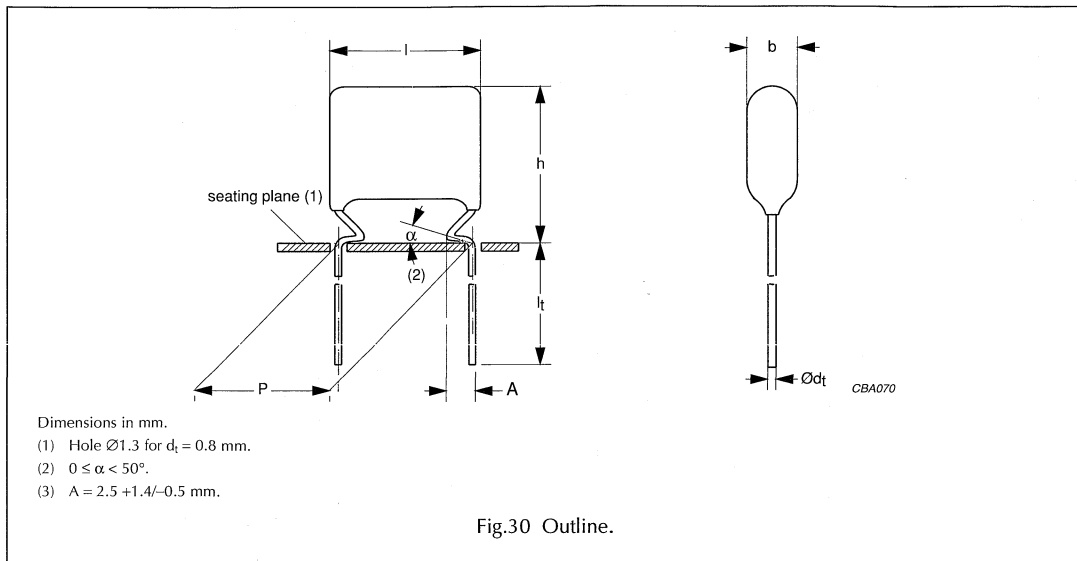
- Under development.

AC and pulse metallized polypropylene film capacitors

KP/MKP 375 monitor

KP/MKP 375 GENERAL DATA

PITCH 22.5 mm



Specific reference data for the 2500 V DC capacitors (monitor type)

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:	$\leq 6 \times 10^{-4}$	$\leq 10 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 2500 V (DC)	18000 V/ μ s	
R between leads at 500 V; 1 minute	>100000 M Ω	
R between interconnected leads and case; 500 V; 1 minute	>100000 M Ω	
Ionization (AC) voltage (typical value) at 20 pC peak discharge	>600 V	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	3500 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 2500 V DC versions (monitor type)

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 5.0 \pm 1.0$ mm	$\pm 5\%$	2222 375 84...	preferred
		$\pm 3.5\%$	2222 375 85...	on request
	$l_t = 3.5 \pm 0.5$ mm	$\pm 5\%$	2222 375 80...	on request
		$\pm 3.5\%$	2222 375 81...	on request
Taped on reel	$H = 16.0$ mm; $P_0 = 12.7$ mm	$\pm 5\%$	2222 375 82...	on request
		$\pm 3.5\%$	2222 375 83...	on request

AC and pulse metallized polypropylene film capacitors

KP/MKP 375 monitor

$U_{Rdc} = 2500 \text{ V}$; $U_{Rac} = 600 \text{ V}$; $U_{p-p} = 1700 \text{ V}$ (monitor type)

C ⁽¹⁾ (μF)	DIMENSIONS $b_{\max} \times h_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 5.0 \pm 1.0 \text{ mm}$
			C-tol = $\pm 5\%$
Pitch = $22.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.001 0.0011	$6.0 \times 19.0 \times 26.0$	2.1	2222 375 84102 2222 375 84112
0.0012 0.0013	$6.5 \times 19.5 \times 26.0$	2.3	2222 375 84122 2222 375 84132
0.0015 0.0016	$7.0 \times 20.0 \times 26.0$	2.6	2222 375 84152 2222 375 84162
0.0018	$7.5 \times 20.5 \times 26.0$	2.8	2222 375 84182
0.002	$8.0 \times 21.0 \times 26.0$	3.0	2222 375 84202
0.0022	$8.5 \times 21.5 \times 26.0$	3.3	2222 375 84222
0.0024	$9.0 \times 22.0 \times 26.0$	3.6	2222 375 84242
0.0027	$9.5 \times 22.5 \times 26.0$	3.8	2222 375 84272
0.003	$10.0 \times 23.0 \times 26.0$	4.2	2222 375 84302
0.0033	$10.5 \times 23.5 \times 26.0$	4.5	2222 375 84332
0.0036	$11.0 \times 24.0 \times 26.0$	4.9	2222 375 84362
0.0039			2222 375 84392
0.0043			2222 375 84432
0.0047	$11.5 \times 24.5 \times 26.0$	5.3	2222 375 84472
0.0051			2222 375 84512

Note

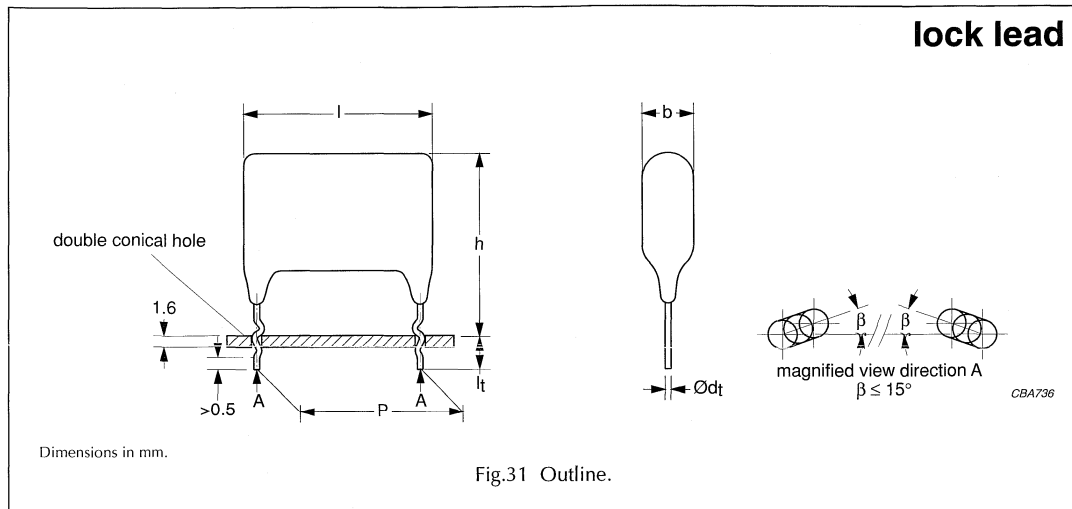
- Under development.

AC and pulse metallized polypropylene film capacitors

KP/MKP 375 monitor

KP/MKP 375 GENERAL DATA

PITCH 22.5 mm



Specific reference data for the 2500 V DC capacitors (monitor type - lock lead)

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle	≤ 6 × 10 ⁻⁴	≤ 10 × 10 ⁻⁴
Rated voltage pulse slope (dU/dt) _R at 2500 V (DC)	18000 V/μs	
R between leads at 500 V; 1 minute	>100000 MΩ	
R between interconnected leads and case; 500 V; 1 minute	>100000 MΩ	
Ionization (AC) voltage (typical value) at 20 pC peak discharge	>600 V	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	3500 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 2500 V DC versions (monitor type - lock lead)

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	l _t = 4.0 +1.0/-0.5 mm	±5%	2222 375 90...	preferred

AC and pulse metallized polypropylene film capacitors

KP/MKP 375 monitor

$U_{Rdc} = 2500 \text{ V}$; $U_{Rac} = 600 \text{ V}$; $U_{p-p} = 1700 \text{ V}$ (monitor type - lock lead)

C ⁽¹⁾ (μF)	DIMENSIONS $b_{\max} \times h_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER
			LOOSE IN BOX
			$l_t = 4.0 +1.0/-0.5 \text{ mm}$
			C-tol = $\pm 5\%$
Pitch = $22.5 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$			
0.001 0.0011	$6.0 \times 22.0 \times 26.0$	2.1	2222 375 90692 2222 375 90693
0.0012 0.0013	$6.5 \times 22.5 \times 26.0$	2.3	2222 375 90694 2222 375 90695
0.0015 0.0016	$7.0 \times 23.0 \times 26.0$	2.6	2222 375 90696 2222 375 90697
0.0018	$7.5 \times 23.5 \times 26.0$	2.8	2222 375 90698
0.002	$8.0 \times 24.0 \times 26.0$	3.0	2222 375 90699
0.0022	$8.5 \times 24.5 \times 26.0$	3.3	2222 375 90701
0.0024	$9.0 \times 25.0 \times 26.0$	3.6	2222 375 90702
0.0027	$9.5 \times 25.5 \times 26.0$	3.8	2222 375 90703
0.003	$10.0 \times 26.0 \times 26.0$	4.2	2222 375 90704
0.0033	$10.5 \times 26.5 \times 26.0$	4.5	2222 375 90705
0.0036 0.0039 0.0043	$11.0 \times 27.0 \times 26.0$	4.9	2222 375 90706 2222 375 90707 2222 375 90708
0.0047 0.0051	$11.5 \times 27.5 \times 26.0$	5.3	2222 375 90709 2222 375 90711

Note

- Under development.

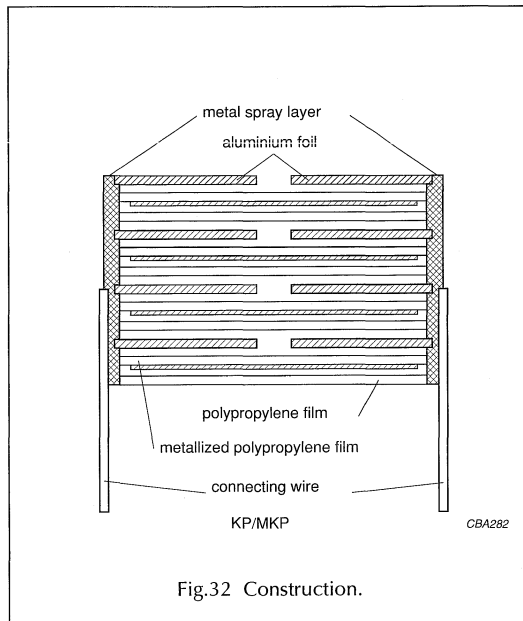
AC and pulse metallized polypropylene film capacitors

KP/MKP 375

CONSTRUCTION

Description

- Series-constructed, 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 boards applications. The capacitors packed in bandoliers are designed for mounting on printed-circuit boards by means of automatic insertion machines. For detailed tape specifications refer to this handbook, chapter "Packaging information".

SPECIFIC METHOD OF MOUNTING TO WITHSTAND VIBRATION AND SHOCK

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

Storage temperature

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

RATINGS AND CHARACTERISTICS REFERENCE CONDITIONS

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 $50 \pm 2\%$.

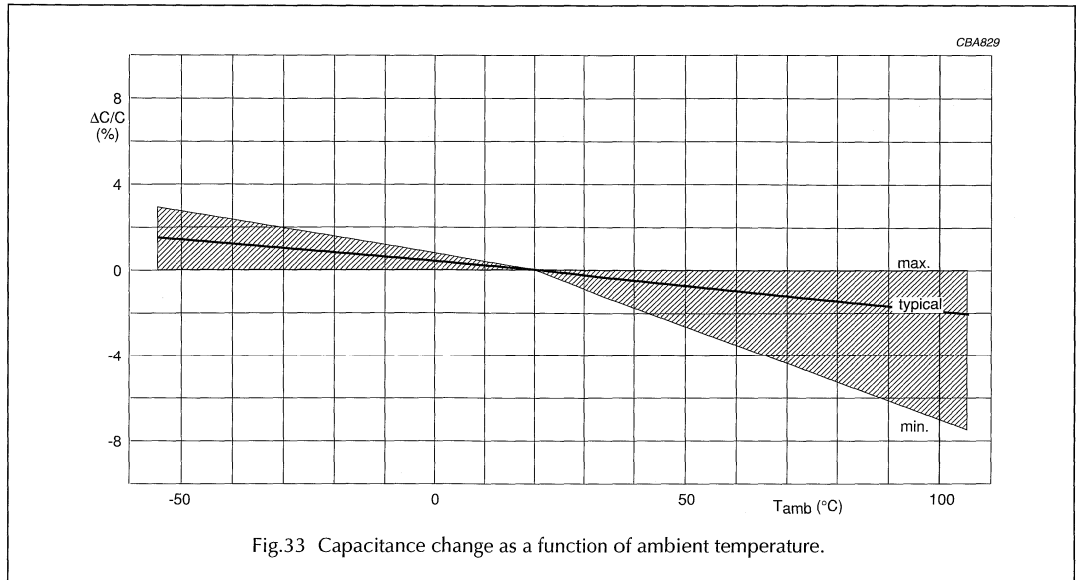
For reference testing, a conditioning period shall be applied over 96 ± 4 hours by heating the products in a circulating air oven at the rated temperature and a relative humidity not exceeding 20%.

AC and pulse metallized polypropylene film capacitors

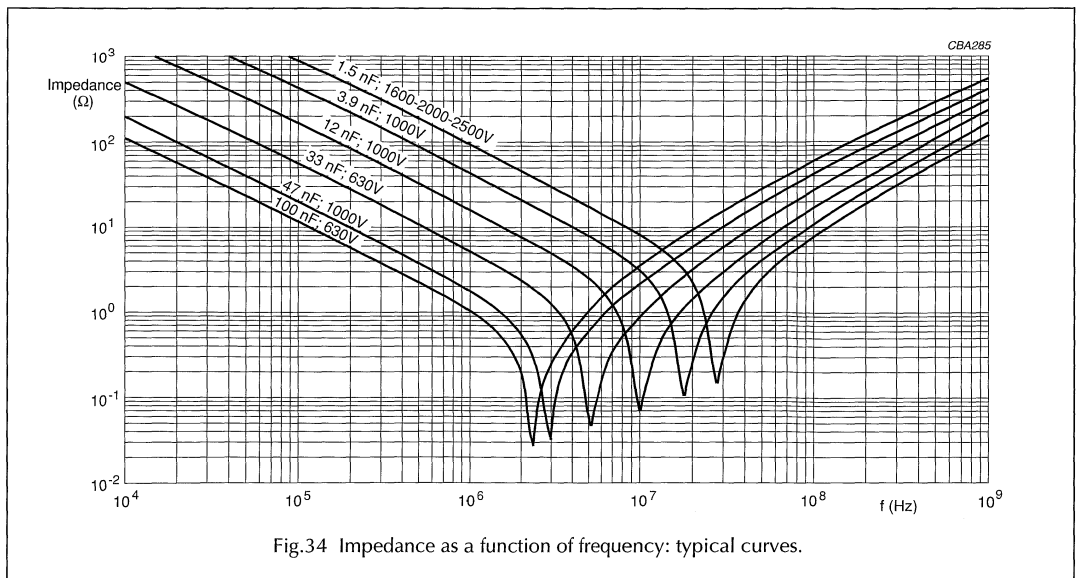
KP/MKP 375

CHARACTERISTICS

Capacitance



Impedance



AC and pulse metallized polypropylene film capacitors

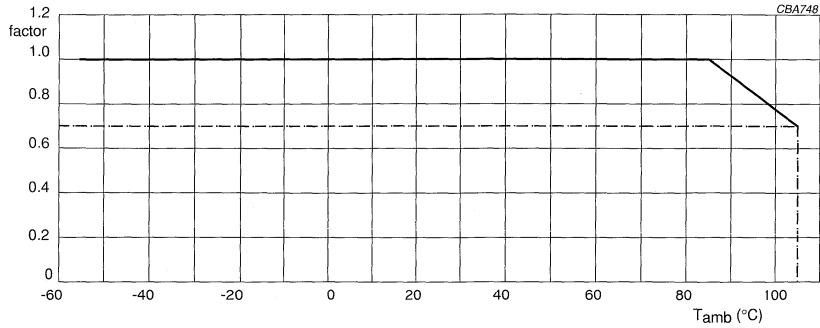
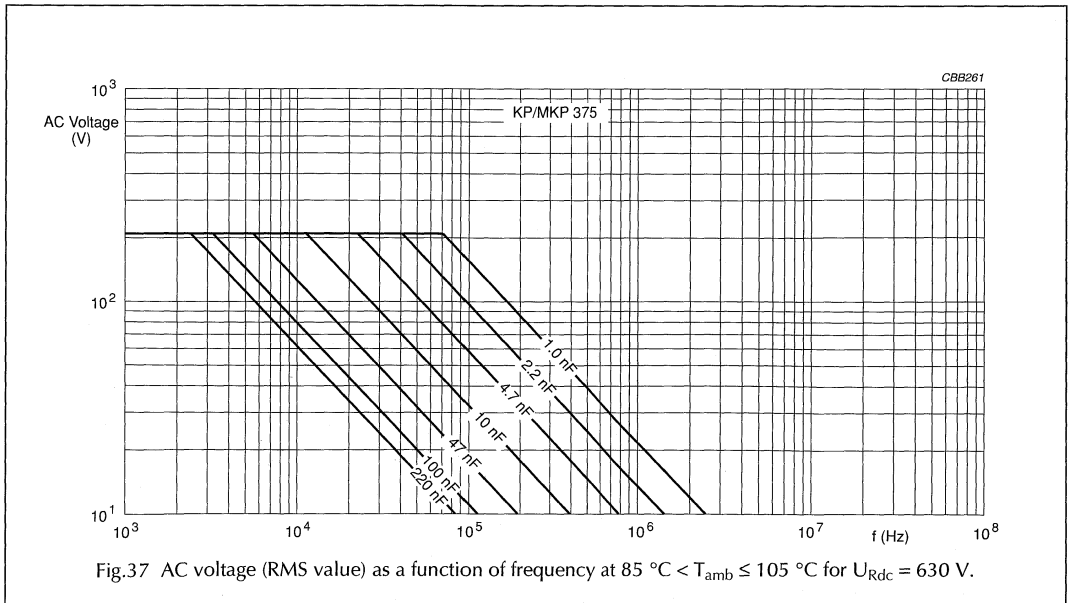
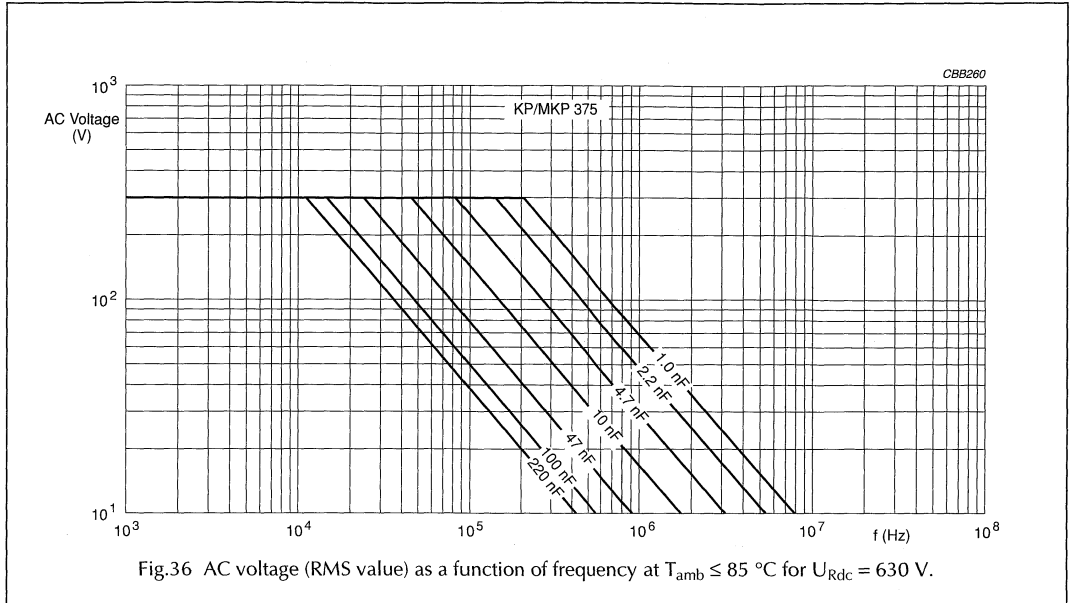
KP/MKP 375**Maximum DC voltage as a function of temperature**

Fig.35 Multiplying factor as a function of temperature.

AC and pulse metallized polypropylene film capacitors

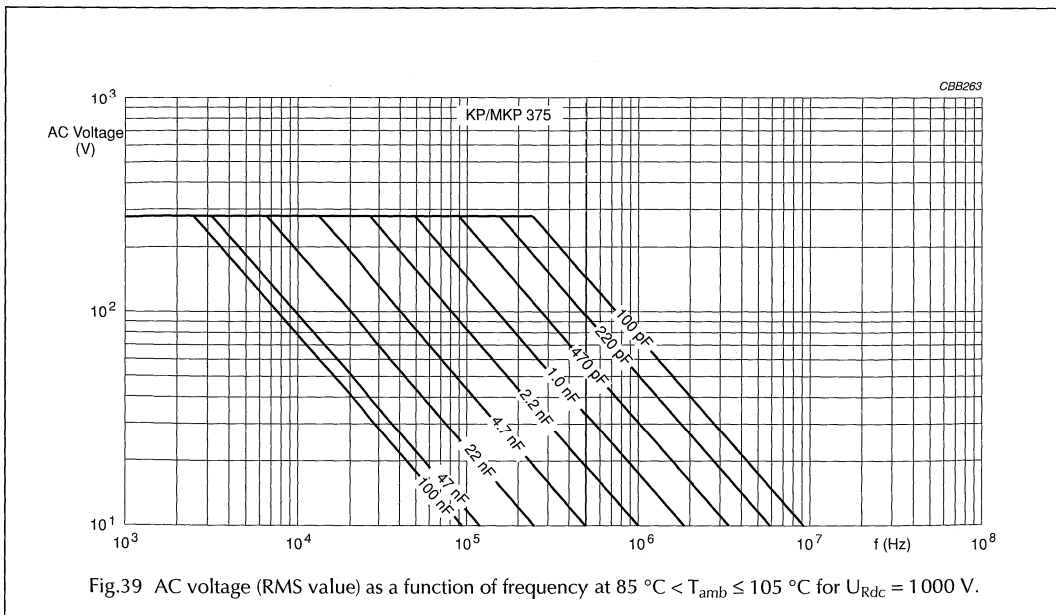
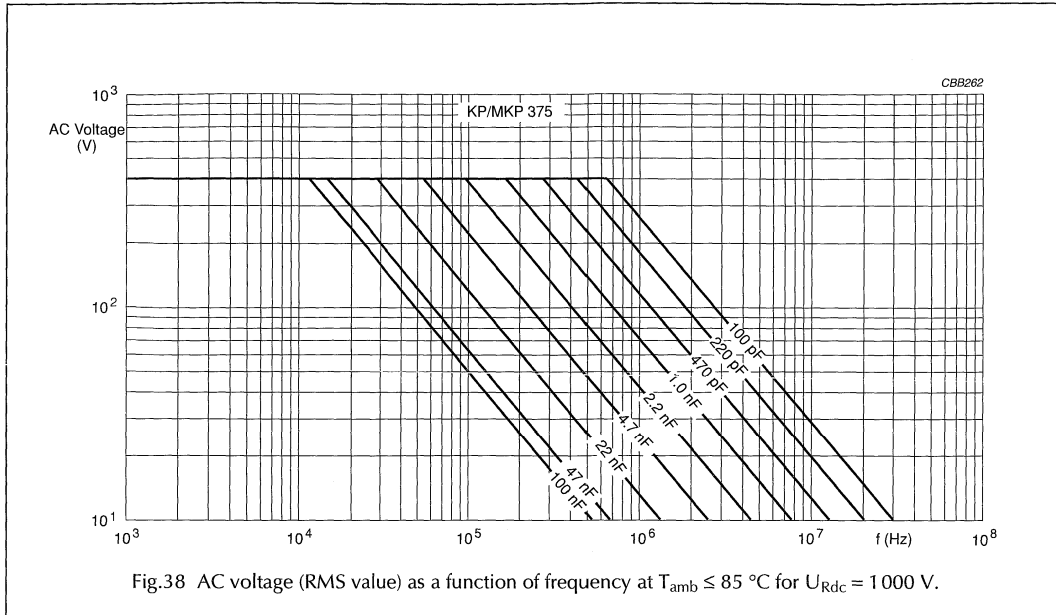
KP/MKP 375

Maximum RMS voltage (sinewave) as a function of frequency



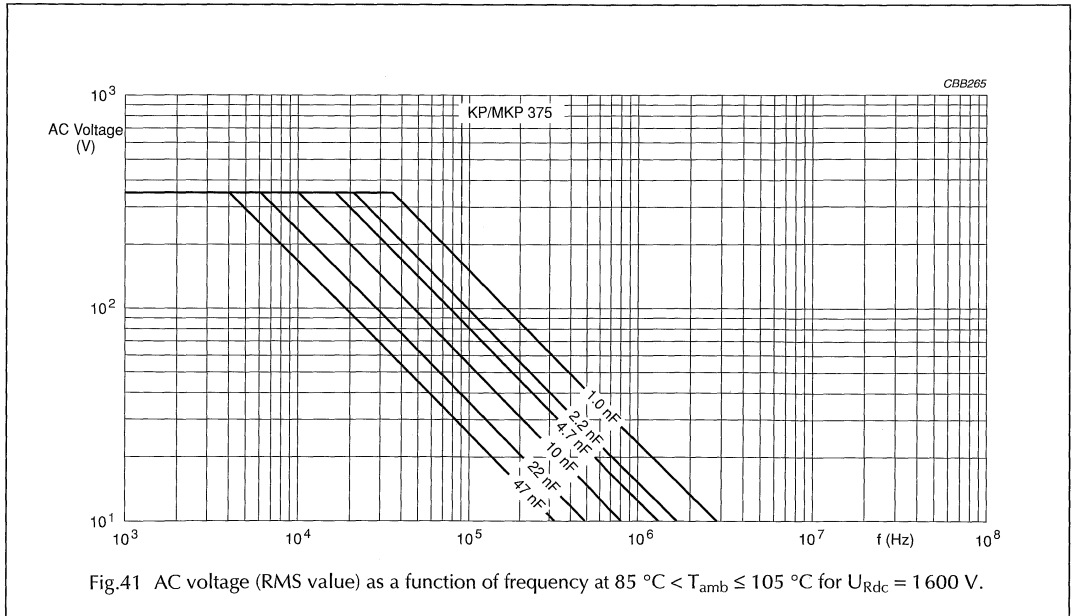
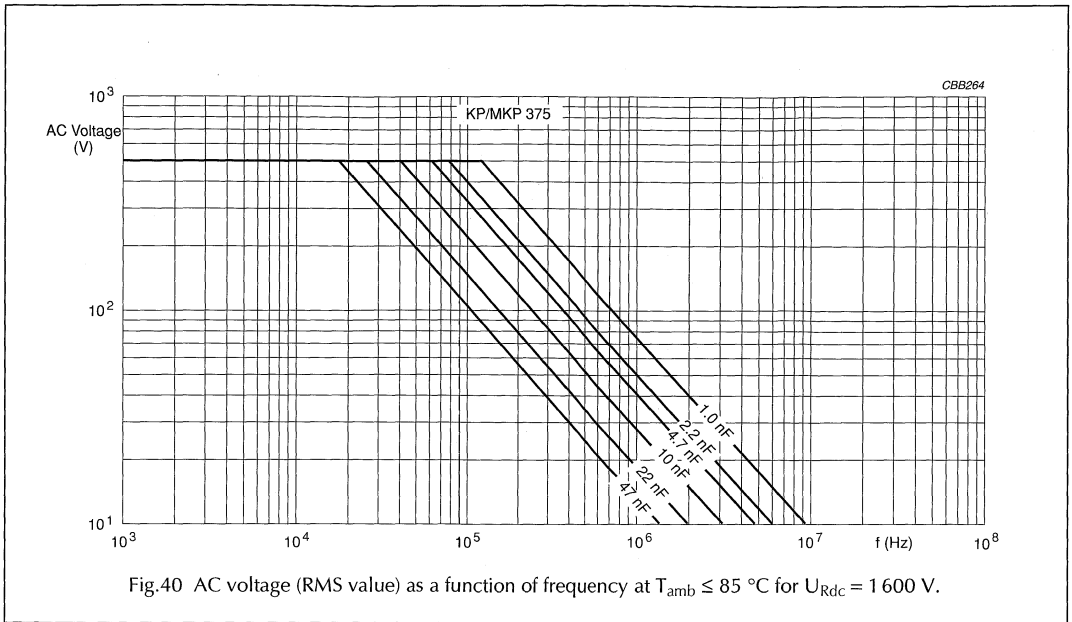
AC and pulse metallized polypropylene film capacitors

KP/MKP 375



AC and pulse metallized polypropylene film capacitors

KP/MKP 375



**AC and pulse
metallized polypropylene film capacitors**

**KP/MKP 375
monitor**

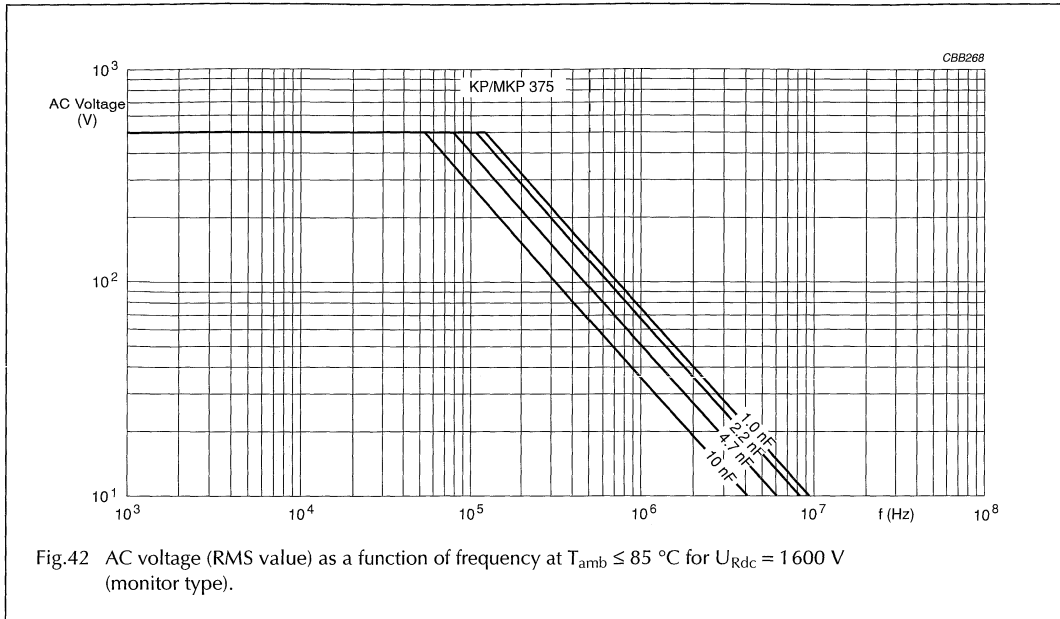


Fig.42 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85 \text{ }^\circ\text{C}$ for $U_{Rdc} = 1600 \text{ V}$ (monitor type).

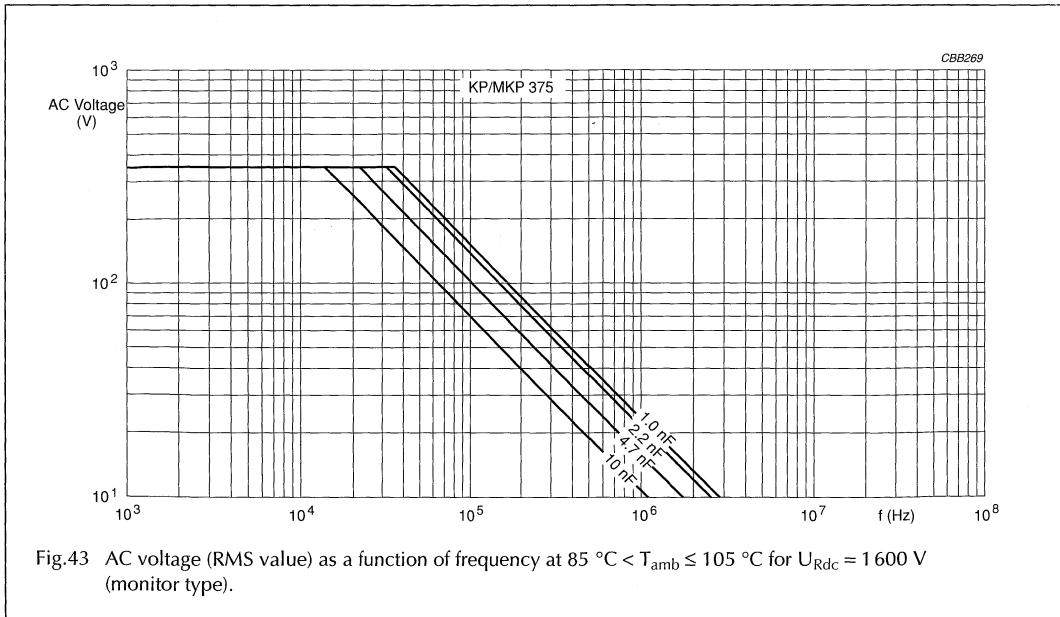
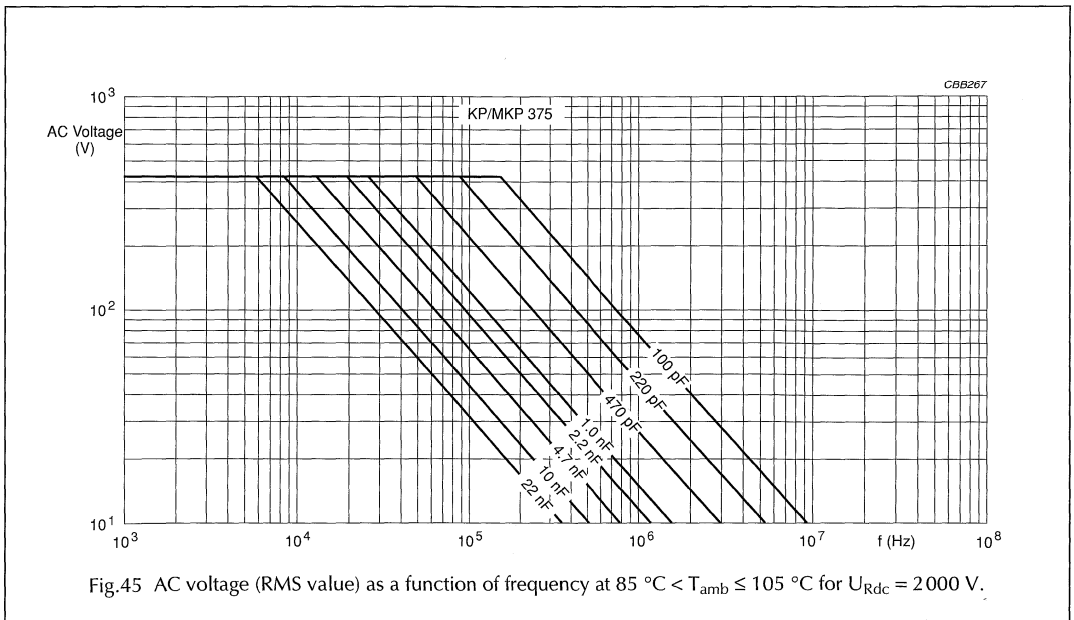
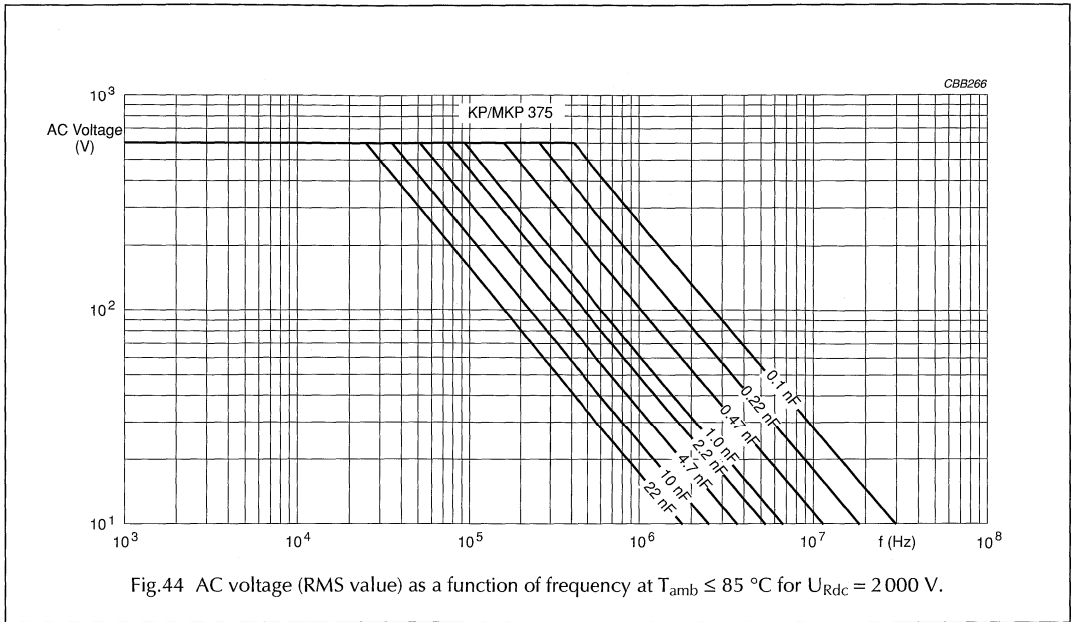


Fig.43 AC voltage (RMS value) as a function of frequency at $85 \text{ }^\circ\text{C} < T_{amb} \leq 105 \text{ }^\circ\text{C}$ for $U_{Rdc} = 1600 \text{ V}$ (monitor type).

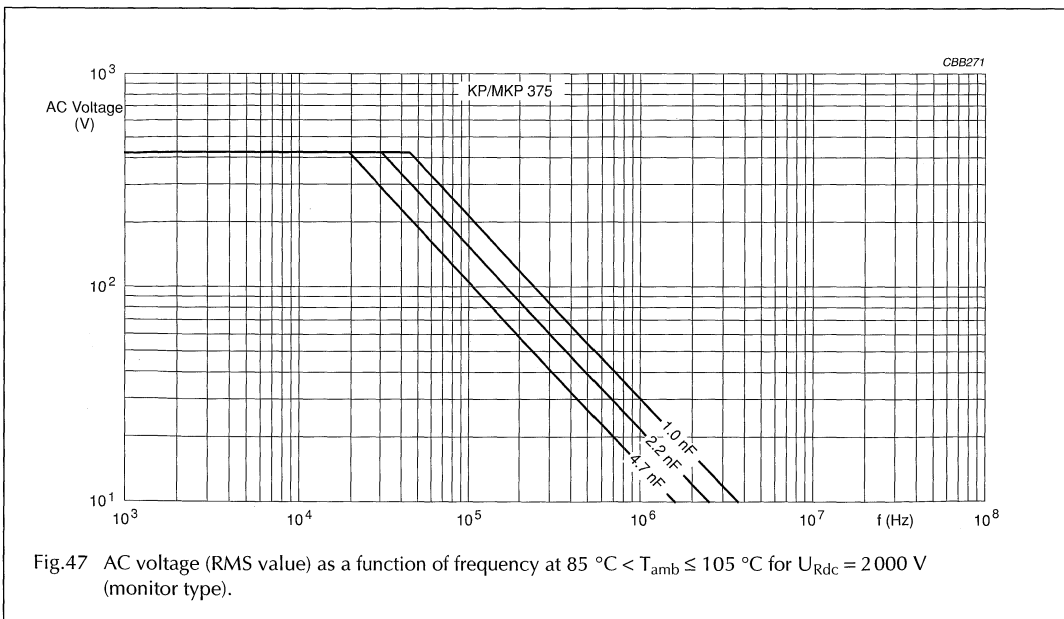
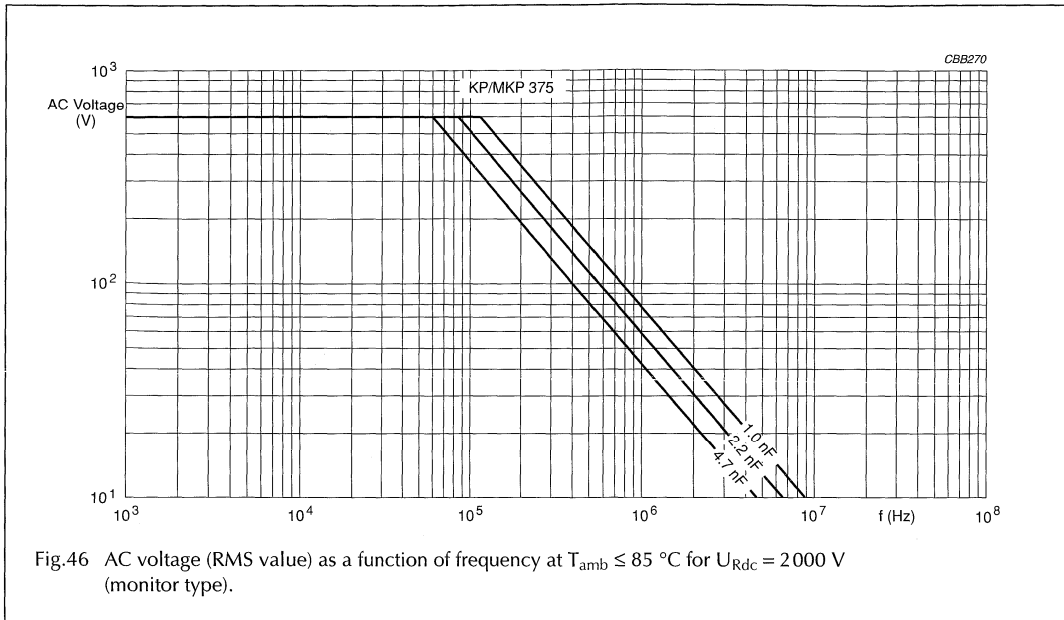
AC and pulse metallized polypropylene film capacitors

KP/MKP 375



**AC and pulse
metallized polypropylene film capacitors**

**KP/MKP 375
monitor**



**AC and pulse
metallized polypropylene film capacitors**

**KP/MKP 375
monitor**

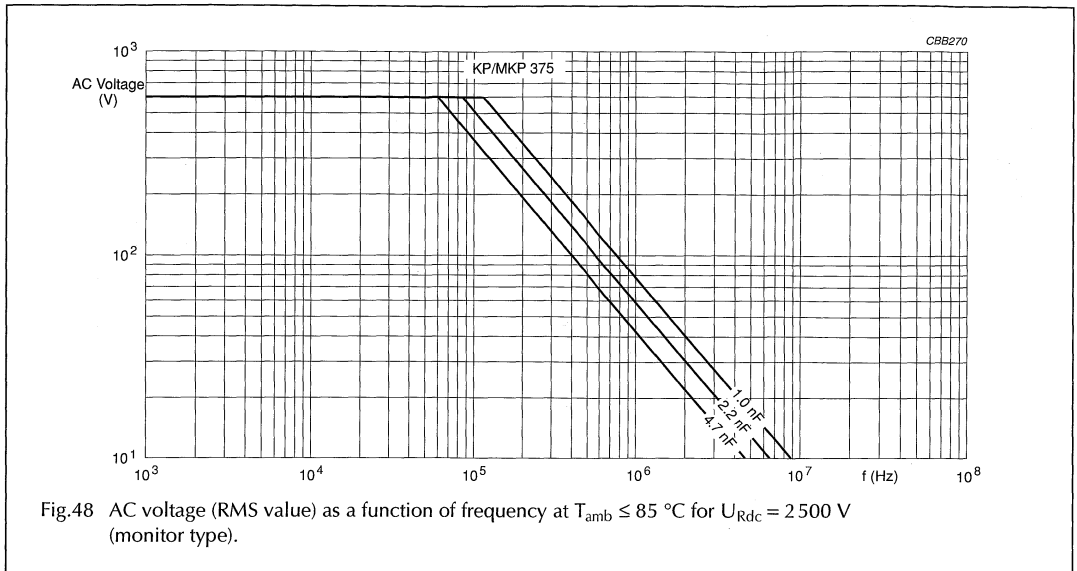


Fig.48 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85 \text{ }^\circ\text{C}$ for $U_{Rdc} = 2500 \text{ V}$ (monitor type).

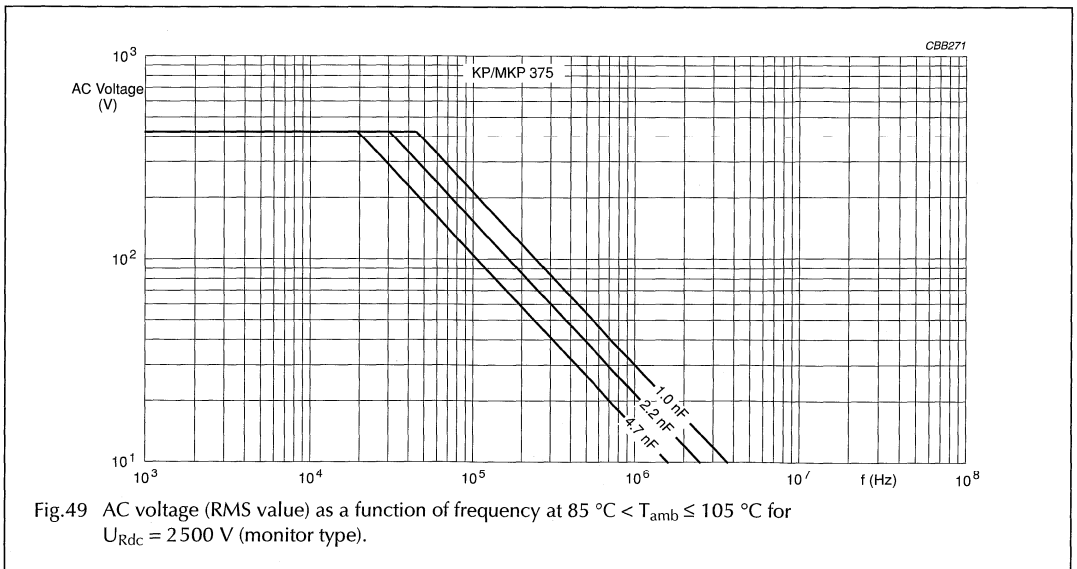


Fig.49 AC voltage (RMS value) as a function of frequency at $85 \text{ }^\circ\text{C} < T_{amb} \leq 105 \text{ }^\circ\text{C}$ for $U_{Rdc} = 2500 \text{ V}$ (monitor type).

Maximum RMS current (sinewave) as a function of frequency

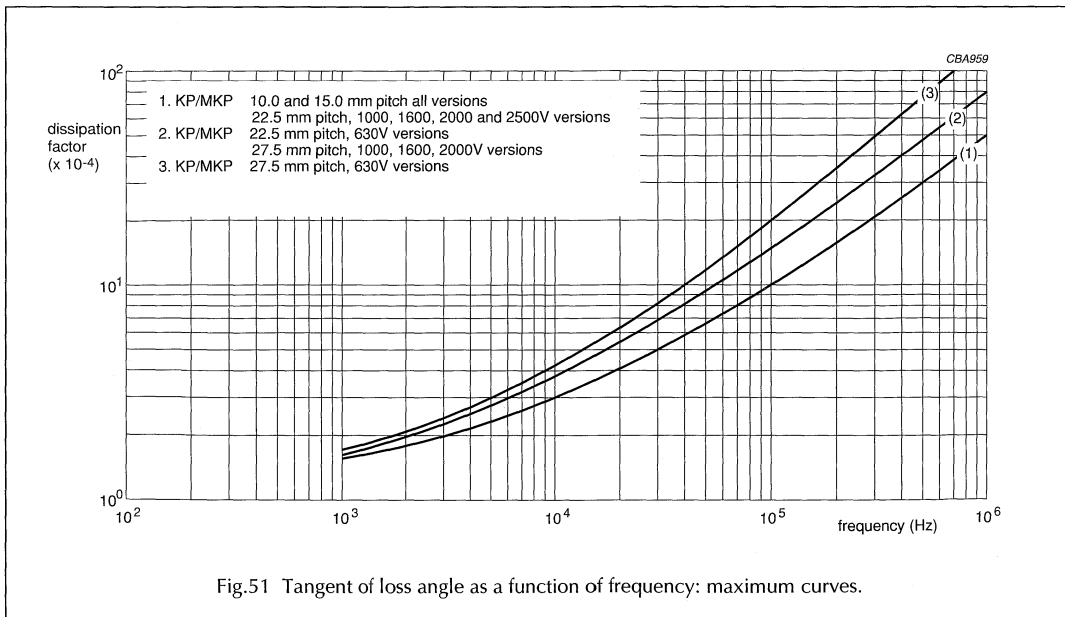
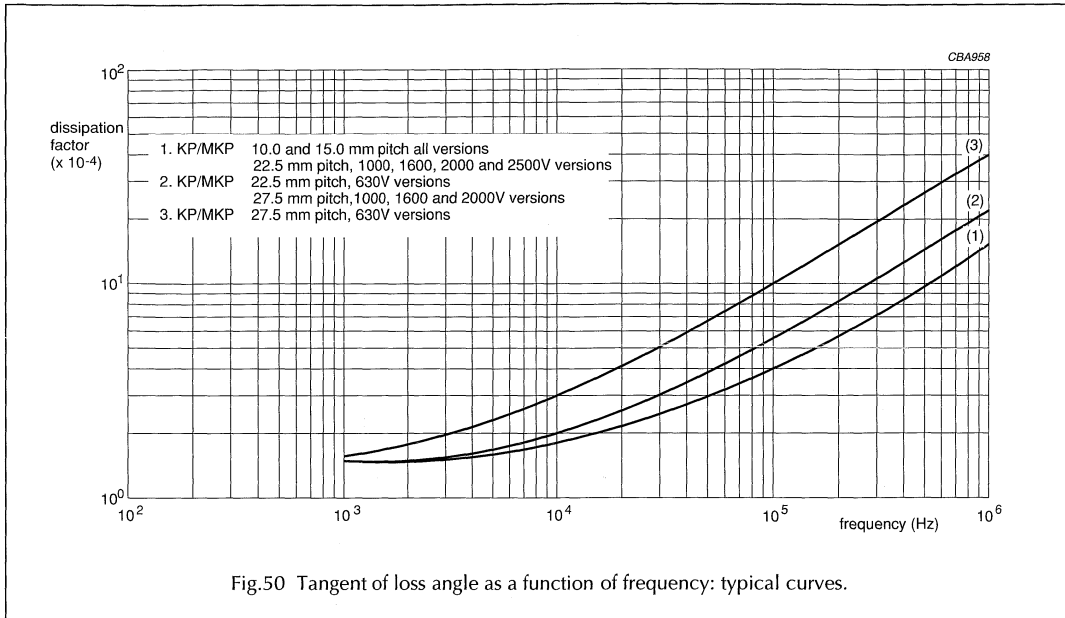
The maximum RMS current is defined by $I_{ac} = \omega \times C \times U_{ac}$.

U_{ac} is the maximum AC voltage depending on the ambient temperature in Figs 36 to 49.

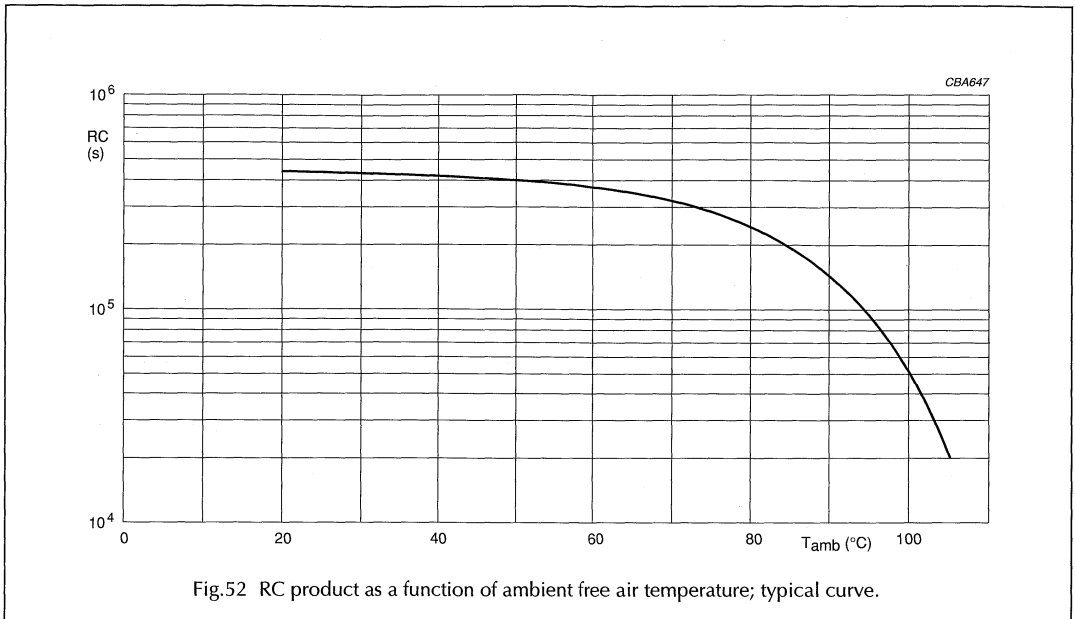
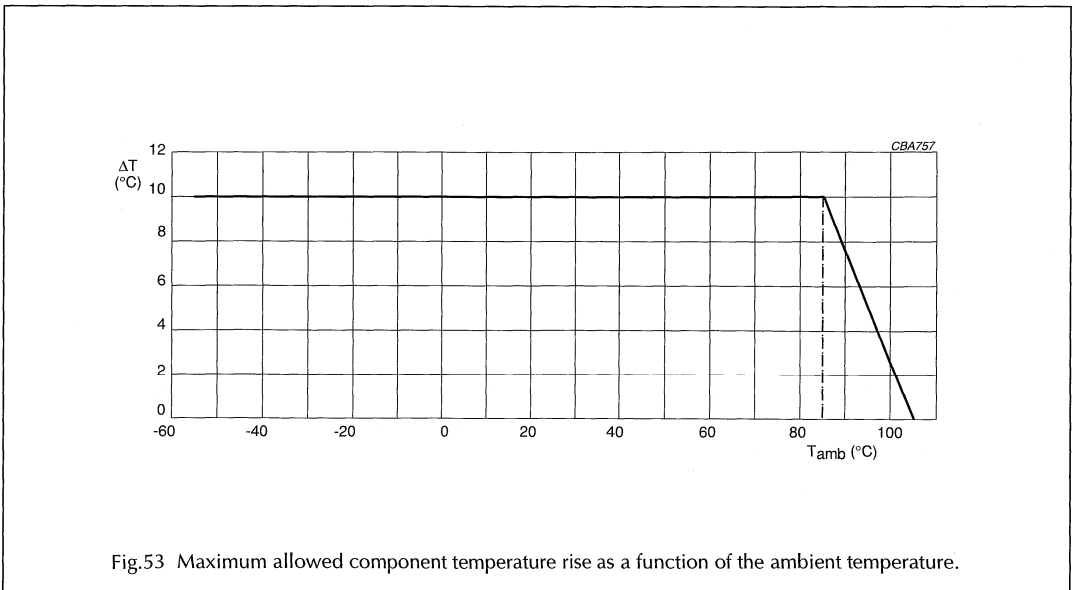
**AC and pulse
metallized polypropylene film capacitors**

**KP/MKP 375
monitor**

Tangent of loss angle



AC and pulse metallized polypropylene film capacitors

KP/MKP 375**Insulation resistance****Maximum allowed component temperature rise (ΔT) as a function of the ambient temperature (T_{amb})**

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

Heat conductivity (G) as a function of pitch and capacitor body thickness in mW/°C

Table 1 Heat conductivity

b _{max} (mm)	ORIGINAL PITCH (mm)			
	10	15	22.5	27.5
4.0	4.0	5.0	–	–
4.5	4.5	6.0	–	–
5.0	5.0	6.0	12.0	13.0
5.5	6.0	6.5	13.0	15.0
6.0	6.0	6.5	13.0	15.0
6.5	6.5	8.0	15.0	17.0
7.0	–	8.0	15.0	17.0
7.5	–	9.0	17.0	18.0
8.0	–	9.0	17.0	20.0
8.5	–	11.0	18.0	20.0
9.0	–	11.0	18.0	22.0
9.5	–	12.0	20.0	22.0
10.0	–	12.0	20.0	23.0
10.5	–	–	22.0	25.0
11.0	–	–	22.0	25.0
11.5	–	–	23.0	27.0
12.0	–	–	–	27.0
12.5	–	–	–	30.0
13.0	–	–	–	30.0
13.5	–	–	–	30.0
14.0	–	–	–	30.0
14.5	–	–	–	33.0
15.0	–	–	–	33.0
15.5	–	–	–	37.0
16.0	–	–	–	37.0

Power dissipation and maximum component temperature rise

The power dissipation must be limited in order not to exceed the maximum allowed component temperature rise as a function of the free air ambient temperature.

The power dissipation can be calculated according chapter "Introduction", section "Maximum power dissipation".

The component temperature rise (ΔT) can be measured (see section "Measuring the component temperature" for more details) or calculated by $\Delta T = P/G$:

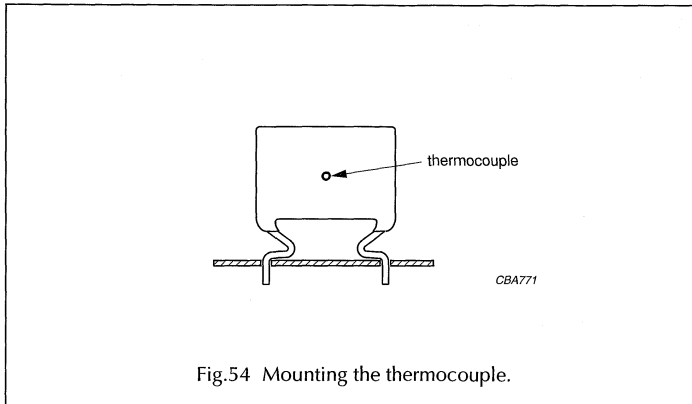
- ΔT = component temperature rise (°C).
- P = power dissipation of the component (mW).
- G = heat conductivity of the component (mW/°C).

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

Measuring the component temperature

A thermocouple must be attached to the capacitor body; see Fig.54.



The temperature is measured in unloaded (T_{amb}) and maximum loaded condition (T_c).

The temperature rise is given by: $\Delta T = T_c - T_{amb}$.

To avoid radiation or convection, the capacitor should be tested in a wind-free box.

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

Application note and limiting conditions

To select the capacitor for a certain application, the following 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 the maximum U_{p-p} to avoid the ionisation inception level.
3. The voltage pulse slope (dU/dt) shall not exceed the rated voltage pulse slope in an RC-circuit at rated voltage and without ringing. If the pulse voltage is lower than the rated DC voltage, the rated voltage pulse slope may be multiplied by U_{Rdc} and divided by the applied voltage.

For all other pulses following equation must be fulfilled:

$$2 \times \int_0^T \left(\frac{dU}{dt} \right)^2 \times dt < U_{Rdc} \times \left(\frac{dU}{dt} \right)_{rated}$$

T is the pulse duration.

4. The maximum component surface temperature rise must be lower than the limits in Fig.53.

Example

$C = 10 \text{ nF} - 1600 \text{ V, KP/MKP}$.

This is a signal as in Fig.55 with:

$$U_{p-p} = 1200 \text{ V}; U_p = 1100 \text{ V}; T_1 = 12 \text{ } \mu\text{s}; T_2 = 64 \text{ } \mu\text{s}.$$

The ambient temperature is $50 \text{ }^\circ\text{C}$

Checking the conditions:

1. The peak voltage $U_p = 1100 \text{ V}$ is lower than 1600 V (DC).
2. The peak-to-peak voltage 1200 V is lower than $2 \times \sqrt{2} \times 500 \text{ V(AC)} = 1414 U_{p-p}$.
3. The voltage pulse slope: $320 \text{ V}/\mu\text{s}$ is much lower than $7000 \text{ V}/\mu\text{s}$.
4. The dissipated power is 170 mW as calculated with Fourier terms.

This gives a temperature rise of $\frac{170 \text{ mW}}{17 \text{ mW}/^\circ\text{C}} = 10 \text{ }^\circ\text{C}$ which is permitted for an ambient temperature of $50 \text{ }^\circ\text{C}$; see Fig.53.

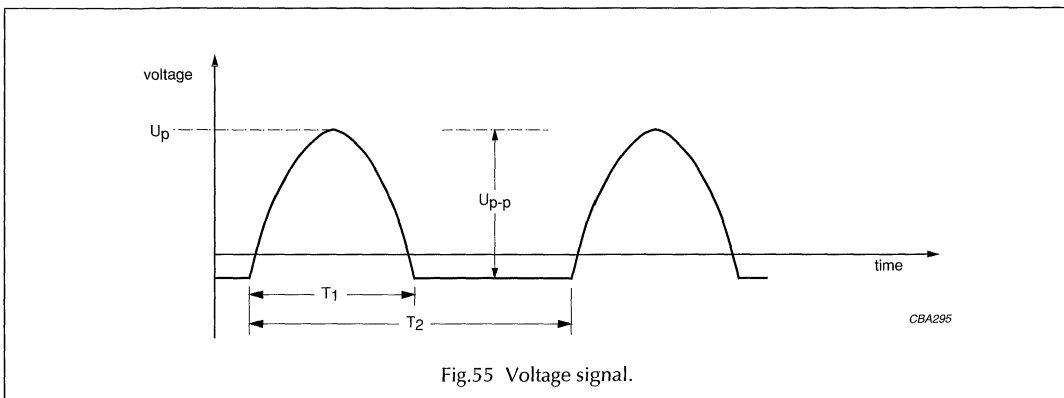


Fig.55 Voltage signal.

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

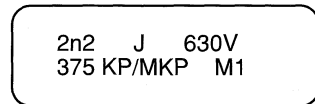
MARKING

Product marking

COUNTRY OF ORIGIN: BELGIUM (INK PRINT)

The capacitors are marked on the top
(see Figs. 56 to 58) with the following information:

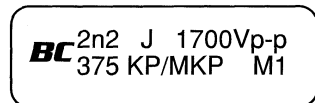
1. Capacitance code in accordance with "IEC 60062"
2. Capacitance tolerance: J = $\pm 5\%$; A = 3.5%
3. Types:
 4. 1. Rated d.c. voltage for 630 V and 1000 V:
original pitch = 10 mm normal types (e.g. 630V)
 2. rated peak-to-peak voltage for 630 V; 1000 V;
1600 V; 2000 V and 2500 V: original
pitch > 10 mm normal types (e.g. 1700 Vp-p)
 3. Rated d.c. voltage for 1600 V; 2000 V and
2500 V: original pitch ≥ 15 mm monitor types
(e.g. 1600 V)
4. Manufacturer's type designation (375)
5. Code for dielectric material (KP/MKP)
(see Figs. 56 and 57)
Code for monitor type: "□" if monitor types
(see Fig.58)
6. Manufacturer's emblem (only for original
pitch ≥ 15 mm)
7. Year and month of manufacturing code (only for
original pitch ≥ 22.5 mm).



2n2 J 630V
375 KP/MKP M1

CBB147

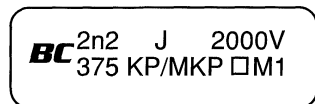
Fig.56 Example of marking for 630 V and 1000 V
original pitch = 10 mm standard types.



BC 2n2 J 1700Vp-p
375 KP/MKP M1

CBB076

Fig.57 Example of marking for 630 V; 1000 V;
1600 V; 2000 V and 2500V
original pitch ≥ 15 mm standard types.



BC 2n2 J 2000V
375 KP/MKP □M1

CBB222

Fig.58 Example of marking for 1600 V; 2000 V and
2500 V original pitch ≥ 15 mm monitor
types.

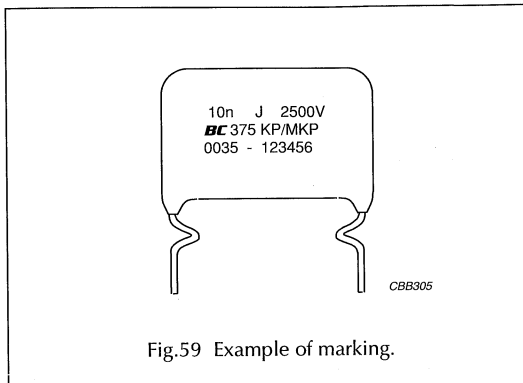
AC and pulse metallized polypropylene film capacitors

KP/MKP 375

COUNTRY OF ORIGIN: BELGIUM (LASER PRINT ONLY FOR PITCH ≥ 15 MM)

The capacitors are marked on the side (see Fig.59) with the following information by laser printing:

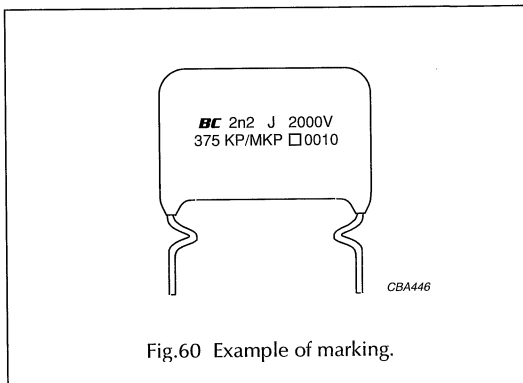
1. Capacitance code in accordance with "IEC 60062"
2. Capacitance tolerance: J = $\pm 5\%$; A = 3.5%
3. Rated d.c. voltage (e.g. 2500V)
4. Manufacturer's emblem
5. Manufacturer's type designation (375)
6. Code for dielectric material (KP/MKP)
7. Year and week of manufacturing code - batch code.



COUNTRY OF ORIGIN: PRC (PEOPLE'S REPUBLIC OF CHINA)

The capacitors are marked in ink on the front (see Fig.60) with the following information:

1. Manufacturer's emblem (BC)
2. Capacitance code in accordance with "IEC 60062"
3. Capacitance tolerance: J = $\pm 5\%$; A = 3.5%
4. Rated d.c. voltage (e.g. 2000V)
5. Manufacturer's type designation (375)
Code for monitor type: "□" if monitor types
6. Code for dielectric material (KP/MKP)
7. Year and week of manufacture code - batch code).



AC and pulse metallized polypropylene film capacitors

KP/MKP 375

QUICK REFERENCE TEST REQUIREMENTS

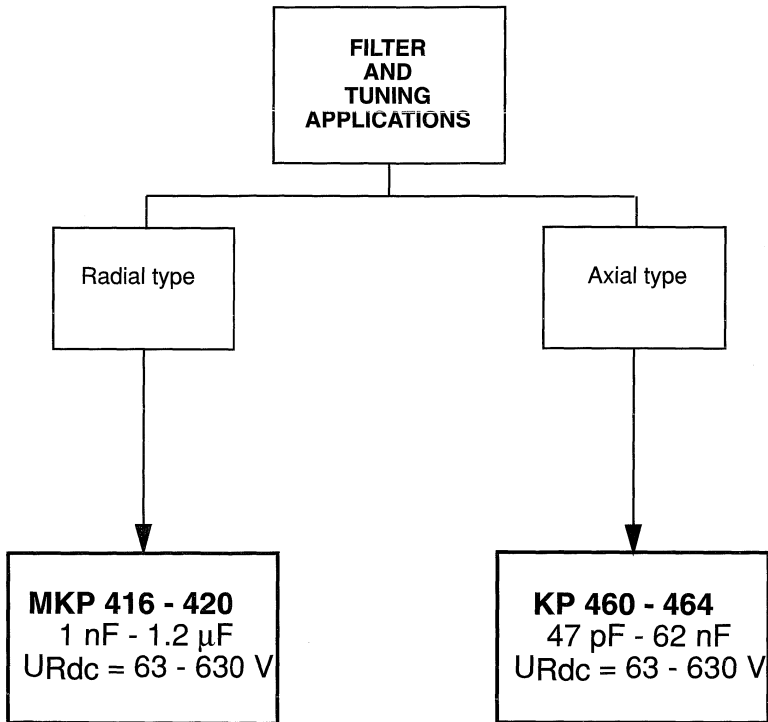
TEST	PROCEDURE (quick reference)	REQUIREMENTS
Robustness of leads		
Tensile strength: "IEC 60068-2-21"	load 10 N; 10 s	no visible damage legible marking $ \Delta C/C \leq 1\% + 5 \text{ pF}$ $\Delta \tan \delta \leq 5 \times 10^{-4}$
Bending: "IEC 60068-2-21"	load 5 N; $4 \times 90^\circ$	
Resistance to soldering heat: "IEC 60068-2-20"	solder bath: 260 °C; 10 s	
Component solvent resistance	isopropyl alcohol; 23 °C; 5 minutes	
Robustness of component		
Vibration: "IEC 60068-2-6"	10 to 55 Hz; amplitude 0.75 mm or acceleration 98 m/s ² ; 6 hours	$ \Delta C/C \leq 2\%$ (C > 0.0056 μF) $ \Delta C/C \leq 3\% + 5 \text{ pF}$ (C ≤ 0.0056 μF) $\Delta \tan \delta \leq 5 \times 10^{-4}$
Shock: "IEC 60068-2-27"	half sinewave; 490 m/s ² ; 11 ms	
Climatic sequence		
Dry heat: "IEC 60068-2-2"	16 hours; 105 °C	$ \Delta C/C \leq 3\% + 5 \text{ pF}$ $\Delta \tan \delta \leq 10 \times 10^{-4}$ $R_{\text{ins}} \geq 50\%$ of specified value
Damp heat, cyclic, test Db, first cycle: "IEC 60068-2-30"		
Cold: "IEC 60068-2-1"	2 hours; -55 °C	
Damp heat, cyclic, test Db, remaining cycles: "IEC 60068-2-30"		
Other applicable tests		
Damp heat, steady state: "IEC 60068-2-3"	56 days; 40 °C; 90 to 95% RH	$ \Delta C/C \leq 1\% + 5 \text{ pF}$ $\Delta \tan \delta \leq 5 \times 10^{-4}$ $R_{\text{ins}} \geq 50\%$ of specified value
Endurance (AC): "IEC 60384-17"	2000 hours; $1.25 \times U_{\text{Rac}}$ (RMS); 50 Hz; 85°C	$ \Delta C/C \leq 2\%$ (C > 0.0056 μF) $ \Delta C/C \leq 3\% + 5 \text{ pF}$ (C ≤ 0.0056 μF) $\Delta \tan \delta \leq 10 \times 10^{-4}$ $R_{\text{ins}} \geq 50\%$ of specified value
	2000 hours; $0.875 \times U_{\text{Rac}}$ (RMS); 50 Hz; 105°C	$ \Delta C/C \leq 5\% + 5 \text{ pF}$ $\Delta \tan \delta \leq 10 \times 10^{-4}$ $R_{\text{ins}} \geq 50\%$ of specified value
Heat storage: "IEC 60384-17"	2000 hours; 105 °C	$ \Delta C/C \leq 3\%$ (C > 0.0056 μF) $ \Delta C/C \leq 5\% + 5 \text{ pF}$ (C ≤ 0.0056 μF) $\Delta \tan \delta \leq 10 \times 10^{-4}$

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

TEST	PROCEDURE (quick reference)	REQUIREMENTS
Resistance to soldering heat with preheating: "IEC 60384-17"	body temperature: 105 °C; bath temperature: 260 °C; dwell time: 10 s	$ \Delta C/C \leq 2\% + 5 \text{ pF}$ $\Delta \tan \delta \leq 5 \times 10^{-4}$
Passive flammability: "IEC 60384-1"	class C	no burning
Endurance (DC): "IEC 60384-17"	2000 hours: $1.25 \times U_{Rdc}$; 85 °C $0.875 \times U_{Rdc}$; 105 °C	$ \Delta C/C \leq 3\% + 5 \text{ pF}$ $\Delta \tan \delta \leq 10 \times 10^{-4}$ $R_{ins} \geq 50\%$ of specified value

PRECISION CAPACITORS



CBB331

Metallized polypropylene filter capacitors

MKP 416 to 420

MKP RADIAL POTTED TYPE

PITCH 5/10/15 mm

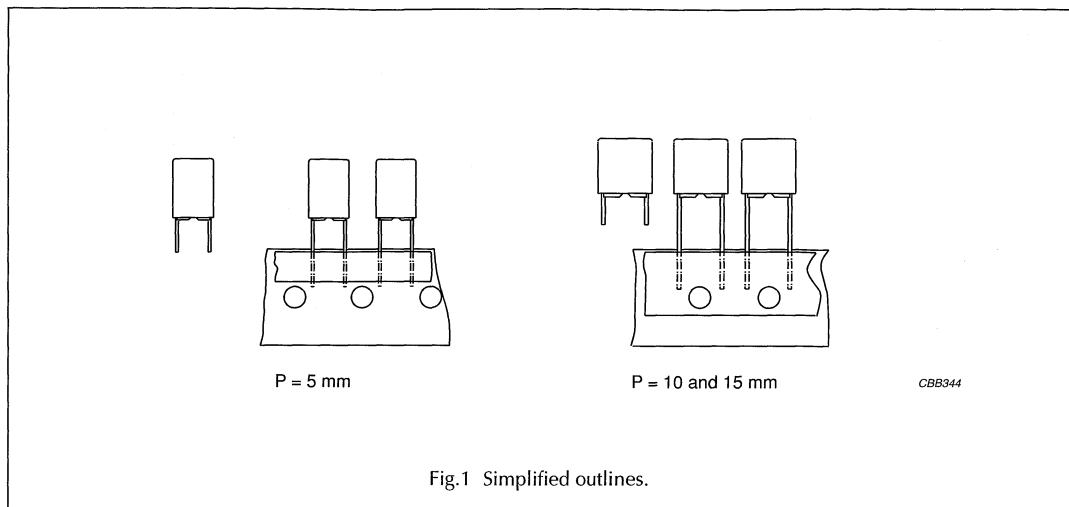


Fig.1 Simplified outlines.

FEATURES

- 5, 10 and 15 mm lead pitch
- Supplied loose in box, in ammpack and taped on reel.
- Intermediate values are available of the E96 series.

APPLICATIONS

- Low losses due to low contact resistance and low loss dielectric result in applications where high frequency occur or high stability is preferred
- Their small dimensions make them suitable for circuits with high packaging density.

DETAIL SPECIFICATION

For more detailed data and test requirements see "Type detail specification HQN-384-16/101".

QUICK REFERENCE DATA

DESCRIPTION	VALUE
Capacitance range (E24 series)	0.001 to 1.2 μ F
Capacitance tolerance	$\pm 5\%$; $\pm 2\%$
Rated (DC) voltage	63 V; 160 V; 250 V; 400 V; 630 V
Rated (AC) voltage	25 V; 63 V; 100 V; 125 V; 160 V
Rated peak-to-peak voltage	70 V; 180 V; 280 V; 350 V; 450 V
Climatic category	55/085/56
Rated temperature (DC)	85 $^{\circ}$ C
Rated temperature (AC)	85 $^{\circ}$ C
Maximum application temperature	85 $^{\circ}$ C
Reference specification	IEC 60384-16
Performance grade	grade 1 (long life)
Stability grade	grade 1
Materials	qualified in accordance with UL94 V-0

Metallized polypropylene filter capacitors

MKP 416 to 420

COMPOSITION OF CATALOGUE NUMBER

TYPE AND PITCHES	
416	5.0/10.0/15.0 mm
417	5.0/10.0/15.0 mm

MULTIPLIER (nF)	
0.01	2
0.1	3
1	4

CAPACITANCE (numerically)

Example:
1004 = 100 × 1 = 100 nF

2222 4.. X XXX X

TYPE	PACKAGING	LEAD CONFIGURATION	PREFERRED TYPES		
			C-TOL	63 V	160 V
416	Taped		±2%	1	
	Loose in box	lead length 3.5 mm	±2%	7	
417	Taped		±2%		1
	Loose in box	lead length 3.5 mm	±2%		7
ON REQUEST					
416	Taped		±5%	0	
	Loose in box	lead length 4.0 mm	±5%	3	
		lead length 3.5 mm	±2%	4	
417	Taped		±5%		0
	Loose in box	lead length 4.0 mm	±5%		3
		lead length 3.5 mm	±2%		4
		lead length 3.5 mm	±5%		6

Metallized polypropylene filter capacitors

TYPE AND PITCHES	
418	5.0/10.0/15.0 mm
419	5.0/10.0/15.0 mm
420	5.0/10.0/15.0 mm

MULTIPLIER (nF)	
0.01	2
0.1	3
1	4

CAPACITANCE
(numerically)

Example:
1004 = 100 x 1 = 100 nF

2222 4.. X XXX X

TYPE	PACKAGING	LEAD CONFIGURATION	PREFERRED TYPES			
			C-TOL	250 V	400 V	630 V
418	Taped		±2%	1		
	Loose in box	lead length 3.5 mm	±2%	7		
419	Taped		±2%		1	
	Loose in box	lead length 3.5 mm	±2%		7	
420	Taped		±2%			1
	Loose in box	lead length 3.5 mm	±2%			7
			ON REQUEST			
418	Taped		±5%	0		
			±5%	3		
	Loose in box	lead length 4.0 mm	±2%	4		
		lead length 3.5 mm	±5%	6		
419	Taped		±5%		0	
			±5%		3	
	Loose in box	lead length 4.0 mm	±2%		4	
		lead length 3.5 mm	±5%		6	
420	Taped		±5%			0
			±5%			3
	Loose in box	lead length 4.0 mm	±2%			4
		lead length 3.5 mm	±5%			6

Metallized polypropylene filter capacitors

MKP 416

MKP 416 GENERAL DATA

PITCH 5/10 mm

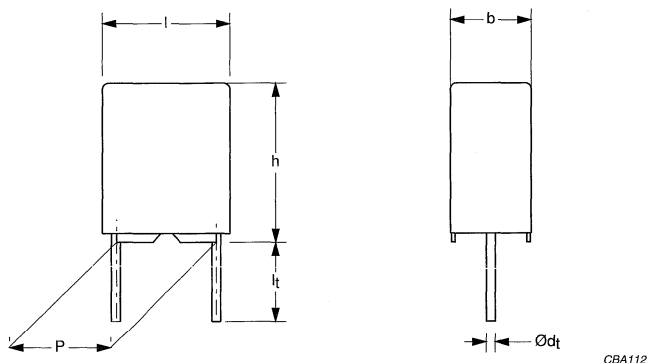


Fig.4 Outline.

Specific reference data for the 63 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
$C \leq 0.11 \mu\text{F}$	$\leq 5 \times 10^{-4}$	$\leq 25 \times 10^{-4}$
$0.11 \mu\text{F} < C \leq 0.18 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 30 \times 10^{-4}$
$0.18 \mu\text{F} < C \leq 0.27 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 35 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 63 V (DC):		
$P = 5 \text{ mm}$	50 V/ μs	
$P = 10 \text{ mm}$	20 V/ μs	
R between leads at 50 V; 1 minute	>100000 M Ω	
R between interconnected leads and case at 50 V; 1 minute	>100000 M Ω	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	100 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 63 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Ammopack	$H = 18.5 \text{ mm}; P_0 = 12.7 \text{ mm}$	$\pm 5\%$	2222 416 0....	on request
		$\pm 2\%$	2222 416 1....	preferred
Loose in box	$l_t = 4.0 + 1.0/-0.5 \text{ mm}$	$\pm 5\%$	2222 416 3....	on request
		$\pm 2\%$	2222 416 4....	on request

Metallized polypropylene filter capacitors**MKP 416** $U_{Rdc} = 63 \text{ V}$; $U_{Rac} = 25 \text{ V}$; $U_{p-p} = 70 \text{ V}$

C (E 24) (μF)	DIMENSIONS $b \times h \times l$ (mm)	MASS (g)	CATALOGUE NUMBER
			AMMOPACK
			H = 18.5 mm; P ₀ = 12.7 mm
			C-tol = $\pm 2\%$
Pitch = 5.0 \pm 0.3 mm; d_t = 0.50 \pm 0.05 mm			
0.036	4.5 \times 9.0 \times 7.2	0.45	2222 416 13603
0.039			2222 416 13903
0.043			2222 416 14303
0.047			2222 416 14703
0.051	6.0 \times 11.0 \times 7.2	0.60	2222 416 15103
0.056			2222 416 15603
0.062			2222 416 16203
0.068			2222 416 16803
0.075			2222 416 17503
0.082			2222 416 18203
0.091			2222 416 19103
0.1			2222 416 11004
0.11			2222 416 11104
0.12			2222 416 11204
Pitch = 10.0 \pm 0.4 mm; d_t = 0.60 \pm 0.06 mm			
0.13	5.0 \times 11.0 \times 12.5	0.85	2222 416 11304
0.15			2222 416 11504
0.16	6.0 \times 12.0 \times 12.5	1.10	2222 416 11604
0.18			2222 416 11804
0.20			2222 416 12004
0.22			2222 416 12204
0.24			2222 416 12404
0.27			2222 416 12704

Metallized polypropylene filter capacitors

MKP 416

MKP 416 GENERAL DATA

PITCH 15 mm

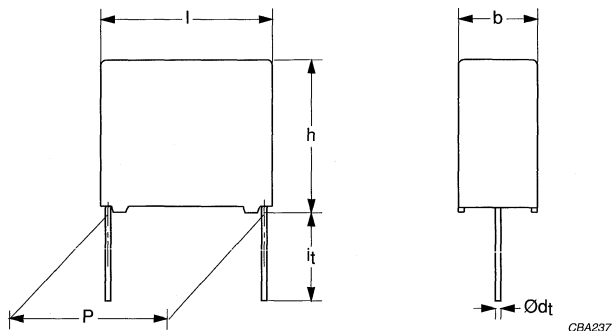


Fig.5 Outline.

Specific reference data for the 63 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
0.3 μF < C \leq 0.39 μF	$\leq 10 \times 10^{-4}$	$\leq 40 \times 10^{-4}$
0.39 μF < C \leq 0.56 μF	$\leq 10 \times 10^{-4}$	$\leq 45 \times 10^{-4}$
0.56 μF < C \leq 0.75 μF	$\leq 10 \times 10^{-4}$	$\leq 50 \times 10^{-4}$
0.75 μF < C \leq 1.1 μF	$\leq 10 \times 10^{-4}$	$\leq 35 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 63 V (DC)	50 V/ μs	
R between leads, for C \leq 0.33 μF at 50 V; 1 minute	>100000 M Ω	
RC between leads, for C > 0.33 μF at 50 V; 1 minute	>30000 s	
R between interconnected leads and case at 50 V; 1 minute	>100000 M Ω	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	100 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 63 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Taped on reel	H = 18.5 mm; P ₀ = 12.7 mm	$\pm 5\%$	2222 416 0....	on request
		$\pm 2\%$	2222 416 1....	preferred
Loose in box	l _t = 3.5 \pm 0.3 mm	$\pm 5\%$	2222 416 6....	on request
		$\pm 2\%$	2222 416 7....	preferred

Metallized polypropylene filter capacitors

MKP 416

 $U_{Rdc} = 63 \text{ V}$; $U_{Rac} = 25 \text{ V}$; $U_{p-p} = 70 \text{ V}$

C (E 24) (μF)	DIMENSIONS $b \times h \times l$ (mm)	MASS (g)	CATALOGUE NUMBER	
			REEL	LOOSE IN BOX
			$H = 18.5 \text{ mm}$; $P_0 = 12.7 \text{ mm}$	$l_1 = 3.5 \pm 0.3 \text{ mm}$
C-tol = $\pm 2\%$				
Pitch = $15.0 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$				
0.3	6.0 × 12.0 × 17.5	1.4	2222 416 13004	... 73004
0.33			2222 416 13304	... 73304
0.36			2222 416 13604	... 73604
0.39			2222 416 13904	... 73904
0.43	7.0 × 13.5 × 17.5	1.9	2222 416 14304	... 74304
0.47			2222 416 14704	... 74704
0.51			2222 416 15104	... 75104
0.56			2222 416 15604	... 75604
0.62	8.5 × 15.0 × 17.5	2.6	2222 416 16204	... 76204
0.68			2222 416 16804	... 76804
0.75			2222 416 17504	... 77504
0.82			2222 416 18204	... 78204
0.91	10.0 × 16.5 × 17.5	3.1	2222 416 19104	... 79104
1.0			2222 416 11005	... 71005
1.1			2222 416 11105	... 71105

Metallized polypropylene filter capacitors

MKP 417

MKP 417 GENERAL DATA

PITCH 5/10 mm

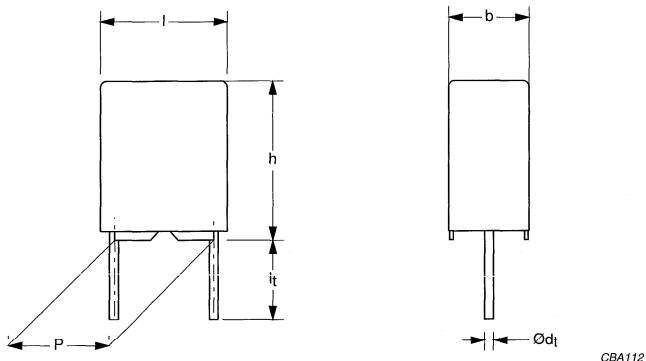


Fig.6 Outline.

Specific reference data for the 160 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
$C \leq 0.027 \mu\text{F}$	$\leq 5 \times 10^{-4}$	$\leq 15 \times 10^{-4}$
$0.027 \mu\text{F} < C \leq 0.075 \mu\text{F}$	$\leq 5 \times 10^{-4}$	$\leq 20 \times 10^{-4}$
$0.075 \mu\text{F} < C \leq 0.11 \mu\text{F}$	$\leq 5 \times 10^{-4}$	$\leq 25 \times 10^{-4}$
$0.11 \mu\text{F} < C \leq 0.18 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 30 \times 10^{-4}$
$0.18 \mu\text{F} < C \leq 0.24 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 35 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 160 V (DC):		
P = 5 mm	50 V/ μs	
P = 10 mm	20 V/ μs	
R between leads at 100 V; 1 minute	>100000 M Ω	
R between interconnected leads and case at 100 V; 1 minute	>100000 M Ω	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	260 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 160 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Ammopack	H = 18.5 mm; P ₀ = 12.7 mm	±5%	2222 417 0....	on request
		±2%	2222 417 1....	preferred
Loose in box	l _t = 4.0 +1.0/-0.5 mm	±5%	2222 417 3....	on request
		±2%	2222 417 4....	on request

Metallized polypropylene filter capacitors

MKP 417

 $U_{Rdc} = 160 \text{ V}$; $U_{Rac} = 63 \text{ V}$; $U_{p-p} = 180 \text{ V}$

C (E 24) (μF)	DIMENSIONS $b \times h \times l$ (mm)	MASS (g)	CATALOGUE NUMBER
			AMMOPACK
			H = 18.5 mm; P ₀ = 12.7 mm
			C-tol = $\pm 2\%$
Pitch = 5.0 \pm 0.3 mm; d_t = 0.50 \pm 0.05 mm			
0.024	4.5 \times 9.0 \times 7.2	0.45	2222 417 12403
0.027			2222 417 12703
0.03			2222 417 13003
0.033			2222 417 13303
0.036	6.0 \times 11.0 \times 7.2	0.60	2222 417 13603
0.039			2222 417 13903
0.043			2222 417 14303
0.047			2222 417 14703
0.051			2222 417 15103
0.056			2222 417 15603
0.062			2222 417 16203
0.068			2222 417 16803
Pitch = 10.0 \pm 0.4 mm; d_t = 0.60 \pm 0.06 mm			
0.075	4.0 \times 10.0 \times 12.5	0.60	2222 417 17503
0.082			2222 417 18203
0.091			2222 417 19103
0.1			2222 417 11004
0.11	5.0 \times 11.0 \times 12.5	0.85	2222 417 11104
0.12			2222 417 11204
0.13			2222 417 11304
0.15			2222 417 11504
0.16	6.0 \times 12.0 \times 12.5	1.10	2222 417 11604
0.18			2222 417 11804
0.20			2222 417 12004
0.22			2222 417 12204
0.24			2222 417 12404

Metallized polypropylene filter capacitors

MKP 417

MKP 417 GENERAL DATA

PITCH 15 mm

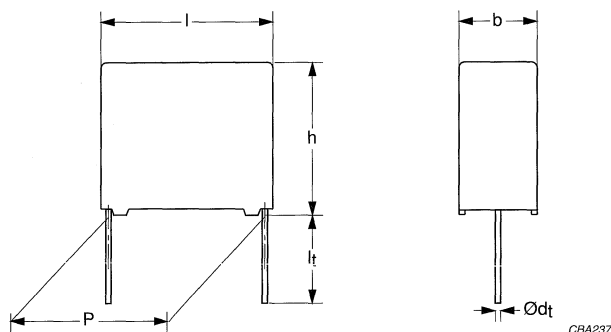


Fig.7 Outline.

Specific reference data for the 160 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
0.27 μF < C \leq 0.39 μF	$\leq 10 \times 10^{-4}$	$\leq 40 \times 10^{-4}$
0.39 μF < C \leq 0.56 μF	$\leq 10 \times 10^{-4}$	$\leq 45 \times 10^{-4}$
0.56 μF < C \leq 0.75 μF	$\leq 10 \times 10^{-4}$	$\leq 50 \times 10^{-4}$
0.75 μF < C \leq 1.1 μF	$\leq 10 \times 10^{-4}$	$\leq 60 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 160 V _(DC) :	50 V/ μs	
R between leads, for C \leq 0.33 μF at 100 V; 1 minute	>100000 M Ω	
RC between leads, for C > 0.33 μF at 100 V; 1 minute	>30000 s	
R between interconnected leads and case at 100 V; 1 minute	>100000 M Ω	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	260 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 160 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Taped on reel	H = 18.5 mm; P ₀ = 12.7 mm	$\pm 5\%$	2222 417 0....	on request
		$\pm 2\%$	2222 417 1....	preferred
Loose in box	l _t = 3.5 \pm 0.3 mm	$\pm 5\%$	2222 417 6....	on request
		$\pm 2\%$	2222 417 7....	preferred

Metallized polypropylene filter capacitors**MKP 417** $U_{Rdc} = 160 \text{ V}$; $U_{Rac} = 63 \text{ V}$; $U_{p-p} = 180 \text{ V}$

C (E 24) (μF)	DIMENSIONS $b \times h \times l$ (mm)	MASS (g)	CATALOGUE NUMBER	
			REEL	LOOSE IN BOX
			H = 18.5 mm; P ₀ = 12.7 mm	l _t = 3.5 ±0.3 mm
C-tol = ±2%				
Pitch = 15.0 ±0.4 mm; d_t = 0.80 ±0.08 mm				
0.27	5.0 × 11.0 × 17.5	1.2	2222 417 12704	... 72704
0.3	6.0 × 12.0 × 17.5	1.4	2222 417 13004	... 73004
0.33			2222 417 13304	... 73304
0.36			2222 417 13604	... 73604
0.39			2222 417 13904	... 73904
0.43	7.0 × 13.5 × 17.5	1.9	2222 417 14304	... 74304
0.47			2222 417 14704	... 74704
0.51			2222 417 15104	... 75104
0.56			2222 417 15604	... 75604
0.62	8.5 × 15.0 × 17.5	2.6	2222 417 16204	... 76204
0.68			2222 417 16804	... 76804
0.75			2222 417 17504	... 77504
0.82			2222 417 18204	... 78204
0.91	10.0 × 16.5 × 17.5	3.1	2222 417 19105	... 79105
1.0			2222 417 11005	... 71005
1.1			2222 417 11105	... 71105

Metallized polypropylene filter capacitors

MKP 418

MKP 418 GENERAL DATA

PITCH 5/10 mm

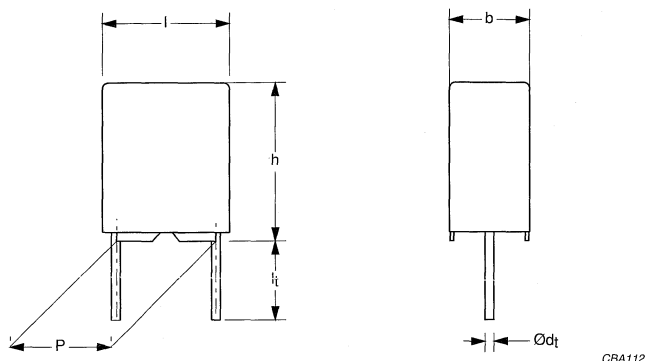


Fig.8 Outline.

Specific reference data for the 250 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
$C \leq 0.027 \mu\text{F}$	$\leq 5 \times 10^{-4}$	$\leq 15 \times 10^{-4}$
$0.027 \mu\text{F} < C \leq 0.075 \mu\text{F}$	$\leq 5 \times 10^{-4}$	$\leq 20 \times 10^{-4}$
$0.075 \mu\text{F} < C \leq 0.11 \mu\text{F}$	$\leq 5 \times 10^{-4}$	$\leq 25 \times 10^{-4}$
$0.11 \mu\text{F} < C \leq 0.13 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 30 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 250 V (DC):		
$P = 5 \text{ mm}$	50 V/ μs	
$P = 10 \text{ mm}$	20 V/ μs	
R between leads at 100 V; 1 minute	$>100000 \text{ M}\Omega$	
R between interconnected leads and case at 100 V; 1 minute	$>100000 \text{ M}\Omega$	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	400 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 250 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Ammopack	$H = 18.5 \text{ mm}; P_0 = 12.7 \text{ mm}$	$\pm 5\%$	2222 418 0.....	on request
		$\pm 2\%$	2222 418 1.....	preferred
Loose in box	$l_t = 4.0 +1.0/-0.5 \text{ mm}$	$\pm 5\%$	2222 418 3.....	on request
		$\pm 2\%$	2222 418 4.....	on request

Metallized polypropylene filter capacitors

MKP 418

 $U_{Rdc} = 250 \text{ V}$; $U_{Rac} = 100 \text{ V}$; $U_{p-p} = 280 \text{ V}$

C (E 24) (μF)	DIMENSIONS $b \times h \times l$ (mm)	MASS (g)	CATALOGUE NUMBER	
			AMMOPACK	
			H = 18.5 mm; P ₀ = 12.7 mm	
			C-tol = $\pm 2\%$	
Pitch = 5.0 \pm 0.3 mm; d_t = 0.50 \pm 0.05 mm				
0.01	3.5 \times 8.0 \times 7.2	0.35	2222 418 11003	
0.011			2222 418 11103	
0.012			2222 418 11203	
0.013			2222 418 11303	
0.015			2222 418 11503	
0.016	4.5 \times 9.0 \times 7.2	0.45	2222 418 11603	
0.018			2222 418 11803	
0.02			2222 418 12003	
0.022			2222 418 12203	
0.024			2222 418 12403	
0.027	6.0 \times 11.0 \times 7.2	0.60	2222 418 12703	
0.03			2222 418 13003	
0.033			2222 418 13303	
0.036			2222 418 13603	
0.039			2222 418 13903	
0.043			2222 418 14303	
Pitch = 10.0 \pm 0.4 mm; d_t = 0.60 \pm 0.06 mm				
0.047	4.0 \times 10.0 \times 12.5	0.60	2222 418 14703	
0.051			2222 418 15103	
0.056			2222 418 15603	
0.062			2222 418 16203	
0.068			2222 418 16803	
0.075	5.0 \times 11.0 \times 12.5	0.85	2222 418 17503	
0.082			2222 418 18203	
0.091			2222 418 19103	
0.1	6.0 \times 12.0 \times 12.5	1.10	2222 418 11004	
0.11			2222 418 11104	
0.12			2222 418 11204	
0.13			2222 418 11304	

Metallized polypropylene filter capacitors

MKP 418

MKP 418 GENERAL DATA

PITCH 15 mm

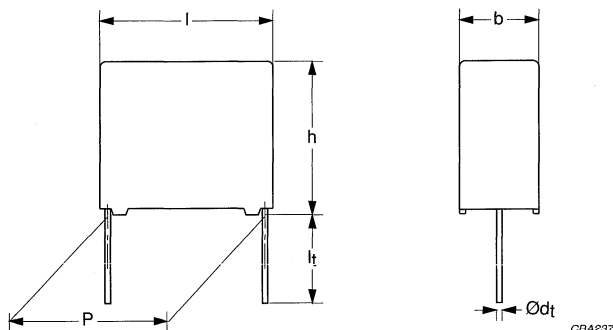


Fig.9 Outline.

Specific reference data for the 250 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
0.15 $\mu\text{F} < C \leq 0.3 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 35 \times 10^{-4}$
0.3 $\mu\text{F} < C \leq 0.39 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 40 \times 10^{-4}$
0.39 $\mu\text{F} < C \leq 0.56 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 45 \times 10^{-4}$
0.56 $\mu\text{F} < C \leq 0.68 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 50 \times 10^{-4}$
Rated voltage pulse slope (dU/dt) _R at 250 V (DC)	50 V/ μs	
R between leads, for $C \leq 0.33 \mu\text{F}$ at 100 V; 1 minute	$> 100000 \text{ M}\Omega$	
RC between leads, for $C > 0.33 \mu\text{F}$ at 100 V; 1 minute	$> 30000 \text{ s}$	
R between interconnected leads and case at 100 V; 1 minute	$> 100000 \text{ M}\Omega$	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	400 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 250 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Taped on reel	H = 18.5 mm; P ₀ = 12.7 mm	$\pm 5\%$	2222 418 0.....	on request
		$\pm 2\%$	2222 418 1.....	preferred
Loose in box	l _t = 3.5 \pm 0.3 mm	$\pm 5\%$	2222 418 6.....	on request
		$\pm 2\%$	2222 418 7.....	preferred

Metallized polypropylene filter capacitors**MKP 418** $U_{Rdc} = 250 \text{ V}$; $U_{Rac} = 100 \text{ V}$; $U_{p-p} = 280 \text{ V}$

C (E 24) (μF)	DIMENSIONS $b \times h \times l$ (mm)	MASS (g)	CATALOGUE NUMBER	
			REEL	LOOSE IN BOX
			H = 18.5 mm; P ₀ = 12.7 mm	l _t = 3.5 ±0.3 mm
C-tol = ±2%				
Pitch = 15.0 ±0.4 mm; d_t = 0.80 ±0.08 mm				
0.15	5.0 × 11.0 × 17.5	1.2	2222 418 11504	... 71504
0.16			2222 418 11604	... 71604
0.18	6.0 × 12.0 × 17.5	1.4	2222 418 11804	... 71804
0.2			2222 418 12004	... 72004
0.22			2222 418 12204	... 72204
0.24			2222 418 12404	... 72404
0.27			2222 418 12704	... 72704
0.3	7.0 × 13.5 × 17.5	1.9	2222 418 13004	... 73004
0.33			2222 418 13304	... 73304
0.36			2222 418 13604	... 73604
0.39			2222 418 13904	... 73904
0.43	8.5 × 15.0 × 17.5	2.6	2222 418 14304	... 74304
0.47			2222 418 14704	... 74704
0.51			2222 418 15104	... 75104
0.56	10.0 × 16.5 × 17.5	3.1	2222 418 15604	... 75604
0.62			2222 418 16204	... 76204
0.68			2222 418 16804	... 76804

Metallized polypropylene filter capacitors

MKP 419

MKP 419 GENERAL DATA

PITCH 5 mm

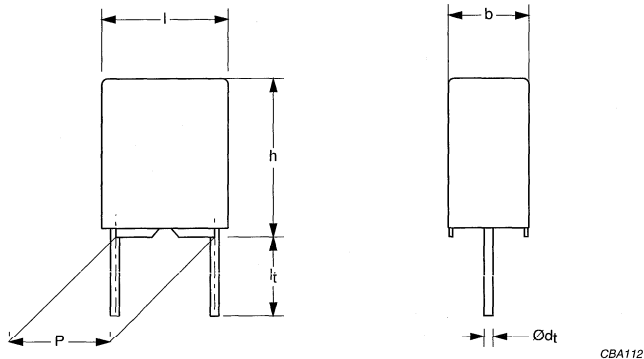


Fig.10 Outline.

Specific reference data for the 400 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: $C \leq 0.0091 \mu\text{F}$ $0.0091 \mu\text{F} < C \leq 0.02 \mu\text{F}$	$\leq 5 \times 10^{-4}$ $\leq 5 \times 10^{-4}$	$\leq 10 \times 10^{-4}$ $\leq 15 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 400 V (DC)	50 V/ μs	
R between leads at 100 V; 1 minute	$>100000 \text{ M}\Omega$	
R between interconnected leads and case at 100 V; 1 minute	$>100000 \text{ M}\Omega$	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	640 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 400 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Ammopack	$H = 18.5 \text{ mm}; P_0 = 12.7 \text{ mm}$	$\pm 5\%$	2222 419 0.....	on request
		$\pm 2\%$	2222 419 1.....	preferred
Loose in box	$l_t = 4.0 +1.0/-0.5 \text{ mm}$	$\pm 5\%$	2222 419 3.....	on request
		$\pm 2\%$	2222 419 4.....	on request

Metallized polypropylene filter capacitors**MKP 419** $U_{Rdc} = 400 \text{ V}$; $U_{Rac} = 125 \text{ V}$; $U_{p-p} = 350 \text{ V}$

C (E 24) (μF)	DIMENSIONS $b \times h \times l$ (mm)	MASS (g)	CATALOGUE NUMBER
			AMMOPACK
			H = 18.5 mm; $P_0 = 12.7 \text{ mm}$
			C-tol = $\pm 2\%$
Pitch = $5.0 \pm 0.3 \text{ mm}$; $d_t = 0.50 \pm 0.05 \text{ mm}$			
0.001	3.5 × 8.0 × 7.2	0.35	2222 419 11002
0.0011			2222 419 11102
0.0012			2222 419 11202
0.0013			2222 419 11302
0.0015			2222 419 11502
0.0016			2222 419 11602
0.0018			2222 419 11802
0.002			2222 419 12002
0.0022			2222 419 12202
0.0024			2222 419 12402
0.0027			2222 419 12702
0.003			2222 419 13002
0.0033			2222 419 13302
0.0036			2222 419 13602
0.0039			2222 419 13902
0.0043	4.5 × 9.0 × 7.2	0.45	2222 419 14302
0.0047			2222 419 14702
0.0051			2222 419 15102
0.0056			2222 419 15602
0.0062			2222 419 16202
0.0068			2222 419 16802
0.0075			2222 419 17502
0.0082			2222 419 18202
0.0091			2222 419 19102
0.01			2222 419 11003
0.011	2222 419 11103		
0.012	2222 419 11203		
0.013	6.0 × 11.0 × 7.2	0.60	2222 419 11303
0.015			2222 419 11503
0.016			2222 419 11603
0.018			2222 419 11803
0.02			2222 419 12003

Metallized polypropylene filter capacitors

MKP 419

MKP 419 GENERAL DATA

PITCH 10 mm

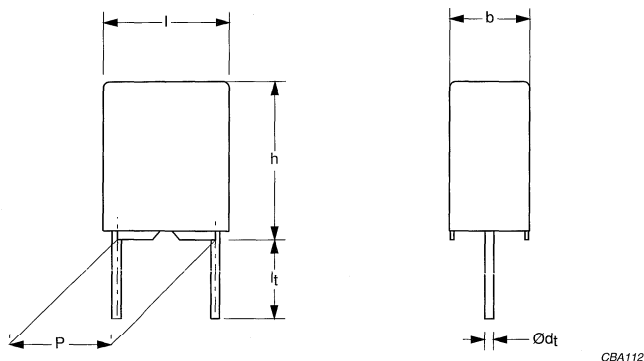


Fig.11 Outline.

Specific reference data for the 400 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: $C \leq 0.027 \mu\text{F}$ $0.027 \mu\text{F} < C \leq 0.068 \mu\text{F}$	$\leq 5 \times 10^{-4}$ $\leq 5 \times 10^{-4}$	$\leq 15 \times 10^{-4}$ $\leq 20 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 400 V (DC)	20 V/ μs	
R between leads at 100 V; 1 minute	>100000 M Ω	
R between interconnected leads and case at 100 V; 1 minute	>100000 M Ω	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	640 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 400 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Ammopack	H = 18.5 mm; P ₀ = 12.7 mm	±5%	2222 419 0.....	on request
		±2%	2222 419 1.....	preferred
Loose in box	l _l = 4.0 +1.0/-0.5 mm	±5%	2222 419 3.....	on request
		±2%	2222 419 4.....	on request

Metallized polypropylene filter capacitors**MKP 419** $U_{Rdc} = 400 \text{ V}$; $U_{Rac} = 125 \text{ V}$; $U_{p-p} = 350 \text{ V}$

C (E 24) (μF)	DIMENSIONS $b \times h \times l$ (mm)	MASS (g)	CATALOGUE NUMBER
			AMMOPACK
			H = 18.5 mm; P ₀ = 12.7 mm
			C-tol = $\pm 2\%$
Pitch = 10.0 \pm 0.4 mm; d_t = 0.60 \pm 0.06 mm			
0.022	4.0 \times 10.0 \times 12.5	0.60	2222 419 12203
0.024			2222 419 12403
0.027			2222 419 12703
0.03			2222 419 13003
0.033			2222 419 13303
0.036	5.0 \times 11.0 \times 12.5	0.85	2222 419 13603
0.039			2222 419 13903
0.043			2222 419 14303
0.047	6.0 \times 12.0 \times 12.5	1.10	2222 419 14703
0.051			2222 419 15103
0.056			2222 419 15603
0.062			2222 419 16203
0.068			2222 419 16803

Metallized polypropylene filter capacitors

MKP 419

MKP 419 GENERAL DATA

PITCH 15 mm

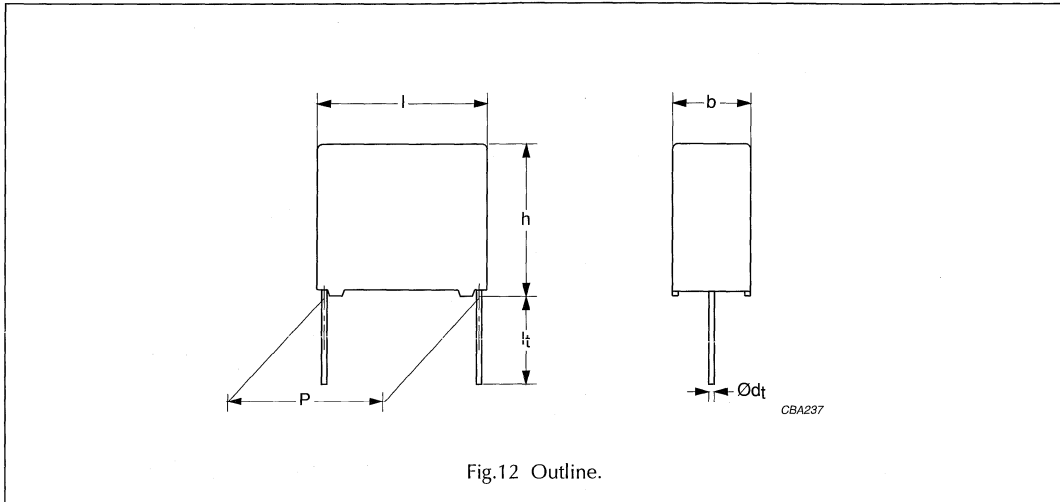


Fig.12 Outline.

Specific reference data for the 400 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
0.075 $\mu\text{F} < C \leq 0.11 \mu\text{F}$	$\leq 5 \times 10^{-4}$	$\leq 25 \times 10^{-4}$
0.11 $\mu\text{F} < C \leq 0.22 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 30 \times 10^{-4}$
0.22 $\mu\text{F} < C \leq 0.36 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 35 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 400 V (DC)	50 V/ μs	
R between leads, for $C \leq 0.33 \mu\text{F}$ at 100 V; 1 minute	$>100000 \text{ M}\Omega$	
RC between leads, for $C > 0.33 \mu\text{F}$ at 100 V; 1 minute	$>30000 \text{ s}$	
R between interconnected leads and case at 100 V; 1 minute	$>100000 \text{ M}\Omega$	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	640 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 400 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Taped on reel	$H = 18.5 \text{ mm}; P_0 = 12.7 \text{ mm}$	$\pm 5\%$	2222 419 0.....	on request
		$\pm 2\%$	2222 419 1.....	preferred
Loose in box	$l_t = 3.5 \pm 0.3 \text{ mm}$	$\pm 5\%$	2222 419 6.....	on request
		$\pm 2\%$	2222 419 7.....	preferred

Metallized polypropylene filter capacitors**MKP 419** $U_{Rdc} = 400 \text{ V}$; $U_{Rac} = 125 \text{ V}$; $U_{p-p} = 350 \text{ V}$

C (E 24) (μF)	DIMENSIONS $b \times h \times l$ (mm)	MASS (g)	CATALOGUE NUMBER	
			REEL	LOOSE IN BOX
			H = 18.5 mm; P ₀ = 12.7 mm	l ₁ = 3.5 ±0.3 mm
			C-tol = ±2%	
Pitch = 15.0 ±0.4 mm; d₁ = 0.80 ±0.08 mm				
0.075	5.0 × 11.0 × 17.5	1.2	2222 419 17503	... 77503
0.082			2222 419 18203	... 78203
0.091	6.0 × 12.0 × 17.5	1.4	2222 419 19103	... 79103
0.1			2222 419 11004	... 71004
0.11			2222 419 11104	... 71104
0.12			2222 419 11204	... 71204
0.13			2222 419 11304	... 71304
0.15			2222 419 11504	... 71504
0.16	7.0 × 13.5 × 17.5	1.9	2222 419 11604	... 71604
0.18			2222 419 11804	... 71804
0.2	8.5 × 15.0 × 17.5	2.6	2222 419 12004	... 72004
0.22			2222 419 12204	... 72204
0.24			2222 419 12404	... 72404
0.27			2222 419 12704	... 72704
0.3	10.0 × 16.5 × 17.5	3.1	2222 419 13004	... 73004
0.33			2222 419 13304	... 73304
0.36			2222 419 13604	... 73604

Metallized polypropylene filter capacitors

MKP 420

MKP 420 GENERAL DATA

PITCH 5 mm

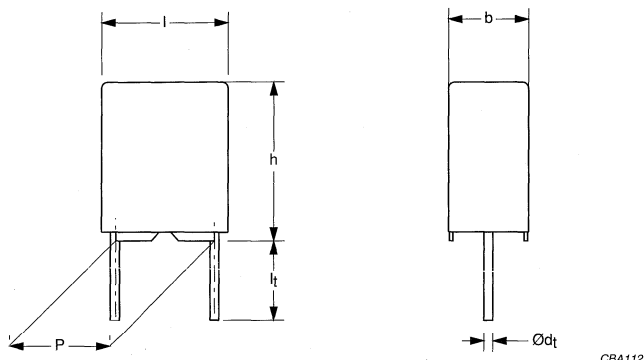


Fig.13 Outline.

Specific reference data for the 630 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: $C \leq 0.0068 \mu\text{F}$	$\leq 5 \times 10^{-4}$	$\leq 10 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 630 V (DC)	50 V/ μs	
R between leads at 500 V; 1 minute	>100 000 M Ω	
R between interconnected leads and case at 500 V; 1 minute	>100 000 M Ω	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	1 000 V; 1 minute	
Withstanding (DC) voltage between leads and case	1 260 V; 1 minute	

Available 630 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Ammopack	$H = 18.5 \text{ mm}; P_0 = 12.7 \text{ mm}$	$\pm 5\%$	2222 420 0.....	on request
		$\pm 2\%$	2222 420 1.....	preferred
Loose in box	$l_t = 4.0 +1.0/-0.5 \text{ mm}$	$\pm 5\%$	2222 420 3.....	on request
		$\pm 2\%$	2222 420 4.....	on request

Metallized polypropylene filter capacitors**MKP 420** $U_{Rdc} = 630 \text{ V}$; $U_{Rac} = 160 \text{ V}$; $U_{p-p} = 450 \text{ V}$

C (E 24) (μF)	DIMENSIONS $b \times h \times l$ (mm)	MASS (g)	CATALOGUE NUMBER
			AMMOPACK
			H = 18.5 mm; P ₀ = 12.7 mm
			C-tol = $\pm 2\%$
Pitch = $5.0 \pm 0.3 \text{ mm}$; $d_t = 0.50 \pm 0.05 \text{ mm}$			
0.0015	3.5 × 8.0 × 7.2	0.35	2222 420 11502
0.0016			2222 420 11602
0.0018			2222 420 11802
0.002			2222 420 12002
0.0022			2222 420 12202
0.0024			2222 420 12402
0.0027			2222 420 12702
0.003	4.5 × 9.0 × 7.2	0.45	2222 420 13002
0.0033			2222 420 13302
0.0036			2222 420 13602
0.0039			2222 420 13902
0.0043	6.0 × 11.0 × 7.2	0.60	2222 420 14302
0.0047			2222 420 14702
0.0051			2222 420 15102
0.0056			2222 420 15602
0.0062			2222 420 16202
0.0068			2222 420 16802

Metallized polypropylene filter capacitors

MKP 420

MKP 420 GENERAL DATA

PITCH 10 mm

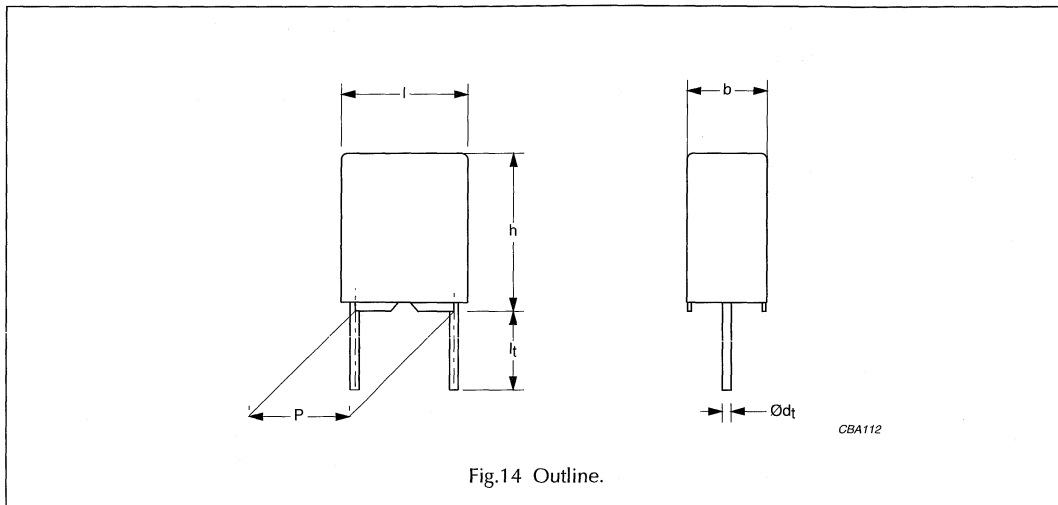


Fig.14 Outline.

Specific reference data for the 630 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
$C \leq 0.027 \mu\text{F}$	$\leq 5 \times 10^{-4}$	$\leq 15 \times 10^{-4}$
$0.027 \mu\text{F} < C \leq 0.047 \mu\text{F}$	$\leq 5 \times 10^{-4}$	$\leq 20 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 630 V (DC)	50 V/ μs	
R between leads at 500 V; 1 minute	>100000 M Ω	
R between interconnected leads and case at 500 V; 1 minute	>100000 M Ω	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	1000 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 630 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Ammopack	$H = 18.5 \text{ mm}; P_0 = 12.7 \text{ mm}$	$\pm 5\%$	2222 420 0.....	on request
		$\pm 2\%$	2222 420 1.....	preferred
Loose in box	$l_t = 4.0 +1.0/-0.5 \text{ mm}$	$\pm 5\%$	2222 420 3.....	on request
		$\pm 2\%$	2222 420 4.....	on request

Metallized polypropylene filter capacitors**MKP 420** $U_{Rdc} = 630 \text{ V}$; $U_{Rac} = 160 \text{ V}$; $U_{p-p} = 450 \text{ V}$

C (E 24) (μF)	DIMENSIONS $b \times h \times l$ (mm)	MASS (g)	CATALOGUE NUMBER
			AMMOPACK
			H = 18.5 mm; P ₀ = 12.7 mm
			C-tol = $\pm 2\%$
Pitch = 10.0 \pm 0.4 mm; $d_t = 0.60 \pm 0.06$ mm			
0.01	4.0 \times 10.0 \times 12.5	0.60	2222 420 11003
0.011			2222 420 11103
0.012			2222 420 11203
0.013			2222 420 11303
0.015			2222 420 11503
0.016			2222 420 11603
0.018	5.0 \times 11.0 \times 12.5	0.85	2222 420 11803
0.02			2222 420 12003
0.022			2222 420 12203
0.024			2222 420 12403
0.027	6.0 \times 12.0 \times 12.5	1.10	2222 420 12703
0.03			2222 420 13003
0.033			2222 420 13303
0.036			2222 420 13603
0.039			2222 420 13903
0.043			2222 420 14303
0.047			2222 420 14703

Metallized polypropylene filter capacitors

MKP 420

MKP 420 GENERAL DATA

PITCH 15 mm

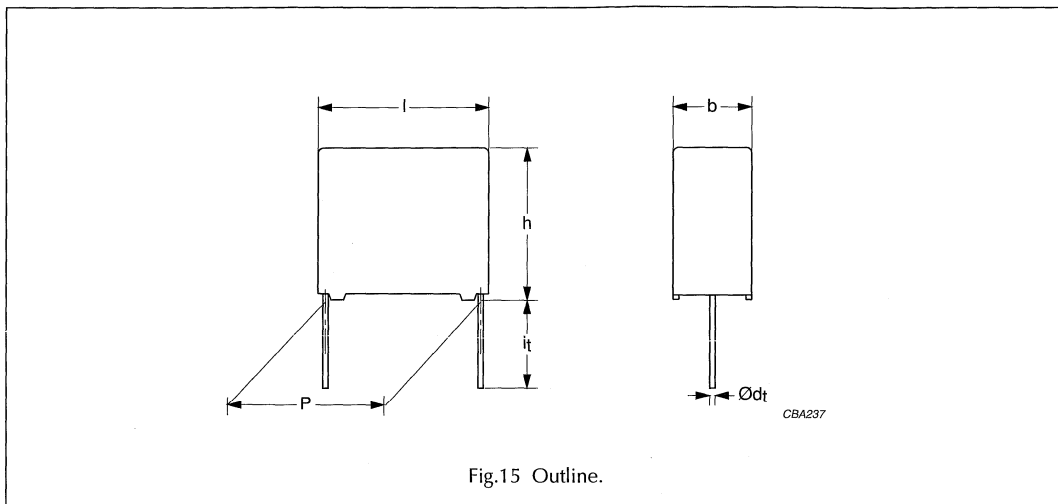


Fig.15 Outline.

Specific reference data for the 630 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: 0.051 $\mu\text{F} < C \leq 0.11 \mu\text{F}$	$\leq 5 \times 10^{-4}$	$\leq 25 \times 10^{-4}$
0.11 $\mu\text{F} < C \leq 0.16 \mu\text{F}$	$\leq 10 \times 10^{-4}$	$\leq 35 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 630 V (DC)	50 V/ μs	
R between leads at 500 V; 1 minute	$>100000 \text{ M}\Omega$	
R between interconnected leads and case at 500 V; 1 minute	$>100000 \text{ M}\Omega$	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	1000 V; 1 minute	
Withstanding (DC) voltage between leads and case	1260 V; 1 minute	

Available 630 V DC versions

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Taped on reel	$H = 18.5 \text{ mm}; P_0 = 12.7 \text{ mm}$	$\pm 5\%$	2222 420 0.....	on request
		$\pm 2\%$	2222 420 1.....	preferred
Loose in box	$l_t = 3.5 \pm 0.3 \text{ mm}$	$\pm 5\%$	2222 420 6.....	on request
		$\pm 2\%$	2222 420 7.....	preferred

Metallized polypropylene filter capacitors**MKP 416 to 420**
 $U_{Rdc} = 630 \text{ V}; U_{Rac} = 160 \text{ V}; U_{p-p} = 450 \text{ V}$

C (E 24) (μF)	DIMENSIONS $b \times h \times l$ (mm)	MASS (g)	CATALOGUE NUMBER	
			REEL	LOOSE IN BOX
			H = 18.5 mm; P ₀ = 12.7 mm	l ₁ = 3.5 ±0.3 mm
			C-tol = ±2%	
Pitch = 15.0 ±0.4 mm; d_t = 0.80 ±0.08 mm				
0.051 0.056	6.0 × 12.0 × 17.5	1.4	2222 420 15103 2222 420 15603	... 75103 ... 75603
0.062 0.068 0.075 0.082	7.0 × 13.5 × 17.5	1.9	2222 420 16203 2222 420 16803 2222 420 17503 2222 420 18203	... 76203 ... 76803 ... 77503 ... 78203
0.091 0.1 0.11 0.12	8.5 × 15.0 × 17.5	2.6	2222 420 19103 2222 420 11004 2222 420 11104 2222 420 11204	... 79103 ... 71004 ... 71104 ... 71204
0.13 0.15 0.16	10.0 × 16.5 × 17.5	3.1	2222 420 11304 2222 420 11504 2222 420 11604	... 71304 ... 71504 ... 71604

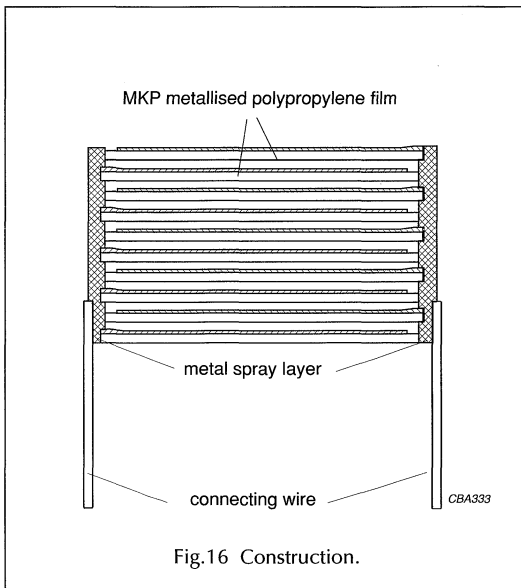
Metallized polypropylene filter capacitors

MKP 416 to 420

CONSTRUCTION

Description

- Low-inductive wound cell of metallized polypropylene (PP) film, potted with epoxy resin in a flame-retardant case
- Radial leads, solder-coated
 - Copper clad steel wire for pitch = 2e, 4e and 6e (case size 1750 and 1760)
 - Copper wire pitch = 6e (case size 1770, 1785 and 1710)
- Solder-plated copper-clad steel wire 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. For detailed specifications refer to this handbook, chapter "Packaging information".

SPECIFIC METHOD OF MOUNTING TO WITHSTAND VIBRATION AND SHOCK

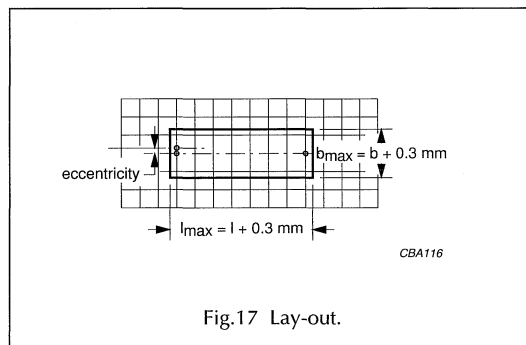
In order to withstand vibration and shock tests, it must be ensured that the stand-off pips are in good contact with the printed-circuit board.

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 Fig.17:

- Eccentricity as in Fig.17. 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 60717" as reference: $h_{\max} \leq h + 0.3 \text{ mm}$.



Storage temperature

- Storage temperature: $T_{\text{stg}} = -25 \text{ to } +40 \text{ }^\circ\text{C}$ with RH maximum 80% without condensation.

RATINGS AND CHARACTERISTICS REFERENCE CONDITIONS

Unless otherwise specified, all electrical values apply at an ambient free air temperature of $23 \pm 1 \text{ }^\circ\text{C}$, an atmospheric pressure of 86 to 106 kPa and a relative humidity of $50 \pm 2\%$.

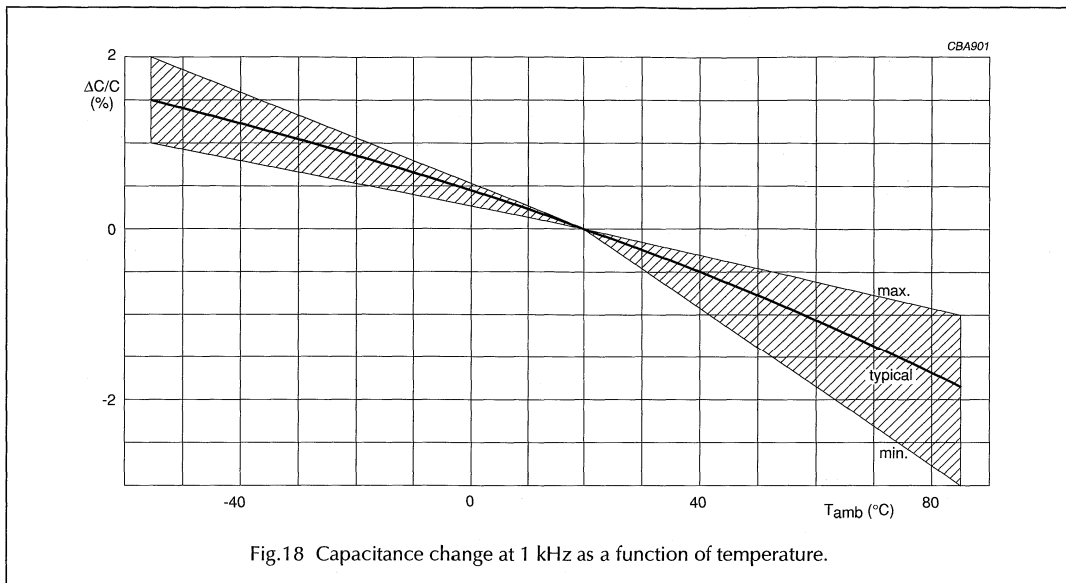
For reference testing, a conditioning period shall be applied over 96 ± 4 hours by heating the products in a circulating air oven at the rated temperature and a relative humidity not exceeding 20%.

Metallized polypropylene filter capacitors

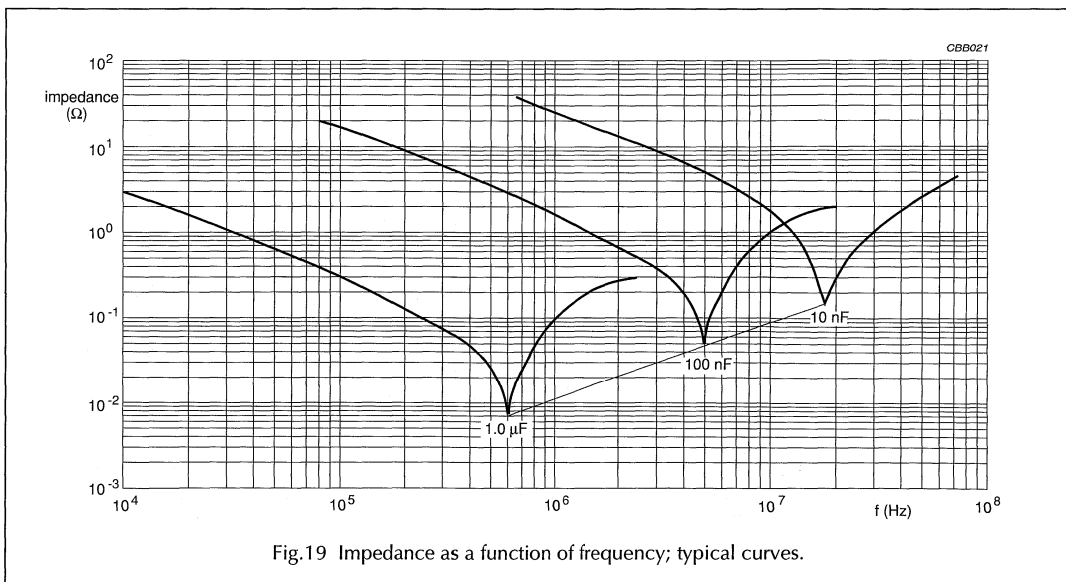
MKP 416 to 420

CHARACTERISTICS

Capacitance



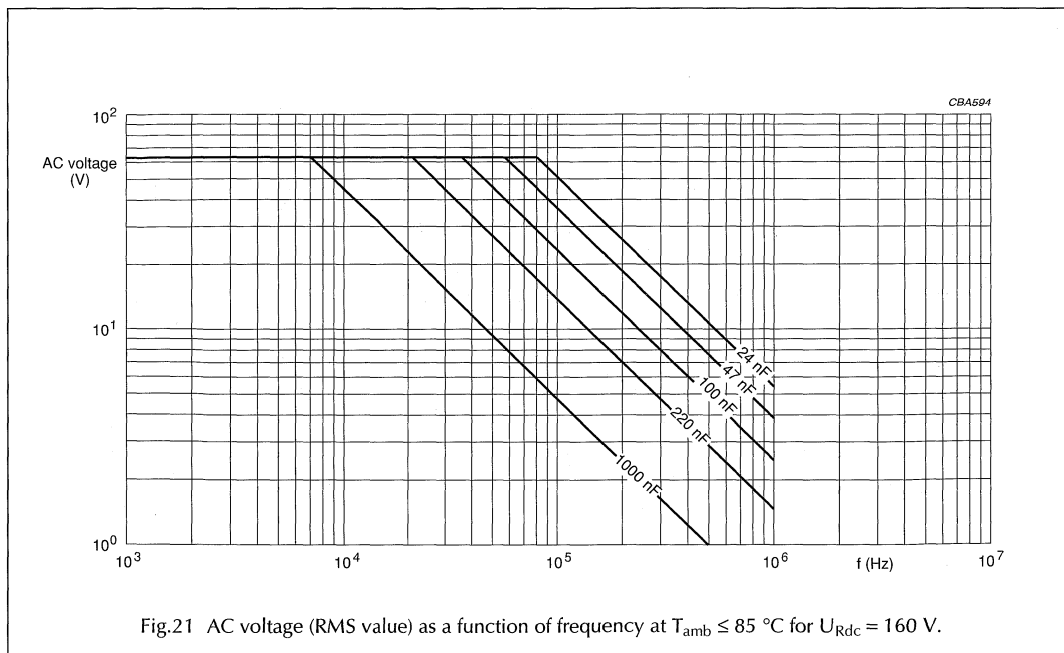
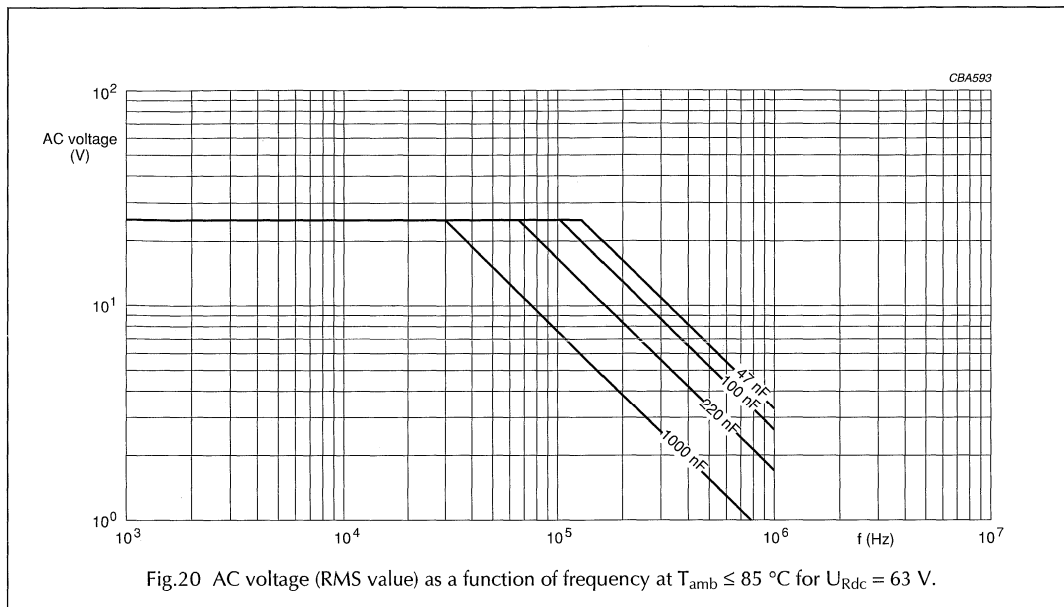
Impedance



Metallized polypropylene filter capacitors

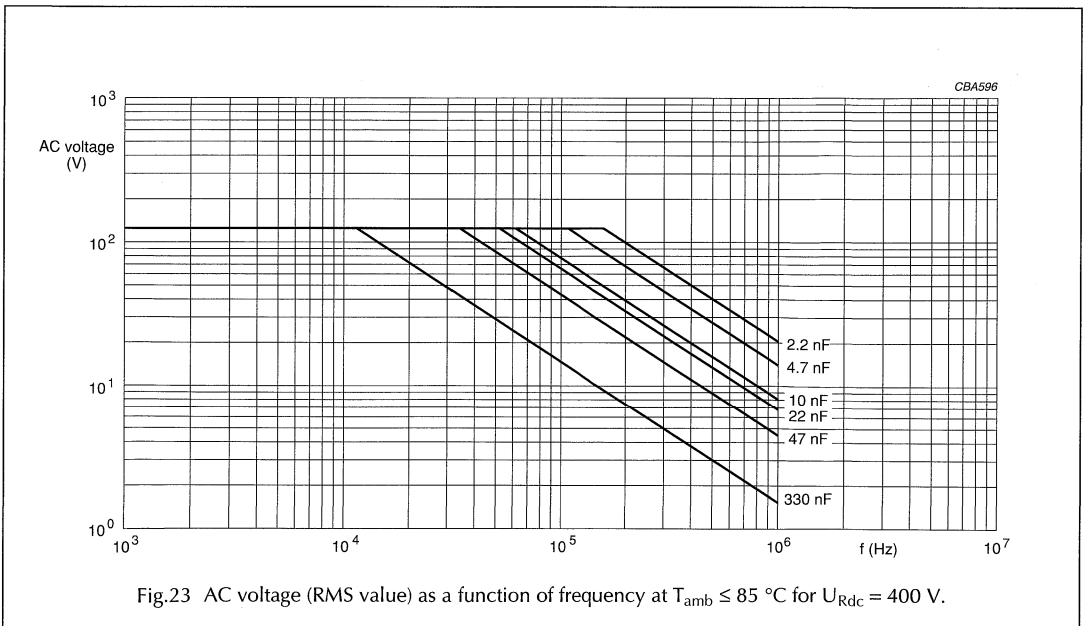
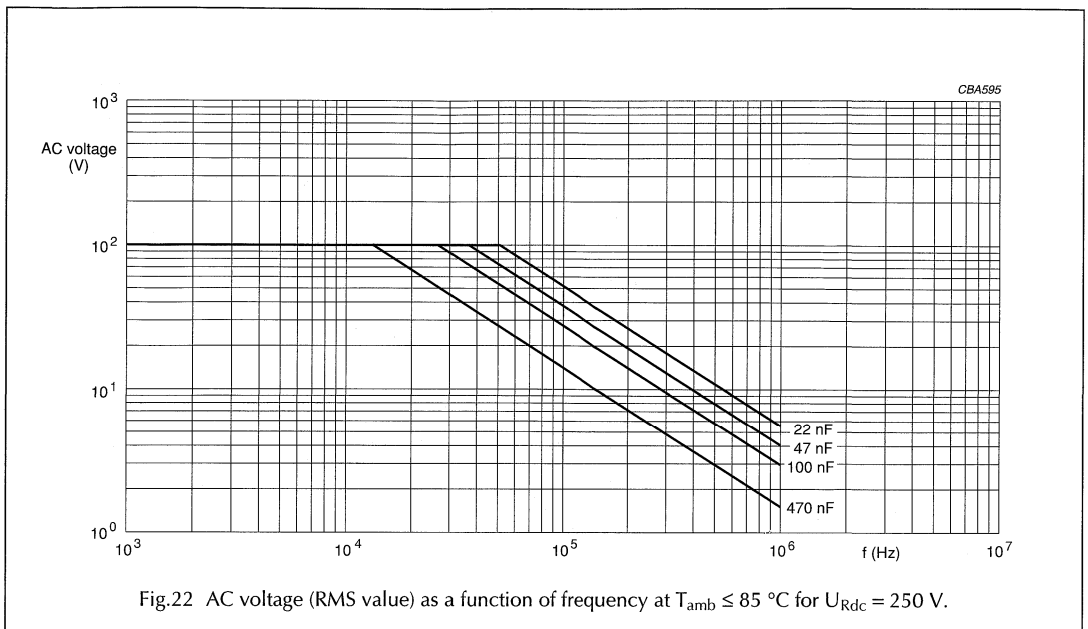
MKP 416 to 420

Maximum RMS voltage (sinewave) as a function of frequency



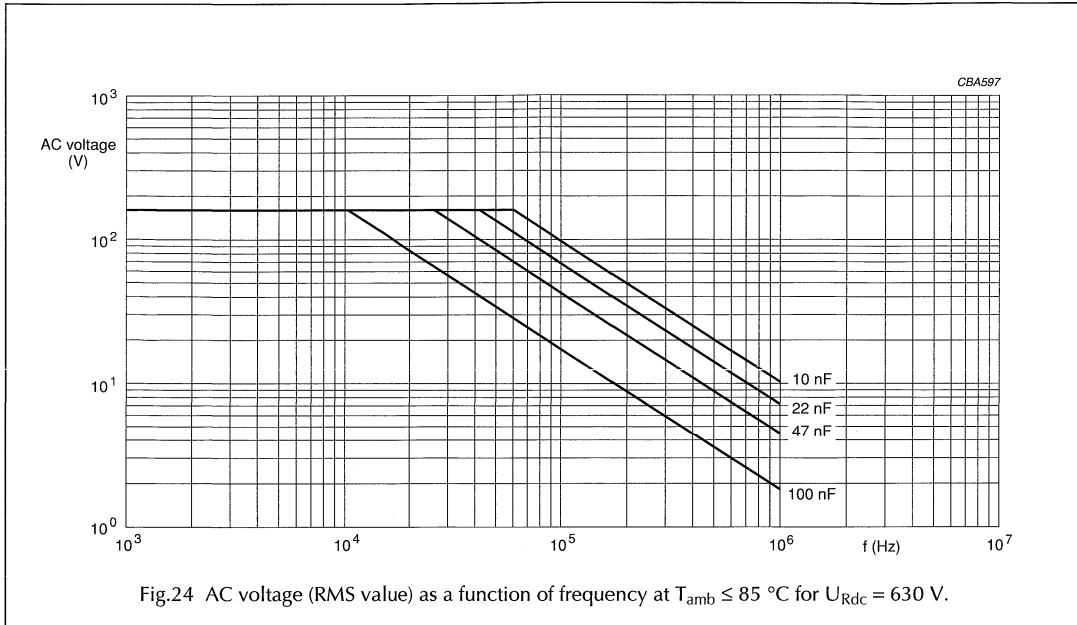
Metallized polypropylene filter capacitors

MKP 416 to 420



Metallized polypropylene filter capacitors

MKP 416 to 420



Maximum RMS current (sinewave) as a function of frequency

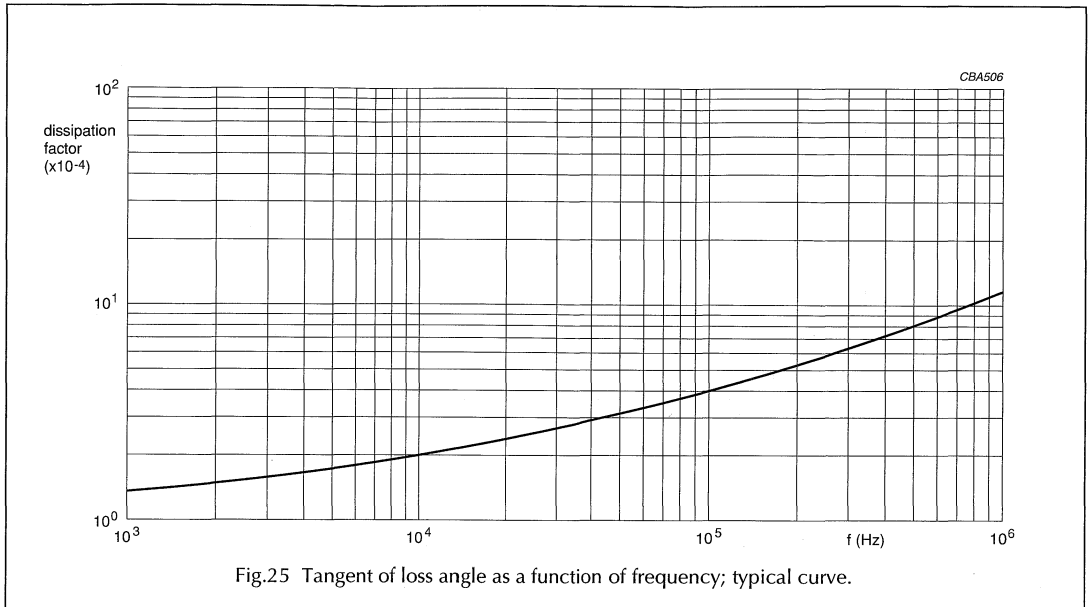
The maximum RMS current is defined by $I_{ac} = \omega \times C \times U_{ac}$.

U_{ac} is the maximum AC voltage depending on the ambient temperature in Figs 20 to 24.

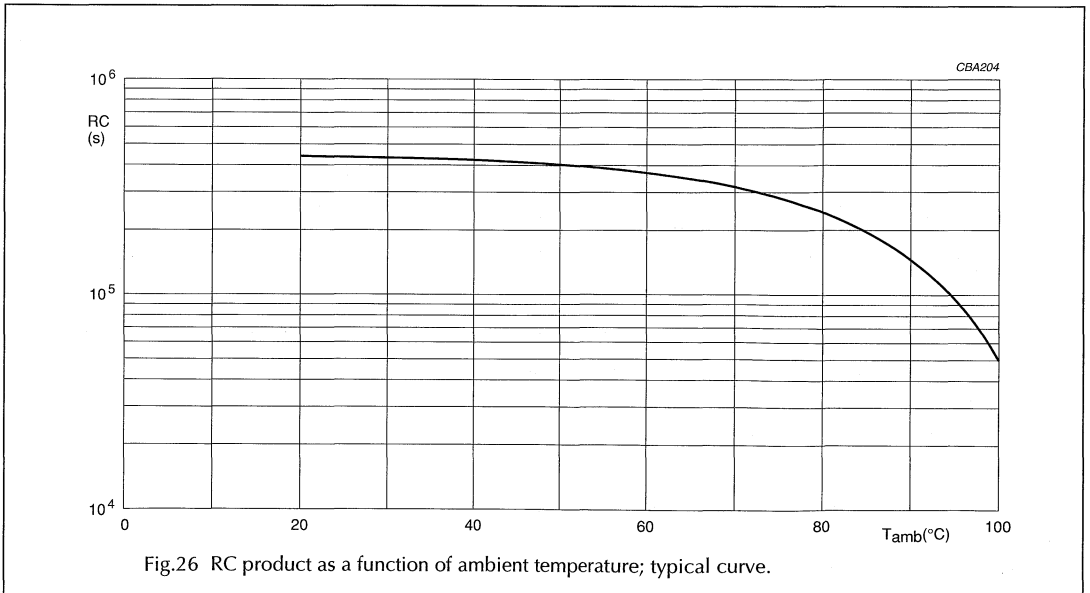
Metallized polypropylene filter capacitors

MKP 416 to 420

Tangent of loss angle



Insulation resistance



Metallized polypropylene filter capacitors**MKP 416 to 420**

Maximum allowed component temperature rise (DT) as a function of the ambient temperature (T_{amb})

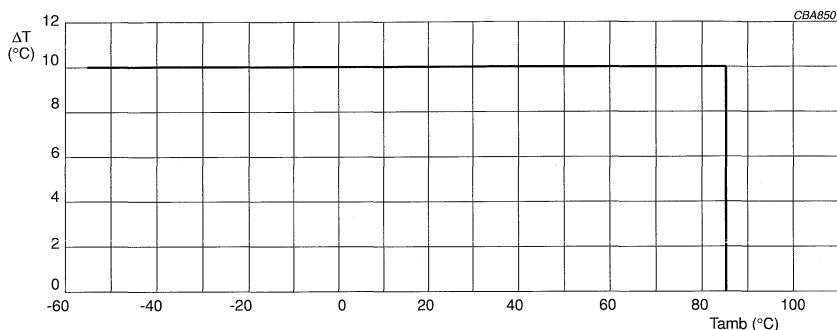


Fig.27 Maximum allowed component temperature rise as a function of the ambient temperature.

Heat conductivity (G) as a function of pitch and capacitor body thickness in $mW/\times C$

Table 1 Heat conductivity

b_{max} (mm)	PITCH (mm)		
	5	10	15
3.5	3.0	—	—
4.0	—	6.5	—
4.5	4.0	—	—
5.0	—	7.5	10
6.0	5.5	9.0	11
7.0	—	—	12
8.5	—	—	16
10.0	—	—	18

Power dissipation and maximum component temperature rise

The power dissipation must be limited in order not to exceed the maximum allowed component temperature rise as a function of the free air ambient temperature.

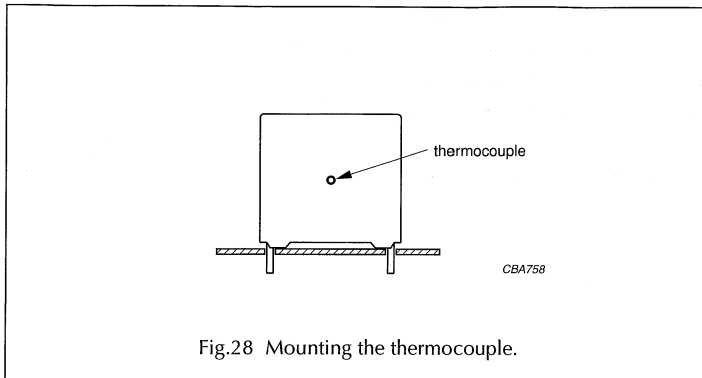
The power dissipation can be calculated according chapter "Introduction", section "Maximum power dissipation".

The component temperature rise (DT) can be measured (see section "Measuring the component temperature" for more details) or calculated by $\Delta T = P/G$:

- ΔT = component temperature rise (°C).
- P = power dissipation of the component (mW).
- G = heat conductivity of the component ($mW/^\circ C$).

Metallized polypropylene filter capacitors**MKP 416 to 420****Measuring the component temperature**

A thermocouple must be attached to the capacitor body; see Fig.28.



The temperature is measured in unloaded (T_{amb}) and maximum loaded condition (T_c).

The temperature rise is given by $\Delta T = T_c - T_{amb}$.

To avoid radiation or convection, the capacitor should be tested in a wind-free box.

Metallized polypropylene filter capacitors

MKP 416 to 420

Application note and limiting conditions

These capacitors are not suitable for mains applications as across-the-line capacitors without additional protection, as described hereunder. These mains applications are strictly regulated in safety standards and therefore electromagnetic interference suppression capacitors conforming the standards must be used.

To select the capacitor for a certain application, the following 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 the maximum U_{p-p} .
3. The voltage pulse slope (dU/dt) shall not exceed the rated voltage pulse slope in an RC-circuit at rated voltage and without ringing. If the pulse voltage is lower than the rated DC voltage, the rated voltage pulse slope may be multiplied by U_{Rdc} and divided by the applied voltage.

For all other pulses following equation must be fulfilled:

$$2 \times \int_0^T \left(\frac{dU}{dt} \right)^2 \times dt < U_{Rdc} \times \left(\frac{dU}{dt} \right)_{rated}$$

T is the pulse duration.

4. The maximum component surface temperature rise must be lower than the limits in Fig.27.
5. Since in circuits used at voltages over 280 V peak-to-peak the risk for an intrinsically active flammability after a capacitor breakdown (short circuit) increases, it is recommended that the power to the component is limited to 100 times the values mentioned in Table 1 "Heat conductivity".
6. When using these capacitors in the input filters or as series connected with an impedance to the mains the applicant must guarantee that following conditions are fulfilled in any case (spikes and surge voltages from the mains or line card supply included).

VOLTAGE CONDITIONS FOR 6 ABOVE

ALLOWED VOLTAGES	$T_{amb} \leq 85 \text{ }^\circ\text{C}$
Maximum continuous RMS voltage	U_{Rac}
Maximum temporary RMS -overvoltage (<24 hours)	$1.25 \times U_{Rac}$
Maximum peak voltage (V_{o-p}) (<2 s)	$1.6 \times U_{Rdc}$

Example

$C = 0.1 \text{ mF} - 250 \text{ V}$ used for the sine voltage signal of $2 V_{RMS}$ at 1 MHz superimposed on 160 V (DC).

The ambient temperature is 50 °C. The circuit is high ohmic during a capacitor breakdown.

Checking the conditions:

1. The peak voltage $U_p = 162.8 \text{ V}$ is lower than 250 V (DC).
2. The peak-to-peak voltage 5.6 V is lower than $2 \times \sqrt{2} \times 100 \text{ V(AC)} = 280 U_{p-p}$.
3. The signal is not pulsed.
4. This is a sinewave, according the curves in, the capacitor can be applied.
5. Not applicable.
6. Not applicable.

Metallized polypropylene filter capacitors

MKP 416 to 420

MARKING

Product marking

CAPACITORS WITH PITCH = 5 mm

The capacitors are marked on the side (see Fig.29) with the following information:

1. Capacitance code in accordance with "IEC 60062": n = nF
2. Tolerance on rated capacitance: G = $\pm 2\%$; J = $\pm 5\%$
3. Rated (DC) voltage (e.g. 250 V)
4. Code for manufacturer
5. Year and week of manufacture (e.g. 0001)
6. Manufacturers type designation.

CAPACITORS WITH PITCH = 10 mm

The capacitors are marked on the front face (see Fig.30) with the following information:

1. Year and week of manufacture (e.g. 0001)
2. Capacitance code in accordance with "IEC 60062"
3. Tolerance on rated capacitance: G = $\pm 2\%$; J = $\pm 5\%$
4. Rated (DC) voltage (e.g. 160 V)
5. Code for dielectric material (MKP)
6. Manufacturer's type designation (e.g. 417)
7. Code for manufacturer.
8. Code for factory of origin (HQ).

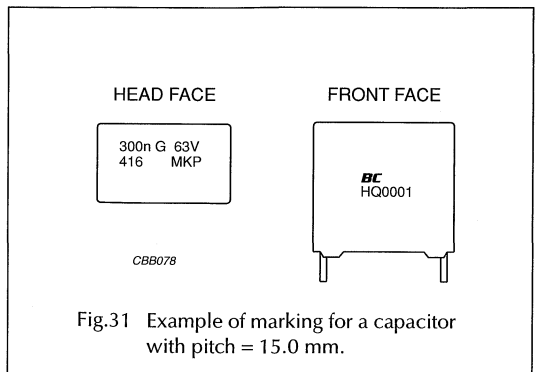
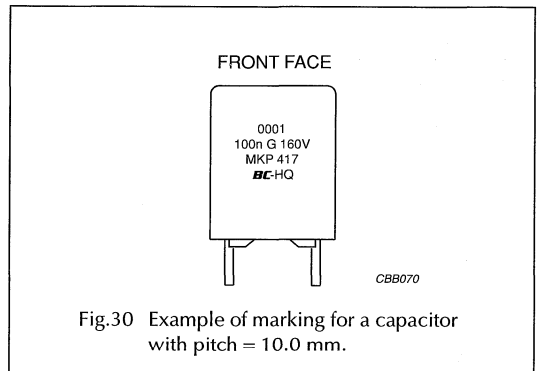
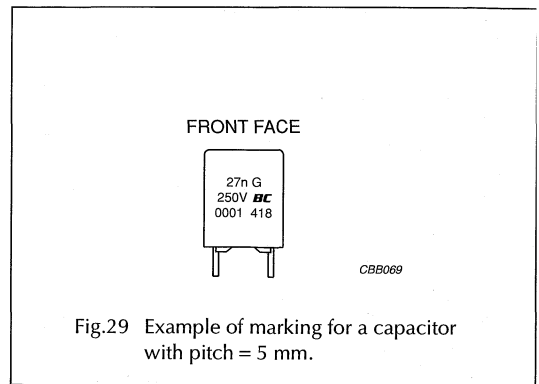
CAPACITORS WITH PITCH = 15 mm

The capacitors are marked on the top (see Fig.31) with the following information:

1. Rated capacitance code in accordance with "IEC 60062"
2. Tolerance on rated capacitance: G = $\pm 2\%$; J = $\pm 5\%$
3. Rated voltage (DC) (e.g. 63 V)
4. Manufacturer's type designation (416)
5. Code for dielectric material (MKP);

and on the side with the following information:

1. Manufacturer
2. Code for factory of origin (HQ)
3. Year and week of manufacture (e.g. 0001).



Metallized polypropylene filter capacitors**MKP 416 to 420****QUICK REFERENCE TEST REQUIREMENTS**

TEST	PROCEDURE (quick reference)	REQUIREMENTS
Robustness of leads		
Tensile strength: "IEC 60068-2-21"	load 10 N; 10 s	no visible damage legible marking $ \Delta C/C \leq 1\% + 5 \text{ pF}$ $\Delta \tan \delta \leq 5 \times 10^{-4}$
Bending: "IEC 60068-2-21"	load 5 N; $4 \times 90^\circ$	
Resistance to soldering heat "IEC 60068-2-20"	solder bath: 260 °C; 5 s	
Component solvent resistance	isopropyl alcohol; 23 °C; 5 minutes	
Robustness of component		
Vibration: "IEC 60068-2-6"	10 to 55 Hz; amplitude 0.75 mm or acceleration 98 m/s ² ; 6 hours	$ \Delta C/C \leq 1\% + 5 \text{ pF}$ $\Delta \tan \delta \leq 5 \times 10^{-4}$
Shock: "IEC 60068-2-27"	half sine wave; 490 m/s ² ; 11 ms	
Climatic sequence		
Dry heat: "IEC 60068-2-2"	16 hours; 85 °C	$ \Delta C/C \leq 1\% + 5 \text{ pF}$ $\Delta \tan \delta \leq 5 \times 10^{-4}$ $R_{\text{ins}} \geq 50\%$ of specified value
Damp heat, cyclic, test Db, first cycle: "IEC 60068-2-30"		
Cold: "IEC 60068-2-1"	2 hours; -55 °C	
Damp heat, cyclic, test Db, remaining cycles: "IEC 60068-2-30"		
Other applicable tests		
Damp heat, steady state: "IEC 60068-2-3"	56 days; 40 °C; 90 to 95% RH	$ \Delta C/C \leq 1\% + 5 \text{ pF}$ $\Delta \tan \delta \leq 5 \times 10^{-4}$ $R_{\text{ins}} \geq 50\%$ of specified value
Endurance (DC): "IEC 60384-16"	2000 hours: $1.25 \times U_{\text{Rdc}}$; 85 °C	$ \Delta C/C \leq 1\% + 5 \text{ pF}$ $\Delta \tan \delta \leq 5 \times 10^{-4}$ $R_{\text{ins}} \geq 50\%$ of specified value
Heat storage: "IEC 60384-16"	2000 hours; 85 °C	$ \Delta C/C \leq 1\% + 5 \text{ pF}$ $\Delta \tan \delta \leq 5 \times 10^{-4}$
Resistance to soldering heat with preheating: "IEC 60384-16"	body temperature: 85 °C; bath temperature: 260 °C; dwell time: 10 s	$ \Delta C/C \leq 1\% + 5 \text{ pF}$ $\Delta \tan \delta \leq 5 \times 10^{-4}$
Passive flammability: "IEC 60384-1"	class C	no burning
Endurance (AC): "IEC 60384-16"	1000 hours: 85 °C $1.25 \times U_{\text{Rac}}$ (RMS); 50 Hz	$ \Delta C/C \leq 2\% + 5 \text{ pF}$ $\Delta \tan \delta \leq 5 \times 10^{-4}$ $R_{\text{ins}} \geq 50\%$ of specified value

Polypropylene film foil capacitors

KP 460 to 464

KP AXIAL EPOXY LACQUERED TYPE

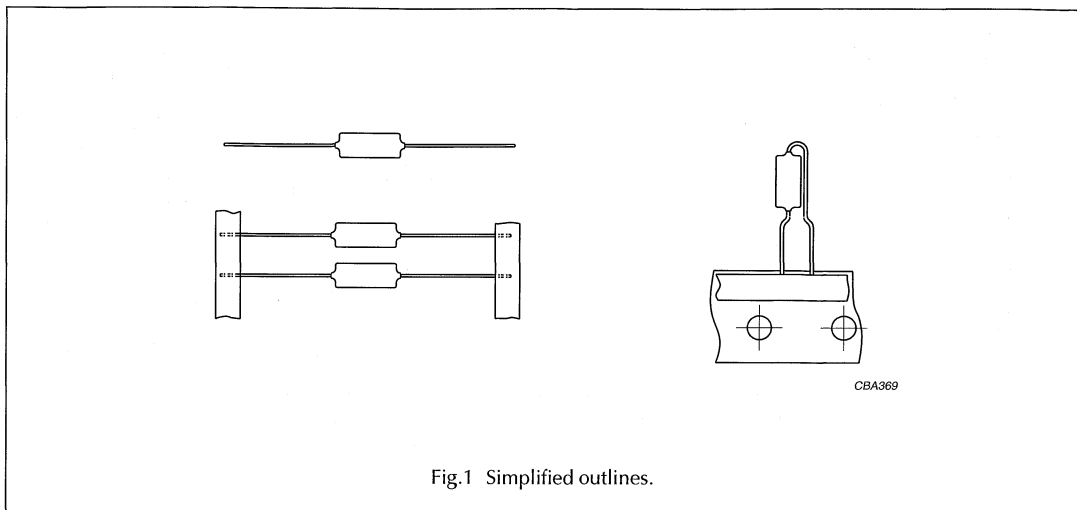


Fig.1 Simplified outlines.

FEATURES

- Supplied loose in box, taped on reel or unidirectional.
- Intermediate values are available of the E96 series.

APPLICATIONS

- In circuits where close tolerance, reliability and low losses are of prime importance, for example: tuned circuits, filter and timing networks.

DETAIL SPECIFICATION

For more detailed data and test requirements see "Type detail specification HQN-384-13/101".

QUICK REFERENCE DATA

DESCRIPTION	VALUE
Capacitance range (E12 series)	47 to 62 000 pF
Capacitance tolerance	±5% (E24 series); ±2% (E24, E48 series); ±1% (E24, E48, E96 series)
Rated (DC) voltage	63 V; 160 V; 250 V; 400 V; 630 V
Rated (AC) voltage	40 V; 63 V; 125 V; 160 V; 200 V
Climatic category	40/100/56
Rated temperature	85 °C
Maximum application temperature	100 °C
Reference specification	IEC 60384-13
Stability class for:	
63; 160; 250 V versions	class 1
400; 630 V versions	class 2

Polypropylene film foil capacitors

KP 460 to 464

COMPOSITION OF CATALOGUE NUMBER

TYPE AND VOLTAGES	
460	63 V
461	160 V

MULTIPLIER (nF)	
0.0001	9
0.001	1
0.01	2
0.1	3

CAPACITANCE
(numerically)

Example:
1003 = 100 x 0.1 = 10 nF

2222 | 46. | X | XXX | X

TYPE	PACKAGING	LEAD CONFIGURATION AND TAPE DISTANCE	PREFERRED TYPES		
			C-TOL	63 V	160 V
460	taped on reel	tape distance 63.5 mm	±1%	8	
			±2%	7	
461	taped on reel	tape distance 63.5 mm	±1%		8
			±2%		7
			ON REQUEST		
460	taped on reel	tape distance 63.5 mm	±5%	6	
	loose in box	lead length 30.0 or 28.0 mm	±1%	4	
			±2%	3	
			±5%	2	
	unidirectional		±1%	1	
±2%			0		
461	taped on reel	tape distance 63.5 mm	±5%		6
	loose in box	lead length 30.0 or 28.0 mm	±1%		4
			±2%		3
			±5%		2
	unidirectional		±1%		1
±2%				0	

Polypropylene film foil capacitors

KP 460 to 464

TYPE AND VOLTAGES	
462	250 V
463	400 V
464	630 V

MULTIPLIER (nF)	
0.0001	9
0.001	1
0.01	2
0.1	3

CAPACITANCE
(numerically)

Example:
1003 = 100 x 0.1 = 10 nF

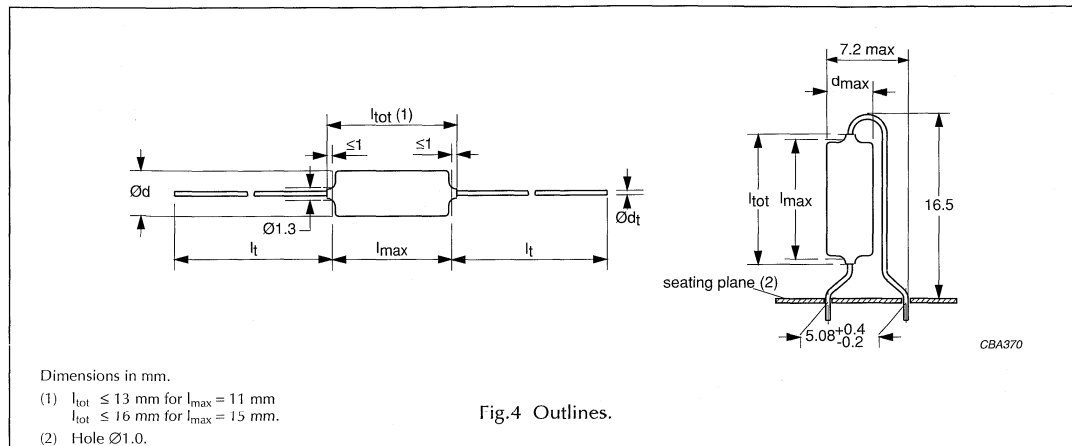
2222 | 46. | X | XXX | X

TYPE	PACKAGING	LEAD CONFIGURATION AND TAPE DISTANCE	PREFERRED TYPES			
			C-TOL	250 V	400 V	630 V
462	taped on reel	tape distance 63.5 mm	±1%	8		
			±2%	7		
463	taped on reel	tape distance 63.5 mm	±1%		8	
			±2%		7	
464	taped on reel	tape distance 63.5 mm	±1%			8
			±2%			7
				ON REQUEST		
462	taped on reel	tape distance 63.5 mm	±5%	6		
			±1%	4		
	loose in box	lead length 30.0 or 28.0 mm	±2%	3		
			±5%	2		
	unidirectional		±1%	1		
			±2%	0		
463	taped on reel	tape distance 63.5 mm	±5%		6	
			±1%		4	
	loose in box	lead length 30.0 or 28.0 mm	±2%		3	
			±5%		2	
	unidirectional		±1%		1	
			±2%		0	
464	taped on reel	tape distance 63.5 mm	±5%			6
			±1%			4
	loose in box	lead length 30.0 or 28.0 mm	±2%			3
			±5%			2
	unidirectional		±1%			1
			±2%			0

Polypropylene film foil capacitors

KP 460

KP 460 GENERAL DATA



Specific reference data for the 63 V DC capacitors

DESCRIPTION	VALUE	
	at 1 kHz	at 100 kHz
Tangent of loss angle: 5000 pF < C ≤ 20000 pF	$\leq 5 \times 10^{-4}$	$\leq 15 \times 10^{-4}$
20000 pF < C ≤ 47000 pF	$\leq 5 \times 10^{-4}$	$\leq 25 \times 10^{-4}$
C > 47000 pF	$\leq 5 \times 10^{-4}$	$\leq 40 \times 10^{-4}$
Rated voltage pulse slope (dU/dt)R at 63 V (DC)	10000 V/μs	
R between leads; at 10 V; 1 minute	>100000 MΩ	
R between interconnected leads and case; 10 V; 1 minute	>100000 MΩ	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	126 V; 1 minute	
Withstanding (DC) voltage between leads and case	400 V; 1 minute	

Available 63 V DC versions

PACKAGING	C-tol	FIRST 8 DIGITS OF CATALOGUE NUMBER	ORDERING
Taped on reel	±1%	2222 460 8....	preferred
	±2%	2222 460 7....	preferred
	±5%	2222 460 6....	on request
Loose in box	±1%	2222 460 4....	on request
	±2%	2222 460 3....	on request
	±5%	2222 460 2....	on request
Unidirectional	±1%	2222 460 1....	on request
	±2%	2222 460 0....	on request

Available on request

PACKAGING	TAPE DISTANCE (mm)
Taped in ammopack	52.5
	63.5
Taped on reel	52.5

Polypropylene film foil capacitors

KP 460

 $U_{Rdc} = 63 \text{ V}$; $U_{Rac} = 40 \text{ V}$

C (E 24) (pF)	DIMENSIONS $d_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER				
			TAPED ON REEL		UNIDIRECTIONAL		
			TAPE DISTANCE 63.5 mm				
			C-tol = $\pm 2\%$	C-tol = $\pm 1\%$	C-tol = $\pm 2\%$	C-tol = $\pm 1\%$	
			catalogue number	last 5 digits	last 5 digits	last 5 digits	last 5 digits
$l_t = 30.0 \text{ mm}$; $d_t = 0.60 \pm 0.06 \text{ mm}$							
6800	5.0 × 11.0	0.5	2222 460 76802	.. 86802	.. 06802	.. 16802	
7500		0.5	2222 460 77502	.. 87502	.. 07502	.. 17502	
8200		0.6	2222 460 78202	.. 88202	.. 08202	.. 18202	
9100		0.6	2222 460 79102	.. 89102	.. 09102	.. 19102	
$l_t = 28.0 \text{ mm}$; $d_t = 0.60 \pm 0.06 \text{ mm}$							
10000	6.0 × 15.0	0.6	2222 460 71003	.. 81003			
11000		0.6	2222 460 71103	.. 81103			
12000		0.7	2222 460 71203	.. 81203			
13000		0.8	2222 460 71303	.. 81303			
15000		0.7	2222 460 71503	.. 81503	–	–	
16000		0.7	2222 460 71603	.. 81603			
18000		0.8	2222 460 71803	.. 81803			
20000		0.8	2222 460 72003	.. 82003			
22000		0.9	2222 460 72203	.. 82203			
24000	6.5 × 15.0	0.9	2222 460 72403	.. 82403	–	–	
27000		1.0	2222 460 72703	.. 82703			
30000	7.0 × 15.0	1.1	2222 460 73003	.. 83003			
33000		1.2	2222 460 73303	.. 83303	–	–	
36000		1.2	2222 460 73603	.. 83603			
39000	7.5 × 15.0	1.3	2222 460 73903	.. 83903	–	–	
43000		1.4	2222 460 74303	.. 84303			
47000	8.0 × 15.0	1.5	2222 460 74703	.. 84703	–	–	
51000		1.6	2222 460 75103	.. 85103			
56000	8.5 × 15.0	1.7	2222 460 75603	.. 85603	–	–	
62000		1.8	2222 460 76203	.. 86203			

Polypropylene film foil capacitors

KP 461

KP 461 GENERAL DATA

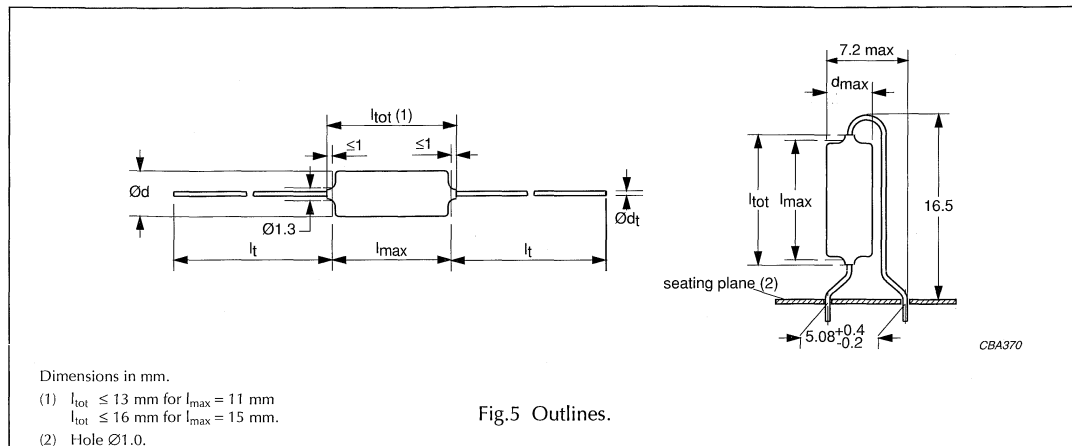


Fig.5 Outlines.

Specific reference data for the 160 V DC capacitors

DESCRIPTION	VALUE	
	at 1 kHz	at 100 kHz
Tangent of loss angle:		
1000 pF < C ≤ 5000 pF	$\leq 5 \times 10^{-4}$	$\leq 10 \times 10^{-4}$
5000 pF < C ≤ 20000 pF	$\leq 5 \times 10^{-4}$	$\leq 15 \times 10^{-4}$
20000 pF < C ≤ 39000 pF	$\leq 5 \times 10^{-4}$	$\leq 25 \times 10^{-4}$
Rated voltage pulse slope (dU/dt) _R at 160 V (DC)	10000 V/μs	
R between leads; at 100 V; 1 minute	>100000 MΩ	
R between interconnected leads and case; 100 V; 1 minute	>100000 MΩ	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	320 V; 1 minute	
Withstanding (DC) voltage between leads and case	400 V; 1 minute	

Available 160 V DC versions

PACKAGING	C-tol	FIRST 8 DIGITS OF CATALOGUE NUMBER	ORDERING
Taped on reel	±1%	2222 461 8....	preferred
	±2%	2222 461 7....	preferred
	±5%	2222 461 6....	on request
Loose in box	±1%	2222 461 4....	on request
	±2%	2222 461 3....	on request
	±5%	2222 461 2....	on request
Unidirectional	±1%	2222 461 1....	on request
	±2%	2222 461 0....	on request

Available on request

PACKAGING	TAPE DISTANCE (mm)
Taped in ammopack	52.5
	63.5
Taped on reel	52.5

Polypropylene film foil capacitors

KP 461

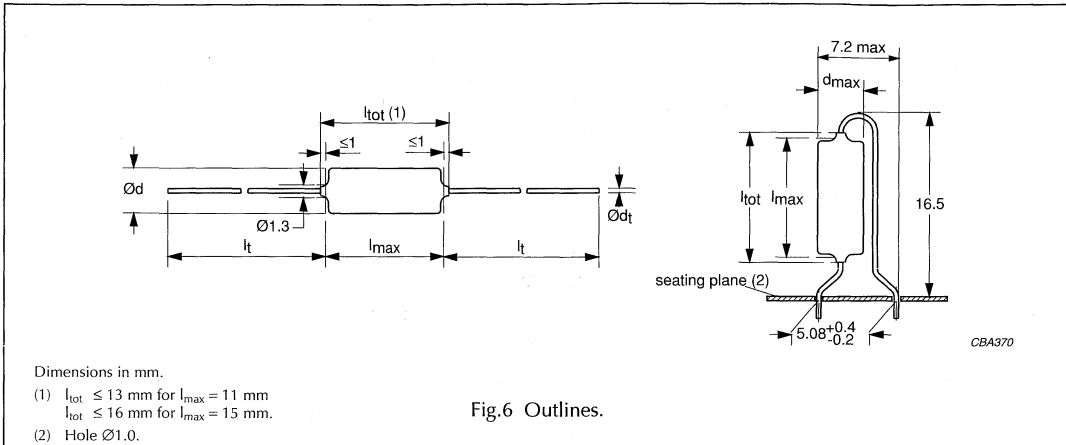
 $U_{Rdc} = 160 \text{ V}$; $U_{Rac} = 63 \text{ V}$

C (E 24) (pF)	DIMENSIONS $d_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER			
			TAPED ON REEL		UNIDIRECTIONAL	
			TAPE DISTANCE 63.5 mm			
			C-tol = $\pm 2\%$	C-tol = $\pm 1\%$	C-tol = $\pm 2\%$	C-tol = $\pm 1\%$
			catalogue number	last 5 digits	last 5 digits	last 5 digits
$l_t = 30.0 \text{ mm}$; $d_t = 0.60 \pm 0.06 \text{ mm}$						
3600	5.0 × 11.0	0.5	2222 461 73602	.. 83602	.. 03602	.. 13602
3900		0.5	2222 461 73902	.. 83902	.. 03902	.. 13902
4300		0.5	2222 461 74302	.. 84302	.. 04302	.. 14302
4700		0.5	2222 461 74702	.. 84702	.. 04702	.. 14702
5100		0.5	2222 461 75102	.. 85102	.. 05102	.. 15102
5600		0.5	2222 461 75602	.. 85602	.. 05602	.. 15602
6200		0.6	2222 461 76202	.. 86202	.. 06202	.. 16202
$l_t = 28.0 \text{ mm}$; $d_t = 0.60 \pm 0.06 \text{ mm}$						
6800	6.0 × 15.0	0.4	2222 461 76802	.. 86802		
7500		0.7	2222 461 77502	.. 87502		
8200		0.6	2222 461 78202	.. 88202		
9100		0.6	2222 461 79102	.. 89102		
10000		0.7	2222 461 71003	.. 81003	–	–
11000		0.7	2222 461 71103	.. 81103		
12000		0.7	2222 461 71203	.. 81203		
13000		0.8	2222 461 71303	.. 81303		
15000		0.8	2222 461 71503	.. 81503		
16000		6.5 × 15.0	0.9	2222 461 71603	.. 81603	
18000	0.9		2222 461 71803	.. 81803	–	–
20000	1.0		2222 461 72003	.. 82003		
22000	7.0 × 15.0	1.1	2222 461 72203	.. 82203		
24000		1.1	2222 461 72403	.. 82403	–	–
27000	7.5 × 15.0	1.2	2222 461 72703	.. 82703	–	–
30000	8.0 × 15.0	1.3	2222 461 73003	.. 83003		
33000		1.4	2222 461 73303	.. 83303	–	–
36000	8.5 × 15.0	1.5	2222 461 73603	.. 83603		
39000		1.6	2222 461 73903	.. 83903	–	–

Polypropylene film foil capacitors

KP 462

KP 462 GENERAL DATA



Specific reference data for the 250 V DC capacitors

DESCRIPTION	VALUE	
	at 1 kHz	at 100 kHz
Tangent of loss angle:		
1 000 pF < C ≤ 5000 pF	$\leq 5 \times 10^{-4}$	$\leq 10 \times 10^{-4}$
5 000 pF < C ≤ 20000 pF	$\leq 5 \times 10^{-4}$	$\leq 15 \times 10^{-4}$
20000 pF < C ≤ 22000 pF	$\leq 5 \times 10^{-4}$	$\leq 25 \times 10^{-4}$
Rated voltage pulse slope (dU/dt)R at 250 V (DC)	10000 V/μs	
R between leads; at 100 V; 1 minute	>100000 MΩ	
R between interconnected leads and case; 100 V; 1 minute	>100000 MΩ	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	500 V; 1 minute	
Withstanding (DC) voltage between leads and case	500 V; 1 minute	

Available 250 V DC versions

PACKAGING	C-tol	FIRST 8 DIGITS OF CATALOGUE NUMBER	ORDERING
Taped on reel	±1%	2222 462 8....	preferred
	±2%	2222 462 7....	preferred
	±5%	2222 462 6....	on request
Loose in box	±1%	2222 462 4....	on request
	±2%	2222 462 3....	on request
	±5%	2222 462 2....	on request
Unidirectional	±1%	2222 462 1....	on request
	±2%	2222 462 0....	on request

Available on request

PACKAGING	TAPE DISTANCE (mm)
Taped in ammopack	52.5
	63.5
Taped on reel	52.5

Polypropylene film foil capacitors

KP 462

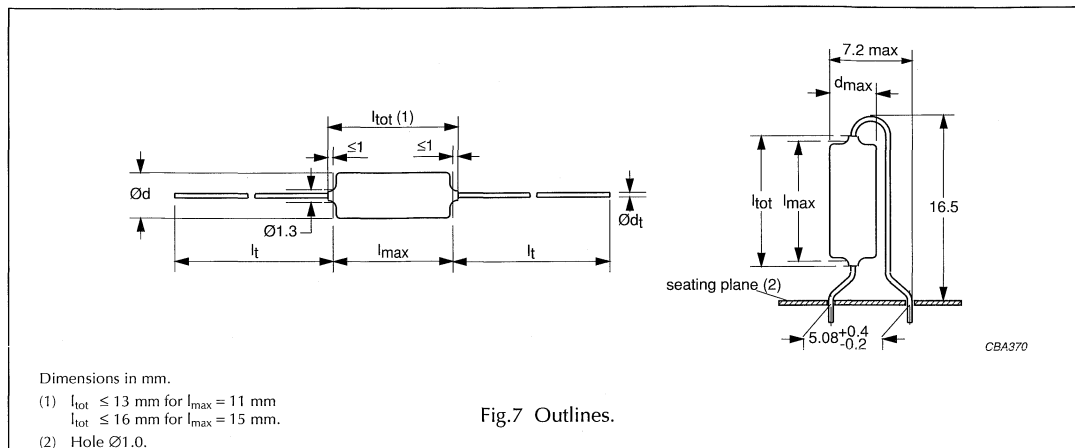
 $U_{Rdc} = 250 \text{ V}$; $U_{Rac} = 125 \text{ V}$

C (E 24) (pF)	DIMENSIONS $d_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER					
			TAPED ON REEL		UNIDIRECTIONAL			
			TAPE DISTANCE 63.5 mm					
			C-tol = $\pm 2\%$	C-tol = $\pm 1\%$	C-tol = $\pm 2\%$	C-tol = $\pm 1\%$		
			catalogue number	last 5 digits	last 5 digits	last 5 digits	last 5 digits	
$l_t = 30.0 \text{ mm}$; $d_t = 0.60 \pm 0.06 \text{ mm}$								
1200	5.0 × 11.0	0.5	2222 462 71202	.. 81202	.. 01202	.. 11202		
1300		0.5	2222 462 71302	.. 81302	.. 01302	.. 11302		
1500		0.4	2222 462 71502	.. 81502	.. 01502	.. 11502		
1600		0.5	2222 462 71602	.. 81602	.. 01602	.. 11602		
1800		0.6	2222 462 71802	.. 81802	.. 01802	.. 11802		
2000		0.6	2222 462 72002	.. 82002	.. 02002	.. 12002		
2200		0.5	2222 462 72202	.. 82202	.. 02202	.. 12202		
2400		0.5	2222 462 72402	.. 82402	.. 02402	.. 12402		
2700		0.5	2222 462 72702	.. 82702	.. 02702	.. 12702		
3000		0.5	2222 462 73002	.. 83002	.. 03002	.. 13002		
3300		0.5	2222 462 73302	.. 83302	.. 03302	.. 13302		
$l_t = 28.0 \text{ mm}$; $d_t = 0.60 \pm 0.06 \text{ mm}$								
3600		6.0 × 15.0	0.5	2222 462 73602	.. 83602			
3900	0.5		2222 462 73902	.. 83902				
4300	0.6		2222 462 74302	.. 84302				
4700	0.6		2222 462 74702	.. 84702				
5100	0.6		2222 462 75102	.. 85102	–	–		
5600	0.6		2222 462 75602	.. 85602				
6200	0.7		2222 462 76202	.. 86202				
6800	0.7		2222 462 76802	.. 86802				
7500	0.7		2222 462 77502	.. 87502				
8200	6.5 × 15.0	0.8	2222 462 78202	.. 88202				
9100		0.8	2222 462 79102	.. 89102	–	–		
10000		0.9	2222 462 71003	.. 81003				
11000	7.0 × 15.0	0.9	2222 462 71103	.. 81103				
12000		1.0	2222 462 71203	.. 81203	–	–		
13000		1.0	2222 462 71303	.. 81303				
15000	7.5 × 15.0	1.1	2222 462 71503	.. 81503	–	–		
16000		1.2	2222 462 71603	.. 81603				
18000	8.0 × 15.0	1.3	2222 462 71803	.. 81803	–	–		
20000	8.5 × 15.0	1.4	2222 462 72003	.. 82003	–	–		
22000		1.5	2222 462 72203	.. 82203				

Polypropylene film foil capacitors

KP 463

KP 463 GENERAL DATA



Specific reference data for the 400 V DC capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 100 kHz	at 1MHz ⁽¹⁾
Tangent of loss angle:			
$C \leq 1000$ pF	$\leq 5 \times 10^{-4}$	–	$\leq 10 \times 10^{-4}$
1000 pF $< C \leq 5000$ pF	$\leq 5 \times 10^{-4}$	$\leq 10 \times 10^{-4}$	–
Rated voltage pulse slope (dU/dt)R at 400 V (DC)	10000 V/ μ s		
R between leads; at 100 V; 1 minute	>100000 M Ω		
R between interconnected leads and case; 100 V; 1 minute	>100000 M Ω		
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	800 V; 1 minute		
Withstanding (DC) voltage between leads and case	800 V; 1 minute		

Note

1. For unidirectional capacitors $\leq 13 \times 10^{-4}$.

Available 400 V DC versions

PACKAGING	C-tol	FIRST 8 DIGITS OF CATALOGUE NUMBER	ORDERING
Taped on reel; notes	$\pm 1\%$	2222 463 8....	preferred
	$\pm 2\%$	2222 463 7....	preferred
	$\pm 5\%$	2222 463 6....	on request
Loose in box	$\pm 1\%$	2222 463 4....	on request
	$\pm 2\%$	2222 463 3....	on request
	$\pm 5\%$	2222 463 2....	on request
Unidirectional	$\pm 1\%$	2222 463 1....	on request
	$\pm 2\%$	2222 463 0....	on request

Available on request

PACKAGING	TAPE DISTANCE (mm)
Taped in ammopack	52.5
	63.5
Taped on reel	52.5

Polypropylene film foil capacitors

KP 463

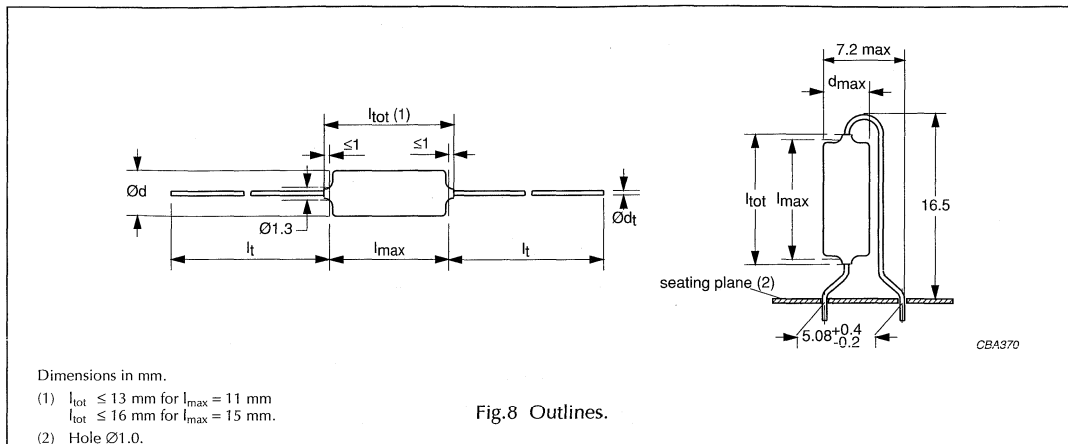
 $U_{Rdc} = 400 \text{ V}$; $U_{Rac} = 160 \text{ V}$

C (E 24) (pF)	DIMENSIONS $d_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER			
			TAPED ON REEL		UNIDIRECTIONAL	
			TAPE DISTANCE 63.5 mm			
			C-tol = $\pm 2\%$		C-tol = $\pm 1\%$	
			catalogue number	last 5 digits	last 5 digits	last 5 digits
$l_t = 30.0 \text{ mm}$; $d_t = 0.60 \pm 0.06 \text{ mm}$						
620	5.0 × 11.0	0.5	2222 463 76201	.. 86201	.. 06201	.. 16201
680		0.5	2222 463 76801	.. 86801	.. 06801	.. 16801
750		0.5	2222 463 77501	.. 87501	.. 07501	.. 17501
820		0.5	2222 463 78201	.. 88201	.. 08201	.. 18201
910		0.5	2222 463 79101	.. 89101	.. 09101	.. 19101
1000		0.5	2222 463 71002	.. 81002	.. 01002	.. 11002
1100		0.5	2222 463 71102	.. 81102	.. 01102	.. 11102
$l_t = 28.0 \text{ mm}$; $d_t = 0.60 \pm 0.06 \text{ mm}$						
1200	6.0 × 15.0	0.5	2222 463 71202	.. 81202		
1300		0.5	2222 463 71302	.. 81302		
1500		0.5	2222 463 71502	.. 81502		
1600		0.5	2222 463 71602	.. 81602	-	-
1800		0.5	2222 463 71802	.. 81802		
2000		0.5	2222 463 72002	.. 82002		
2200	6.5 × 15.0	0.5	2222 463 72202	.. 82202		
2400		0.5	2222 463 72402	.. 82402		
2700		0.6	2222 463 72702	.. 82702	-	-
3000		0.7	2222 463 73002	.. 83002		
3300	7.0 × 15.0	0.7	2222 463 73302	.. 83302		
3600		0.7	2222 463 73602	.. 83602	-	-
3900		0.8	2222 463 73902	.. 83902		
4300	7.5 × 15.0	0.8	2222 463 74302	.. 84302		
4700		0.9	2222 463 74702	.. 84702	-	-
5100		0.9	2222 463 75102	.. 85102		
5600	8.0 × 15.0	1.0	2222 463 75602	.. 85602	-	-
6200		1.0	2222 463 76202	.. 86202		
6800	8.5 × 15.0	1.1	2222 463 76802	.. 86802		
7500		1.2	2222 463 77502	.. 87502	-	-
8200		1.3	2222 463 78202	.. 88202		

Polypropylene film foil capacitors

KP 464

KP 464 GENERAL DATA



Specific reference data for the 630 V DC capacitors

DESCRIPTION	VALUE	
	at 1 kHz	at 1 MHz ⁽¹⁾
Tangent of loss angle: $C \leq 560$ pF	$\leq 5 \times 10^{-4}$	$\leq 10 \times 10^{-4}$
Rated voltage pulse slope (dU/dt)R at 630 V (DC)	10000 V/ μ s	
R between leads; at 500 V; 1 minute	>100000 M Ω	
R between interconnected leads and case; 500 V; 1 minute	>100000 M Ω	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	1260 V; 1 minute	
Withstanding (DC) voltage between leads and case	1260 V; 1 minute	

Note

1. For unidirectional capacitors $\leq 13 \times 10^{-4}$.

Available 630 V DC versions

PACKAGING	C-tol	FIRST 8 DIGITS OF CATALOGUE NUMBER	ORDERING
Taped on reel	$\pm 1\%$	2222 464 8....	preferred
	$\pm 2\%$	2222 464 7....	preferred
	$\pm 5\%$	2222 464 6....	on request
Loose in box	$\pm 1\%$	2222 464 4....	on request
	$\pm 2\%$	2222 464 3....	on request
	$\pm 5\%$	2222 464 2....	on request
Unidirectional	$\pm 1\%$	2222 464 1....	on request
	$\pm 2\%$	2222 464 0....	on request

Available on request

PACKAGING	TAPE DISTANCE (mm)
Taped in ammpack	52.5
	63.5
Taped on reel	52.5

Polypropylene film foil capacitors

KP 464

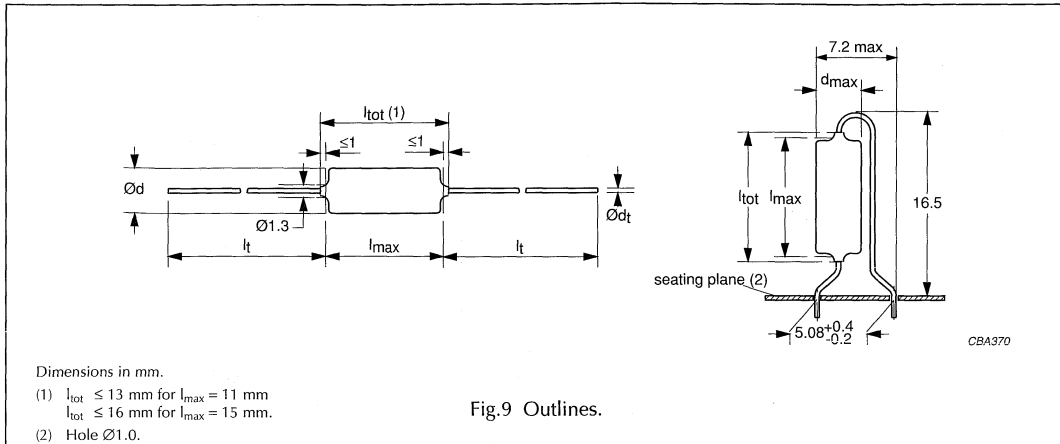
 $U_{Rdc} = 630 \text{ V}$; $U_{Rac} = 200 \text{ V}$

C (E 24) (pF)	DIMENSIONS $d_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER			
			TAPED ON REEL		UNIDIRECTIONAL	
			TAPE DISTANCE 63.5 mm			
			C-tol = $\pm 2\%$	C-tol = $\pm 1\%$	C-tol = $\pm 2\%$	C-tol = $\pm 1\%$
			catalogue number	last 5 digits	last 5 digits	last 5 digits
$l_t = 30.0 \text{ mm}$; $d_t = 0.60 \pm 0.06 \text{ mm}$						
47	5.0 × 11.0	0.4	2222 464 74709	.. 84709	.. 04709	.. 14709
51		0.4	2222 464 75109	.. 85109	.. 05109	.. 15109
56		0.4	2222 464 75609	.. 85609	.. 05609	.. 15609
62		0.4	2222 464 76209	.. 86209	.. 06209	.. 16209
68		0.4	2222 464 76809	.. 86809	.. 06809	.. 16809
75		0.4	2222 464 77509	.. 87509	.. 07509	.. 17509
82		0.4	2222 464 78209	.. 88209	.. 08209	.. 18209
91		0.4	2222 464 79109	.. 89109	.. 09109	.. 19109
100		0.4	2222 464 71001	.. 81001	.. 01001	.. 11001
110		0.4	2222 464 71101	.. 81101	.. 01101	.. 11101
120		0.4	2222 464 71201	.. 81201	.. 01201	.. 11201
130		0.5	2222 464 71301	.. 81301	.. 01301	.. 11301
150		0.4	2222 464 71501	.. 81501	.. 01501	.. 11501
160		0.4	2222 464 71601	.. 81601	.. 01601	.. 11601
180		0.5	2222 464 71801	.. 81801	.. 01801	.. 11801
200		0.5	2222 464 72001	.. 82001	.. 02001	.. 12001
220		0.6	2222 464 72201	.. 82201	.. 02201	.. 12201
240		0.6	2222 464 72401	.. 82401	.. 02401	.. 12401
270		0.6	2222 464 72701	.. 82701	.. 02701	.. 12701
300		0.7	2222 464 73001	.. 83001	.. 03001	.. 13001
330		0.4	2222 464 73301	.. 83301	.. 03301	.. 13301
360		0.4	2222 464 73601	.. 83601	.. 03601	.. 13601
390		0.5	2222 464 73901	.. 83901	.. 03901	.. 13901
430		0.5	2222 464 74301	.. 84301	.. 04301	.. 14301
470		0.5	2222 464 74701	.. 84701	.. 04701	.. 14701
510		0.5	2222 464 75101	.. 85101	.. 05101	.. 15101
560		0.5	2222 464 75601	.. 85601	.. 05601	.. 15601

Polypropylene film foil capacitors

KP 464

KP 464 GENERAL DATA



Specific reference data for the 630 V DC capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 100 kHz	at 1 MHz
Tangent of loss angle: $C \leq 1000$ pF 1000 pF < $C \leq 4700$ pF	$\leq 5 \times 10^{-4}$	–	$\leq 10 \times 10^{-4}$
Rated voltage pulse slope (dU/dt)R at 630 V (DC)	10000 V/μs		
R between leads; at 500 V; 1 minute	>100000 MΩ		
R between interconnected leads and case; 500 V; 1 minute	>100000 MΩ		
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	1260 V; 1 minute		
Withstanding (DC) voltage between leads and case	1260 V; 1 minute		

Available 630 V DC versions

PACKAGING	C-tol	FIRST 8 DIGITS OF CATALOGUE NUMBER	ORDERING
Taped on reel	±1%	2222 464 8....	preferred
	±2%	2222 464 7....	preferred
	±5%	2222 464 6....	on request
Loose in box	±1%	2222 464 4....	on request
	±2%	2222 464 3....	on request
	±5%	2222 464 2....	on request
Unidirectional	±1%	2222 464 1....	on request
	±2%	2222 464 0....	on request

Available on request

PACKAGING	TAPE DISTANCE (mm)
Taped in ammpack	52.5
	63.5
Taped on reel	52.5

Polypropylene film foil capacitors

KP 460 to 464

 $U_{Rdc} = 630 \text{ V}$; $U_{Rac} = 200 \text{ V}$

C (E 24) (pF)	DIMENSIONS $d_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER	
			TAPED ON REEL	
			TAPE DISTANCE 63.5 mm	
			C-tol = $\pm 2\%$	C-tol = $\pm 1\%$
			catalogue number	last 5 digits
$l_t = 28.0 \text{ mm}$; $d_t = 0.60 \pm 0.06 \text{ mm}$				
620	6.0 × 15.0	0.5	2222 464 76201	.. 86201
680		0.5	2222 464 76801	.. 86801
750		0.5	2222 464 77501	.. 87501
820		0.5	2222 464 78201	.. 88201
910		0.5	2222 464 79101	.. 89101
1000		0.5	2222 464 71002	.. 81002
1100		0.5	2222 464 71102	.. 81102
1200		0.5	2222 464 71202	.. 81202
1300	6.5 × 15.0	0.6	2222 464 71302	.. 81302
1500		0.6	2222 464 71502	.. 81502
1600		0.7	2222 464 71602	.. 81602
1800		0.7	2222 464 71802	.. 81802
2000	7.0 × 15.0	0.8	2222 464 72002	.. 82002
2200		0.9	2222 464 72202	.. 82202
2400		0.9	2222 464 72402	.. 82402
2700	7.5 × 15.0	0.9	2222 464 72702	.. 82702
3000		1.0	2222 464 73002	.. 83002
3300	8.0 × 15.0	1.1	2222 464 73302	.. 83302
3600		1.2	2222 464 73602	.. 83602
3900		1.3	2222 464 73902	.. 83902
4300	8.5 × 15.0	1.4	2222 464 74302	.. 84302
4700		1.5	2222 464 74702	.. 84702

Polypropylene film foil capacitors

KP 460 to 464

CONSTRUCTION

Description

- Low-inductive wound cell of metal foil and a polypropylene film
- Protected by a hard, water-repellent solvent-resistant blue epoxy lacquer
- Axial iron leads, solder-coated.

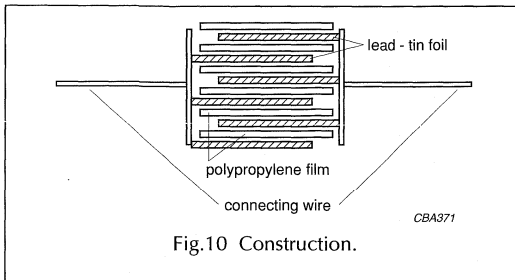


Fig.10 Construction.

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.

SPECIFIC METHOD OF MOUNTING TO WITHSTAND VIBRATION AND SHOCK

The capacitors shall be mechanically fixed by the leads.

SOLDERING CONDITIONS

The capacitance stability is dependent on the maximum temperature the capacitor reaches during soldering. Figure 11 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.

Storage temperature

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

RATINGS AND CHARACTERISTICS REFERENCE CONDITIONS

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 $50 \pm 2\%$.

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

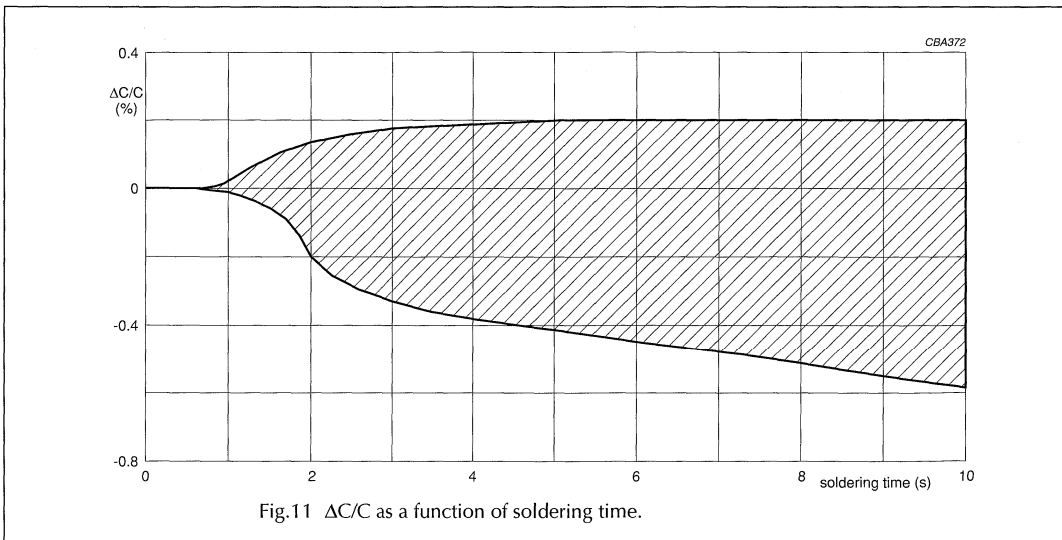


Fig.11 $\Delta C/C$ as a function of soldering time.

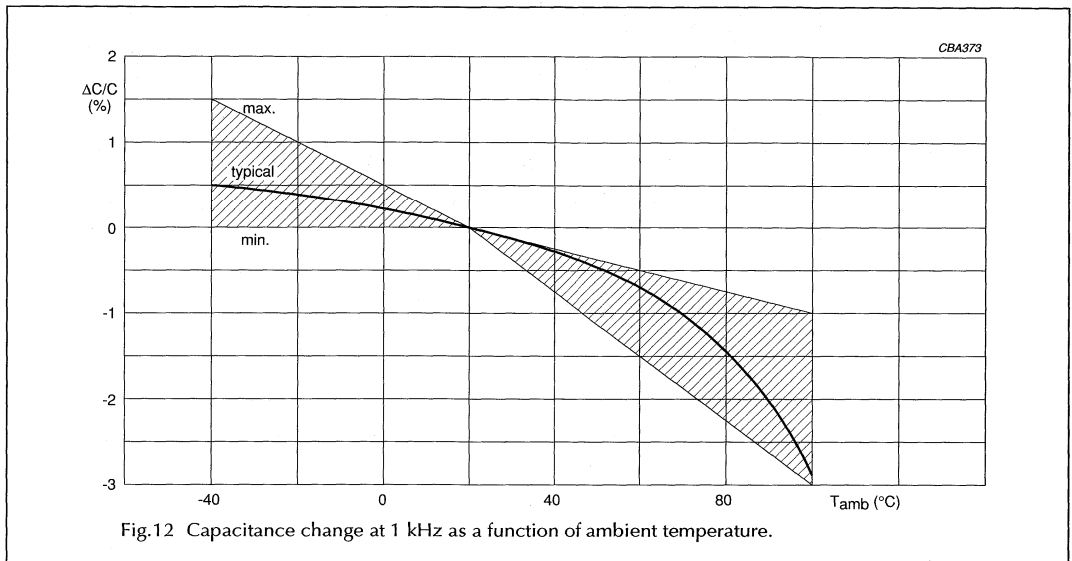
Polypropylene film foil capacitors

KP 460 to 464

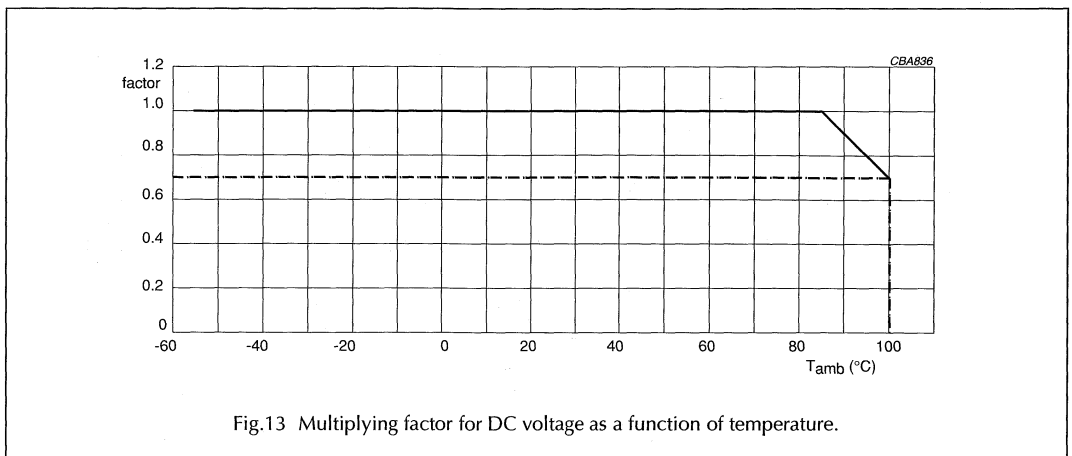
CHARACTERISTICS

Capacitance

- Temperature coefficient:
 - between -40 and $+20$ °C for $C \leq 1000$ pF: $-(125 \pm 125) \times 10^{-6}/K$
 - between -40 and $+20$ °C for $C > 1000$ pF: $-(125 \pm 60) \times 10^{-6}/K$
 - between $+20$ and $+100$ °C: $-(250 \pm 120) \times 10^{-6}/K$.



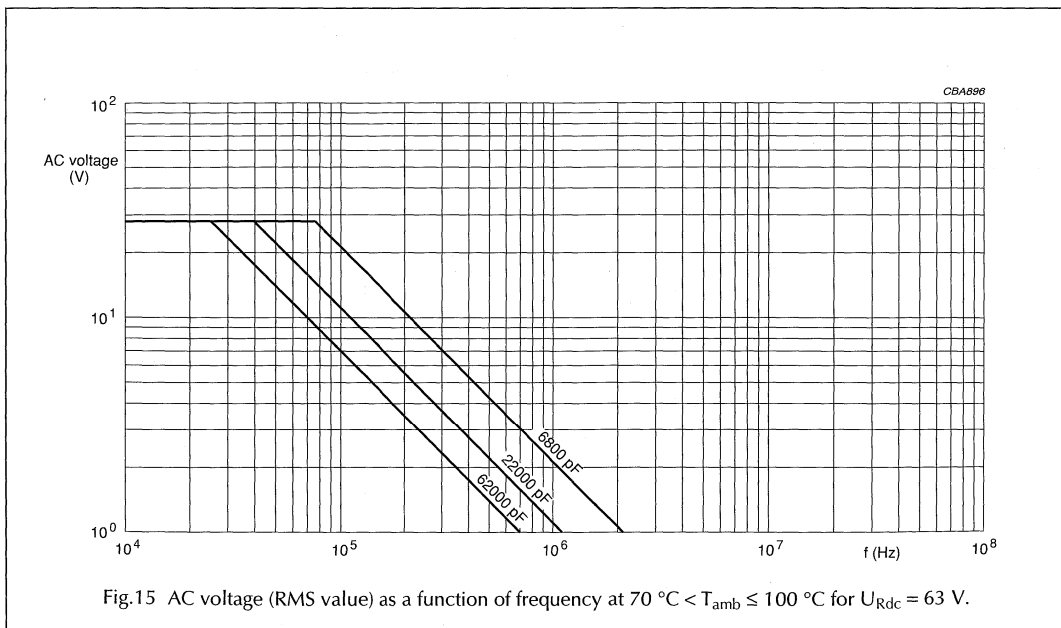
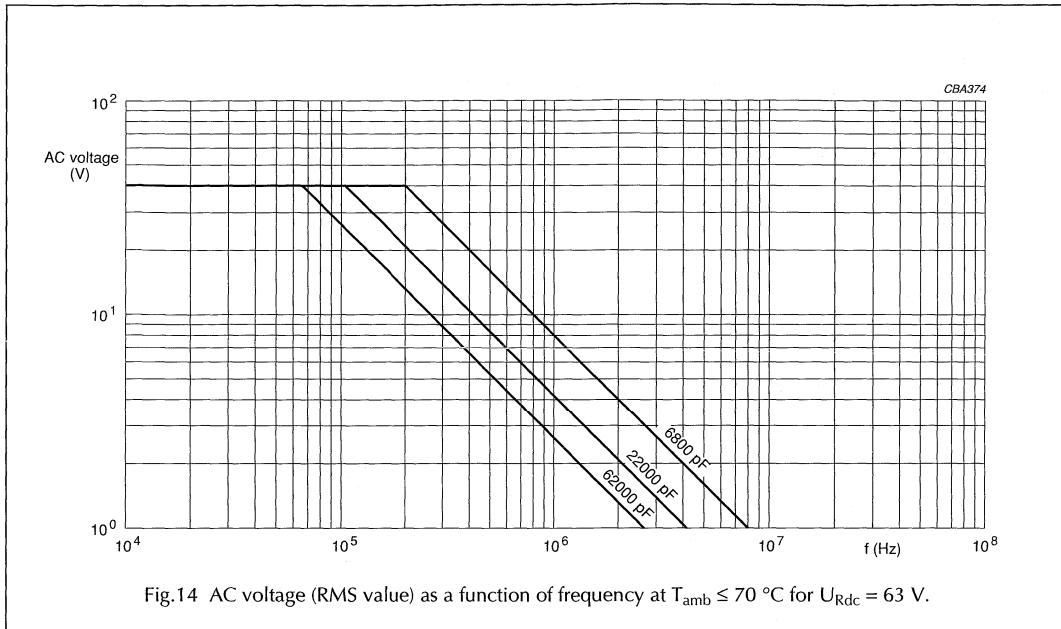
Maximum DC voltage as a function of temperature



Polypropylene film foil capacitors

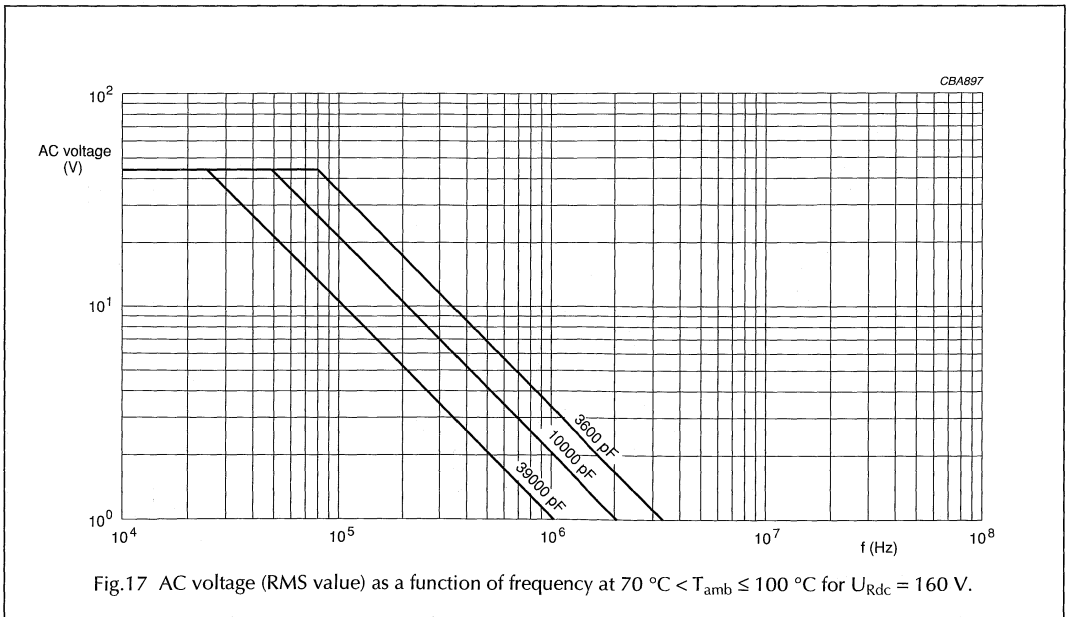
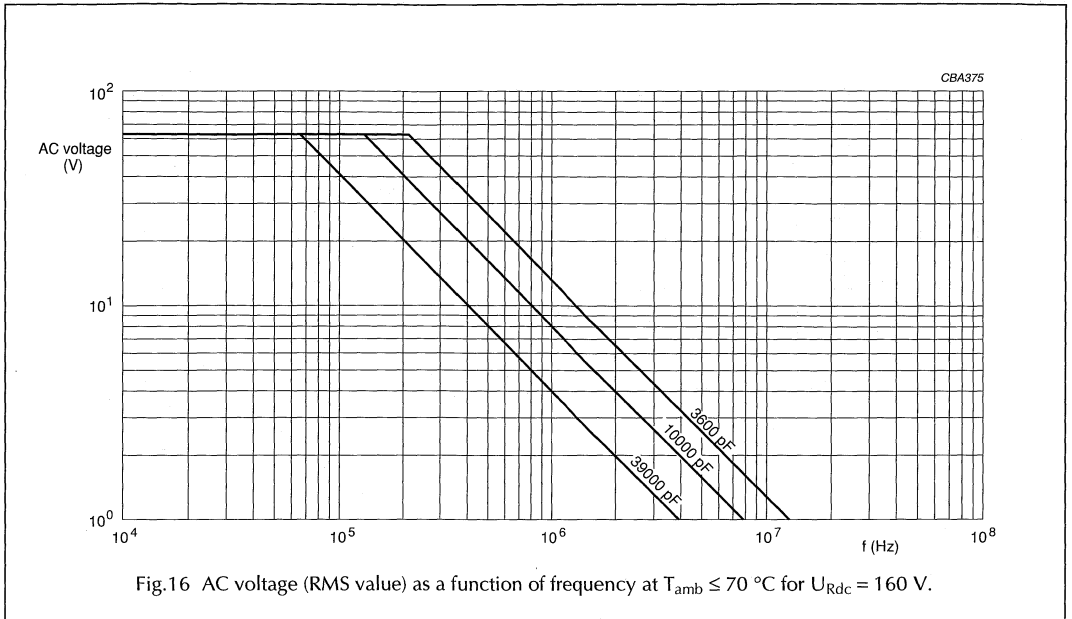
KP 460 to 464

Maximum RMS voltage (sinewave) as a function of frequency



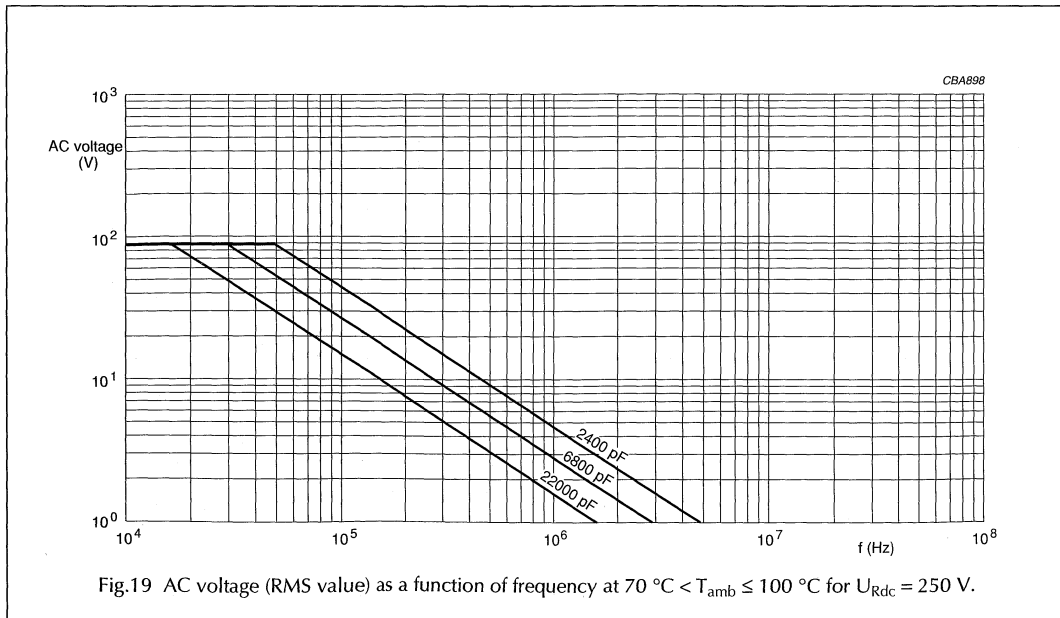
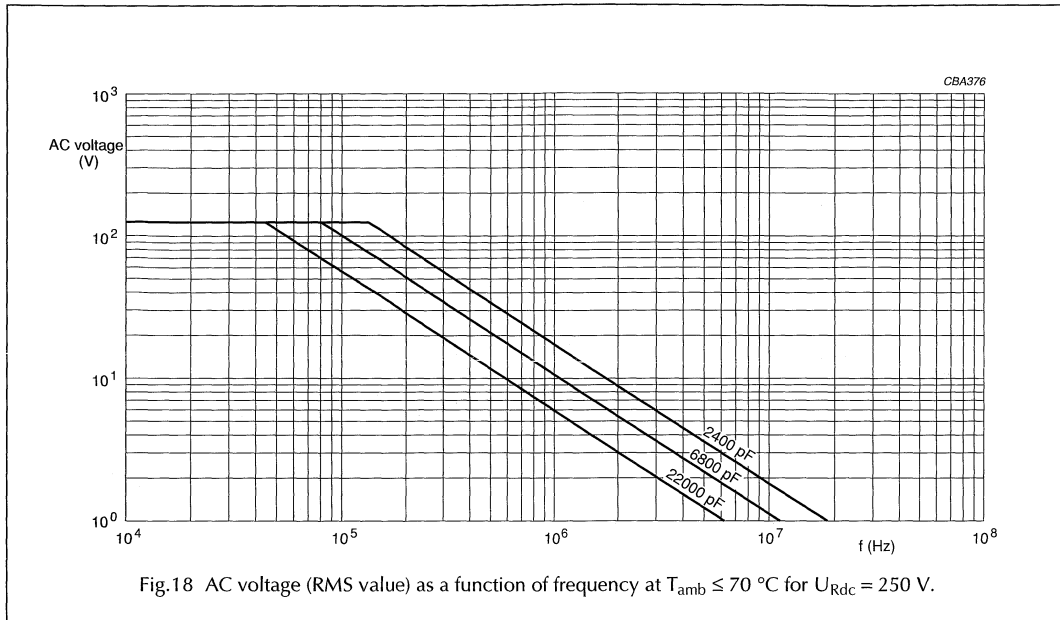
Polypropylene film foil capacitors

KP 460 to 464



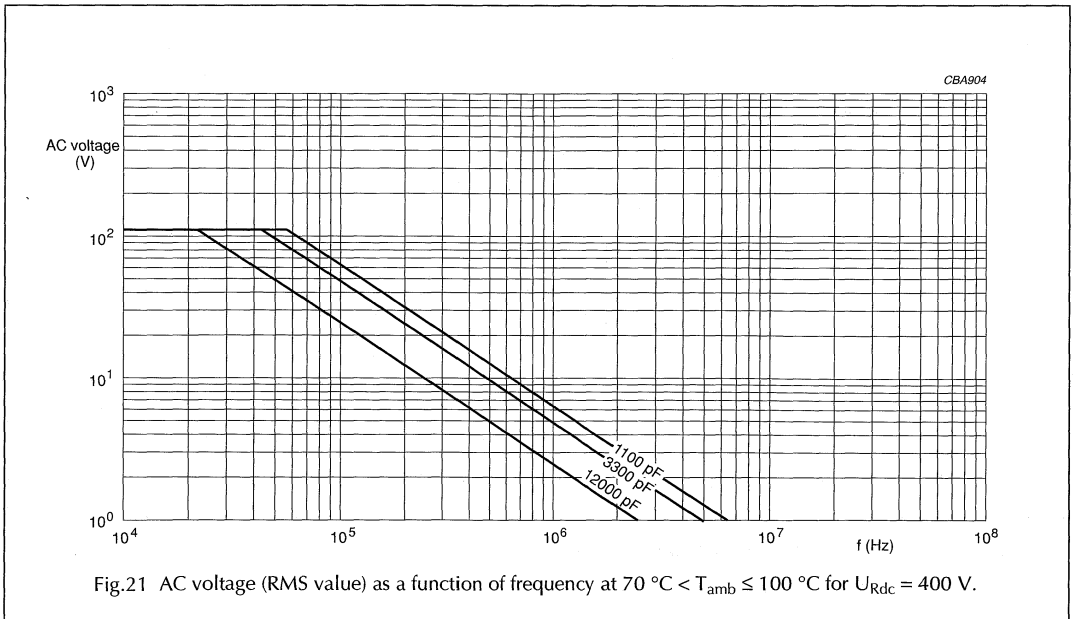
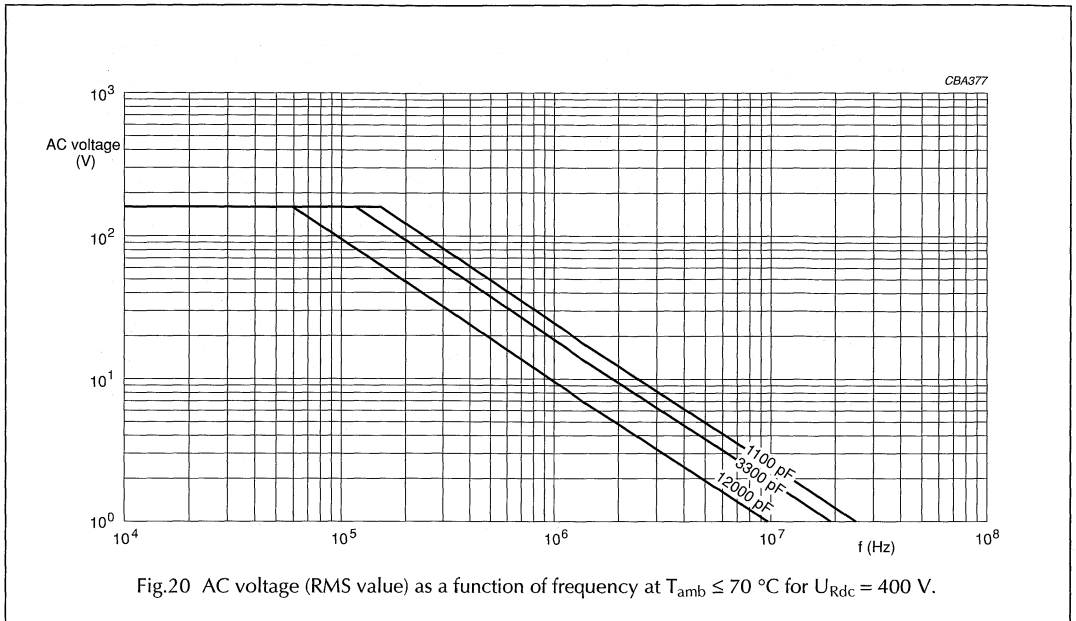
Polypropylene film foil capacitors

KP 460 to 464



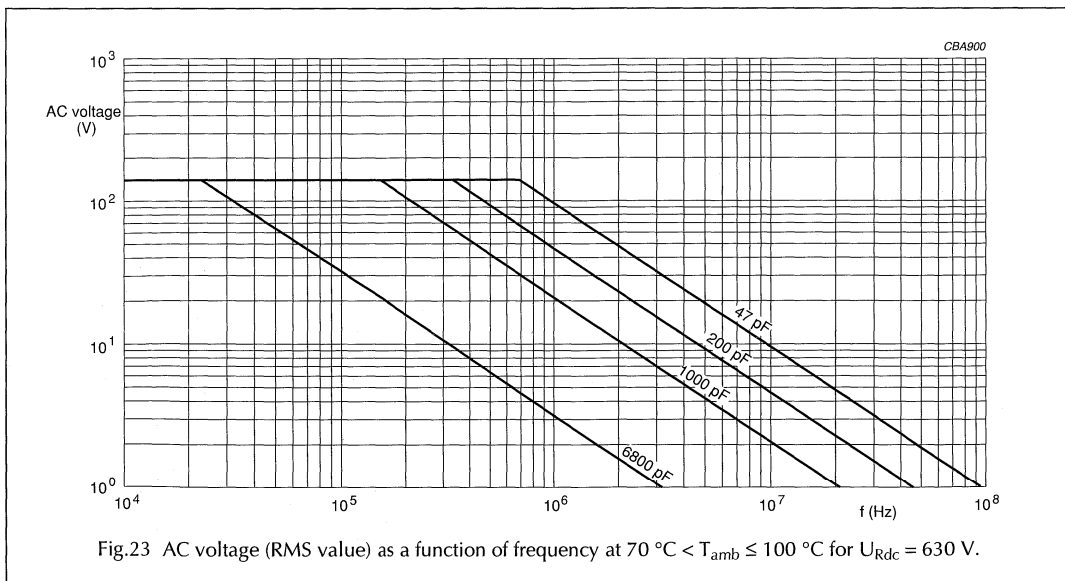
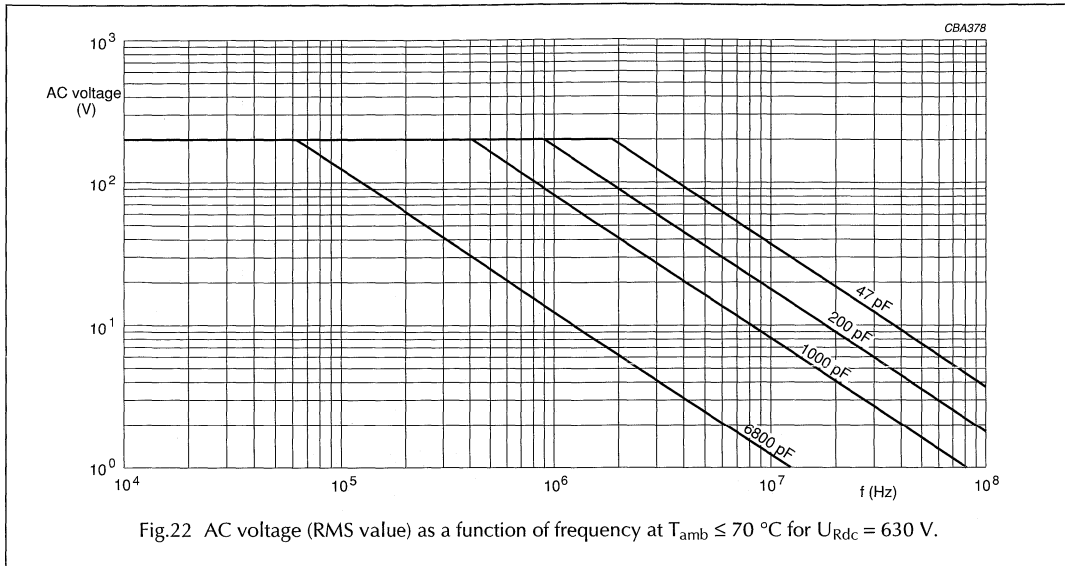
Polypropylene film foil capacitors

KP 460 to 464



Polypropylene film foil capacitors

KP 460 to 464



Maximum RMS current (sinewave) as a function of frequency

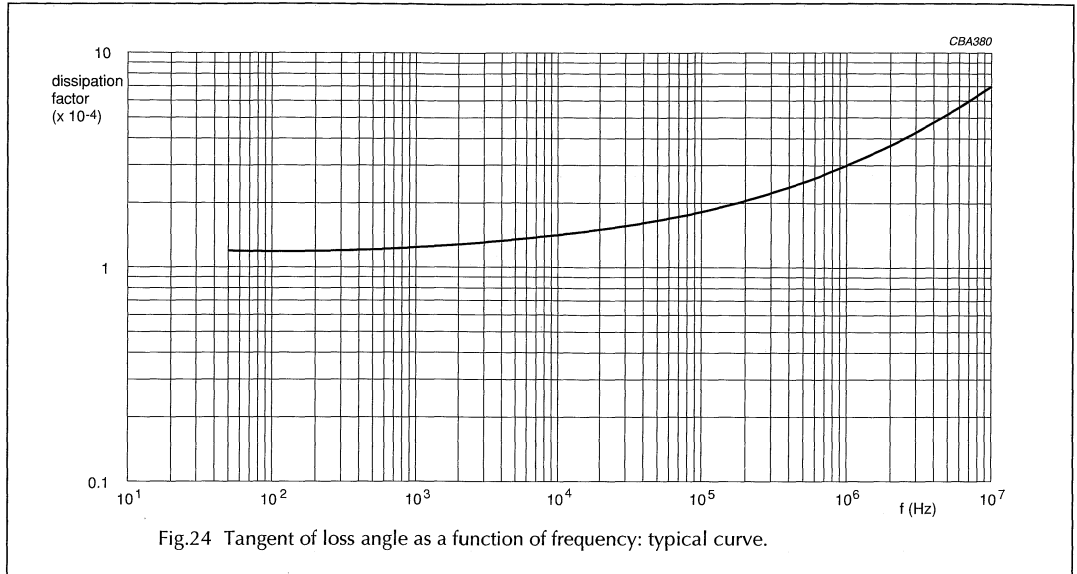
The maximum RMS current is defined by $I_{ac} = \omega \times C \times U_{ac}$.

U_{ac} is the maximum AC voltage depending on the ambient temperature in Figs 14 to 23.

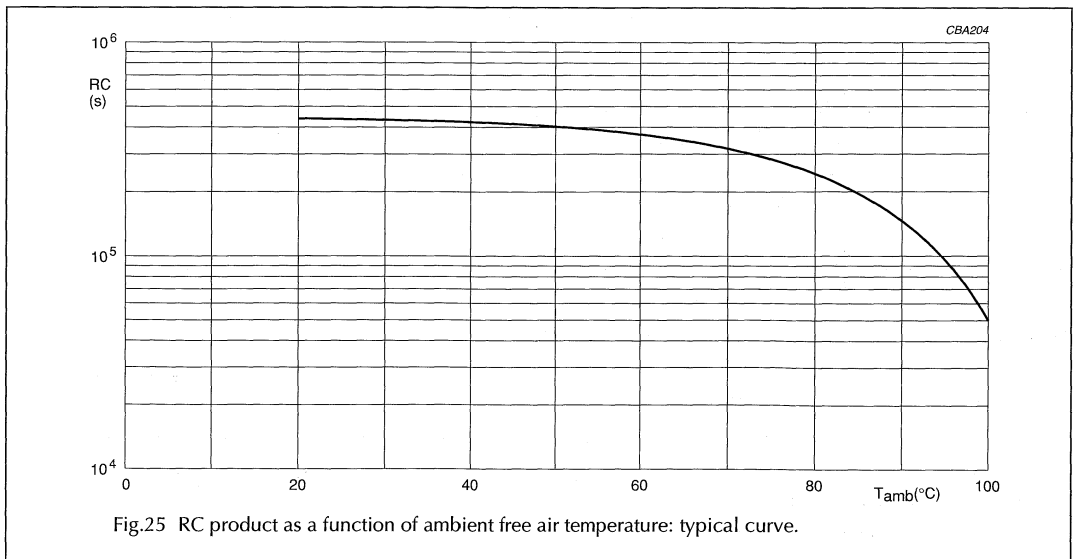
Polypropylene film foil capacitors

KP 460 to 464

Tangent of loss angle



Insulation resistance



Inductance

- L dependent on lead and capacitor length: ≤ 10 nH/cm.

Polypropylene film foil capacitors

KP 460 to 464

Maximum allowed component temperature rise (ΔT) as a function of the ambient temperature (T_{amb})

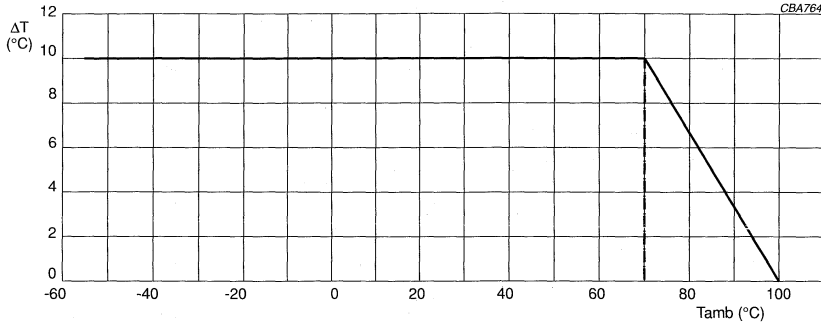


Fig.26 Maximum allowed component temperature rise as a function of the ambient temperature.

Heat conductivity (G) as a function of body dimensions in mW/°C

Table 1 Heat conductivity

$d_{max} \times l_{max}$ (mm)	G (mW/°C)
5.0 × 11.0	2.7
5.5 × 15.0	4.3
6.0 × 15.0	4.7
7.0 × 15.0	5.3
7.5 × 15.0	5.7
8.0 × 15.0	6.3
8.5 × 15.0	6.7

Power dissipation and maximum component temperature rise

The power dissipation must be limited in order not to exceed the maximum allowed component temperature rise as a function of the free air ambient temperature.

The power dissipation can be calculated according chapter "Introduction", section "Maximum power dissipation".

The component temperature rise (ΔT) can be measured (see section "Measuring the component temperature" for more details) or calculated by $\Delta T = P/G$:

- ΔT = component temperature rise (°C).
- P = power dissipation of the component (mW).
- G = heat conductivity of the component (mW/°C).

Polypropylene film foil capacitors

KP 460 to 464

Measuring the component temperature

A thermocouple must be attached to the capacitor body as in Fig.27.

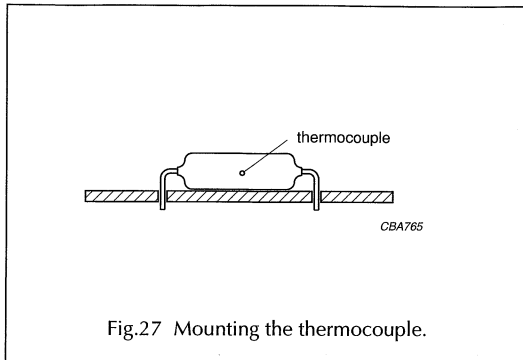


Fig.27 Mounting the thermocouple.

The temperature is measured in unloaded (T_{amb}) and maximum loaded condition (T_c).

The temperature rise is given by $\Delta T = T_c - T_{amb}$.

To avoid radiation or convection, the capacitor should be tested in a wind-free box.

Application note and limiting conditions

To select the capacitor for a certain application, the following 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 the maximum U_{p-p} to avoid the ionisation inception level.
3. The voltage pulse slope (dU/dt) shall not exceed the rated voltage pulse slope in an RC-circuit at rated voltage and without ringing. If the pulse voltage is lower than the rated DC voltage, the rated voltage pulse slope may be multiplied by U_{Rdc} and divided by the applied voltage.

For all other pulses following equation must be fulfilled:

$$2 \times \int_0^T \left(\frac{dU}{dt} \right)^2 \times dt < U_{Rdc} \times \left(\frac{dU}{dt} \right)_{rated}$$

T is the pulse duration.

4. The maximum component surface temperature rise must be lower than the limits in Fig.26.
5. The maximum component surface temperature must be lower than 100 °C.
6. The capacitance drift is influenced by the soldering conditions (see section "Soldering conditions" for more details).

Polypropylene film foil capacitors**KP 460 to 464****MARKING****Product marking**

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

1. Rated capacitance code in accordance with "IEC 60062"
2. Tolerance on rated capacitance: F = $\pm 1\%$; G $\pm 2\%$; J = $\pm 5\%$
3. Rated (DC) voltage (e.g. 63 V)
4. Code for dielectric material (KP)
5. Production date code in accordance with "IEC 60062; clause 5"
6. Manufacturer.

MARKING EXAMPLE

8n2
 G 63
 KPK2 (see Table 2)
 BC.

Table 2 Letter codes for year and numbers for month of production

YEAR	LETTER CODE	MONTH	CODE
1998	K	January	1
1999	L	February	2
2000	M	March	3
2001	N	April	4
2002	P	May	5
2003	R	June	6
2004	S	July	7
2005	T	August	8
2006	U	September	9
2007	V	October	O
2008	W	November	N
2009	X	December	D

Polypropylene film foil capacitors

KP 460 to 464

QUICK REFERENCE TEST REQUIREMENTS

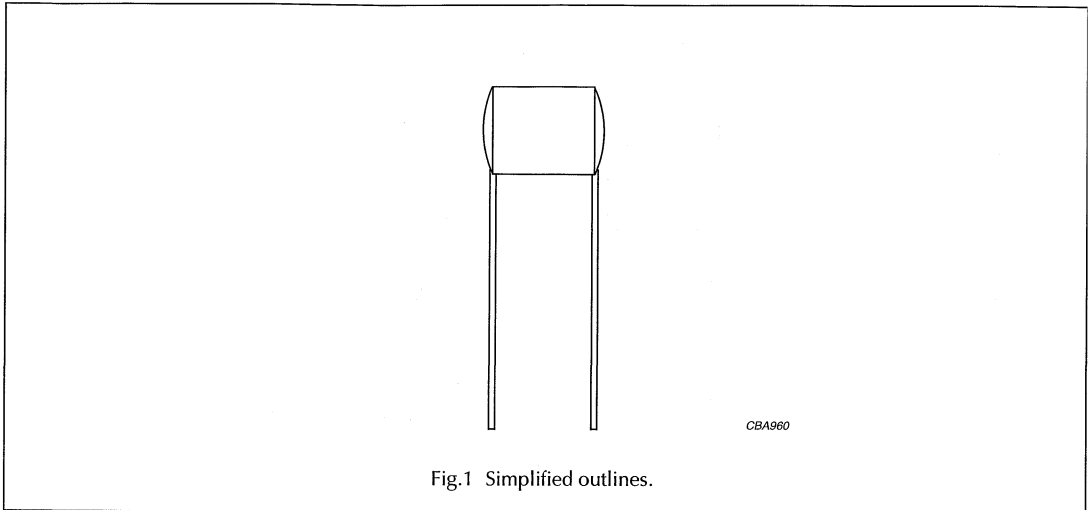
TEST	PROCEDURE (quick reference)	REQUIREMENTS
Robustness of leads		
Tensile: "IEC 60068-2-21"	load 10 N; 10 s	no visible damage legible marking $ \Delta C/C \leq 2\% + 1 \text{ pF}$ ($C \leq 1100 \text{ pF}$) $ \Delta C/C \leq 1\%$ ($C > 1100 \text{ pF}$)
Bending: "IEC 60068-2-21"	load 5 N; $4 \times 90^\circ$	
Torsion:	$2 \times 180^\circ$	
Resistance to soldering heat: "IEC 60068-2-20"	solder bath: 260°C ; 5 s	
Component solvent resistance	isopropyl alcohol; 23°C ; 5 minutes	
Robustness of component		
Vibration: "IEC 60068-2-6"	10 to 55 Hz; amplitude 0.75 mm or acceleration 98 m/s^2 ; 6 hours	$ \Delta C/C \leq 2\% + 1 \text{ pF}$ ($C \leq 1100 \text{ pF}$) $ \Delta C/C \leq 1\%$ ($C > 1100 \text{ pF}$) $R_{\text{ins}} \geq 50\%$ of specified value
Shock: "IEC 60068-2-27"	half sinewave; 490 m/s^2 ; 11 ms	
Climatic sequence		
Dry heat: "IEC 60068-2-2"	16 hours; 100°C	$ \Delta C/C \leq 1\% + 1 \text{ pF}$ ($C \leq 1100 \text{ pF}$) $ \Delta C/C \leq 1\%$ ($C > 1100 \text{ pF}$) $R_{\text{ins}} \geq 50\%$ of specified value
Damp heat, cyclic, test Db, first cycle: "IEC 60068-2-30"		
Cold: "IEC 60068-2-1"	2 hours; -40°C	
Damp heat, cyclic, test Db, remaining cycles: "IEC 60068-2-30"		
Other applicable tests		
Damp heat, steady state: "IEC 60068-2-3"	56 days; 40°C ; 90 to 95% RH	$ \Delta C/C \leq 1\% + 1 \text{ pF}$ ($C \leq 1100 \text{ pF}$) $ \Delta C/C \leq 1\%$ ($C > 1100 \text{ pF}$) $R_{\text{ins}} \geq 50\%$ of specified value
Endurance (DC): "IEC 60384-13"	1000 hours; $1.5 \times U_{\text{Rdc}}$; 85°C $1.05 \times U_{\text{Rdc}}$; 100°C	$ \Delta C/C \leq 2\% + 1 \text{ pF}$ ($C \leq 1100 \text{ pF}$) $ \Delta C/C \leq 1\%$ ($C > 1100 \text{ pF}$) $R_{\text{ins}} \geq 100\%$ of specified value
Variation of capacitance with temperature: "IEC 60384-13"	static method; one cycle	$ \Delta C/C \leq 2\% + 1 \text{ pF}$ ($C \leq 1100 \text{ pF}$) $ \Delta C/C \leq 1\%$ ($C > 1100 \text{ pF}$) $R_{\text{ins}} \geq 10000 \text{ M}\Omega$
Heat storage: "IEC 60384-13"	1000 hours; 100°C	$ \Delta C/C \leq 2\% + 1 \text{ pF}$ ($C \leq 1100 \text{ pF}$) $ \Delta C/C \leq 1\%$ ($C > 1100 \text{ pF}$)
Resistance to soldering heat with preheating: "IEC 60384-13"	body temperature: 100°C ; bath temperature: 260°C ; dwell time: 5 s	$ \Delta C/C \leq 2\% + 1 \text{ pF}$ ($C \leq 1100 \text{ pF}$) $ \Delta C/C \leq 1\%$ ($C > 1100 \text{ pF}$)

FLUORESCENT LAMP STARTER CAPACITORS

Fluorescent lamp starter capacitors**KT 311 90028**

KT RADIAL TYPE

PITCH 11.5 mm

**FEATURES**

- 11.5 mm lead pitch
- Supplied loose in box.

APPLICATIONS

- The capacitors are suitable for radio interference suppression and incorporation in starters for fluorescent lamp circuits.

QUICK REFERENCE DATA

DESCRIPTION	VALUE
Capacitance value	5.6 nF
Capacitance range	5.0 to 7.0 nF
Rated (AC) voltage	250 V
Climatic category	40/100/21
Rated temperature	85 °C
Reference specification	IEC 60155

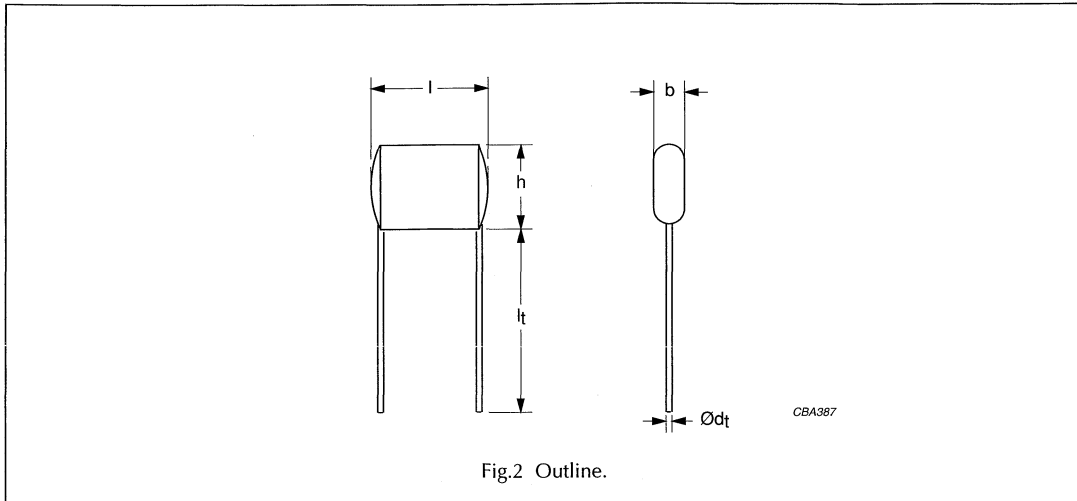
DETAIL SPECIFICATION

For more detailed data and test requirements see "Type detail specification HQN-155-14/116".

Fluorescent lamp starter capacitors

KT 311 90028

KT 311 90028 GENERAL DATA



Specific reference data

DESCRIPTION	VALUE
Tangent of loss angle	at 1 kHz
	$\leq 60 \times 10^{-4}$
Capacitance value	$5.0 \text{ nF} \leq C \leq 7.0 \text{ nF}$
R between terminations at 100 V; 1 minute	$\geq 50000 \text{ M}\Omega$
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	2000 V; 1 minute
Withstanding (DC) voltage between leads (100% on line)	3000 V; 1 s

Mechanical and ordering data

loose

C ⁽¹⁾ (nF)	DIMENSIONS $b_{\max} \times h_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER	SMALLEST PACKING QUANTITIES
				SPQ
loose in box				
Pitch = $11.5 \pm 1.5 \text{ mm}$; $l_t = 27.0 \pm 1.0 \text{ mm}$; $d_t = 0.60 \pm 0.06 \text{ mm}$				
5.6	$3.6 \times 9.0 \times 14.2$	0.46	2222 311 90028	5000

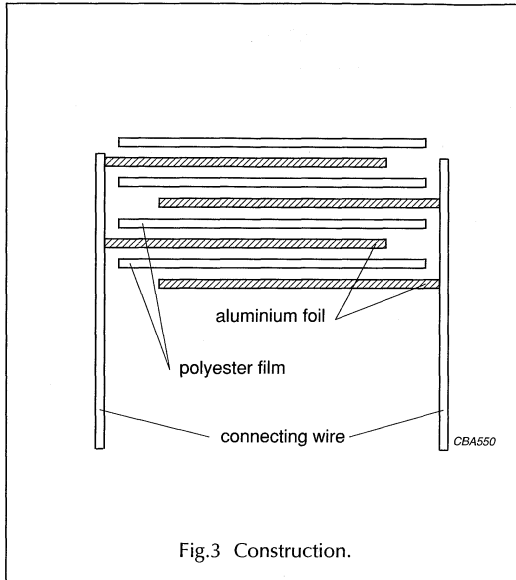
Note

1. A limit is imposed on the maximum tolerance combinations of length and thickness, by the requirement that Capacitors must fit a jig, consisting of a cylinder with an inside diameter of $19.3 - 0.1 \text{ mm}$, containing a cylinder with an outside diameter of $12.6 + 0.1 \text{ mm}$, which is fixed against the wall of the outer cylinder.

Fluorescent lamp starter capacitors

KT 311 90028

CONSTRUCTION



Description

- Impregnated non-inductive wound cell of aluminium foil with polyester film
- The lead connection is reinforced
- Radial copper leads, solder-coated.

Mounting

NORMAL USE

The capacitors are designed for point-to-point wiring.

SPECIFIC METHOD OF MOUNTING FOR VIBRATION AND DUMP

Not applicable.

Storage temperature

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

RATINGS AND CHARACTERISTICS REFERENCE CONDITIONS

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 $50 \pm 2\%$.

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

MARKING

Product marking

The capacitors have no marking.

Fluorescent lamp starter capacitors

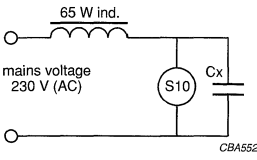
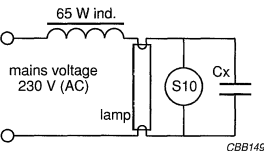
KT 311 90028

QUICK REFERENCE TEST REQUIREMENTS

TEST	PROCEDURE (quick reference)	REQUIREMENTS
Robustness of leads		
Tensile strength: "IEC 60068-2-21"	load 5 N; 10 s	no visible damage
Bending: "IEC 60068-2-21"	bending the leads to a pitch of 14 mm at 11 mm from the cell	$ \Delta C/C \leq 5\%$
Robustness of component		
Rapid change of temperature: "IEC 60068-2-14"	5 cycles 1 cycle = 30 minutes at $-40\text{ }^{\circ}\text{C}$ and 30 minutes at $100\text{ }^{\circ}\text{C}$	$ \Delta C/C \leq 10\%$
Climatic sequence		
Dry heat: "IEC 60068-2-2"	16 hours; $100\text{ }^{\circ}\text{C}$	$ \Delta C/C \leq 10\%$ $\Delta \tan \delta \leq 60 \times 10^{-4}$; note 1 $R_{\text{ins}} \geq 50\%$ of specified value
Damp heat, cyclic, test Db, first cycle: "IEC 60068-2-30"		
Cold: "IEC 60068-2-1"	2 hours; $-40\text{ }^{\circ}\text{C}$	
Damp heat, cyclic, test Db, remaining cycles: "IEC 60068-2-30"		
Voltage proof: "IEC 60384-14"	$V_p = 2000\text{ V (DC)}$; 1 minute	
Other applicable tests		
Damp heat, steady state: "IEC 60068-2-3"	21 days; $40\text{ }^{\circ}\text{C}$; 90 to 95% RH $V_p = 2000\text{ V (DC)}$; 1 minute	$ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 60 \times 10^{-4}$; note 1 $R_{\text{ins}} \geq 50\%$ of specified value
Endurance (AC): "IEC 60384-14"	2000 hours; 16 hours at $25\text{ }^{\circ}\text{C}$ and 8 hours at $100\text{ }^{\circ}\text{C}$; $1.25 \times U_{\text{Rac}}$	$ \Delta C/C \leq 10\%$ $\Delta \tan \delta \leq 60 \times 10^{-4}$; note 1 $R_{\text{ins}} \geq 50\%$ of specified value
Active flammability: "IEC 60384-14"	voltage proof up to 2000 V (AC) until breakdown (100 V/sec, current limited 2mA) Failed capacitors in series with inductor of 65 W connected to a 250 V (AC) power supply during 5 minutes	no burning

Fluorescent lamp starter capacitors

KT 311 90028

TEST	PROCEDURE (quick reference)	REQUIREMENTS
Intermittent voltage test (continuous operation)	 <p>8 hours at 25 °C</p>	no damage. no short circuit
Intermittent voltage test (discontinuous operation)	 <p>16 hours at 25 °C/ 8 hours at 100 °C; 30 s on/30 s off; 160 hours</p>	no damage no short circuit

Note

1. Measuring frequency 1 kHz.

Fluorescent lamp starter capacitors

KT 311
90045/46/49/51/52

KT RADIAL TYPE

PITCH 7.5 mm

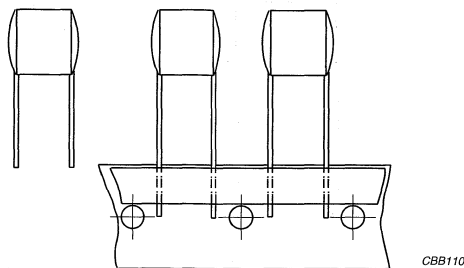


Fig.1 Simplified outlines.

FEATURES

- 7.5 mm lead pitch
- Supplied loose in box and taped on reel.

APPLICATIONS

- The capacitors are suitable for radio interference suppression and incorporation in starters for fluorescent lamp circuits.

DETAIL SPECIFICATION

For more detailed data and test requirements see "Type detail specification HQN-199-14/115".

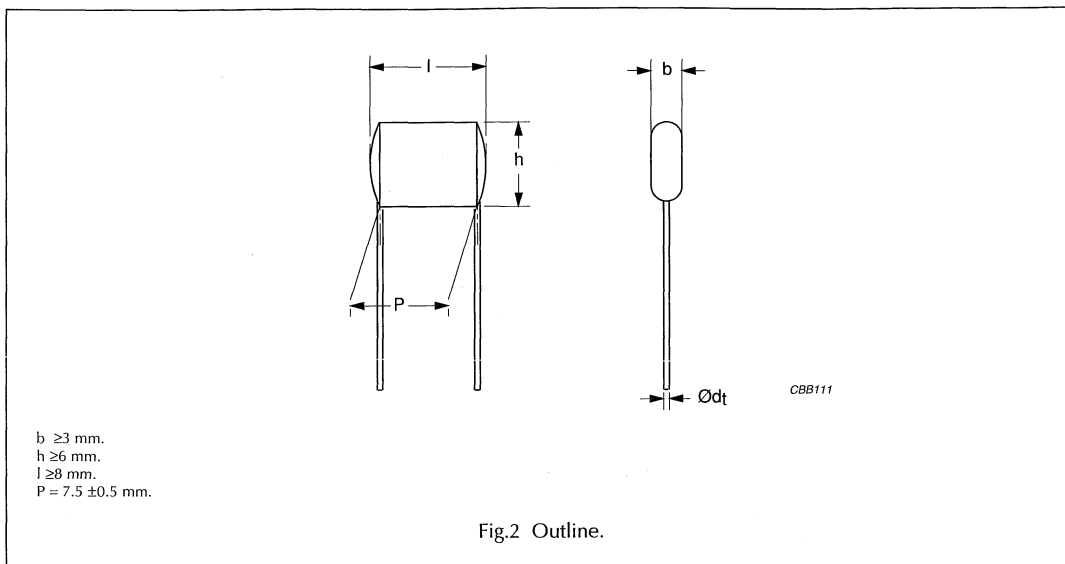
QUICK REFERENCE DATA

DESCRIPTION	VALUE
Capacitance value	1 200 pF; 3 000 pF
Capacitance tolerance	±20%
Rated (AC) voltage URac, 50 to 60 Hz	250 V
Climatic category	40/125/21
Upper temperature:	
1 200 pF	140 °C
3 000 pF	125 °C
Tangent of loss angle at: 1kHz	60 × 10 ⁻⁴
Reference specification	IEC 1199

Fluorescent lamp starter capacitors

KT 311
90045/46/49/51/52

KT 311 900.. GENERAL DATA



Specific reference data

DESCRIPTION	VALUE
Tangent of loss angle	at 1 kHz
	$\leq 60 \times 10^{-4}$
Capacitance value	1.2 nF and 3.0 nF
R between terminations at 100 V; 1 minute	$\geq 50000 \text{ M}\Omega$
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	2000 V; 1 minute
Withstanding (DC) voltage between leads (100% on line)	2750 V; 1 s

Mechanical and ordering data

loose and taped

C (pF)	DIMENSIONS $b_{\max} \times h_{\max} \times l_{\max}$ (mm)	MASS (g)	CATALOGUE NUMBER AND SMALLEST PACKING QUANTITIES				
			LOOSE IN BOX			REEL; H = 26.0 mm ⁽¹⁾	
			l_t	catalogue number	SPQ	catalogue number	SPQ
Pitch = 7.5 ± 0.5 mm; $d_t = 0.60 \pm 0.06 \text{ mm}$							
1200	4.5 × 8.5 × 10.0	0.33	17 ± 1 mm	2222 311 90049	5000	2222 311 90045	2800
3000		0.34		2222 311 90051		2222 311 90046	
1200	4.5 × 8.5 × 10.0	0.35	25 ± 1 mm	2222 311 90052	5000	–	–

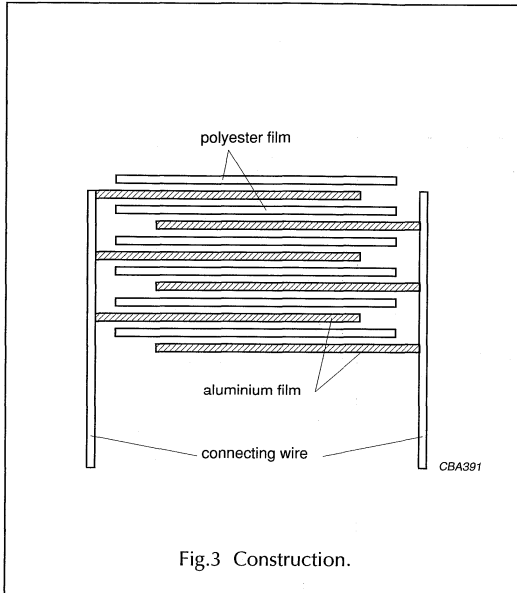
Note

1. H = Intape height.

Fluorescent lamp starter capacitors

KT 311
90045/46/49/51/52

CONSTRUCTION



Description

- Non-inductive wound cell of aluminium foil with polyester film
- Radial leads are solder-coated
- The lead connection is re-inforced.

Mounting

NORMAL USE

The capacitors are designed for point-to-point wiring.

SPECIFIC METHOD OF MOUNTING FOR VIBRATION AND BUMP

Not applicable.

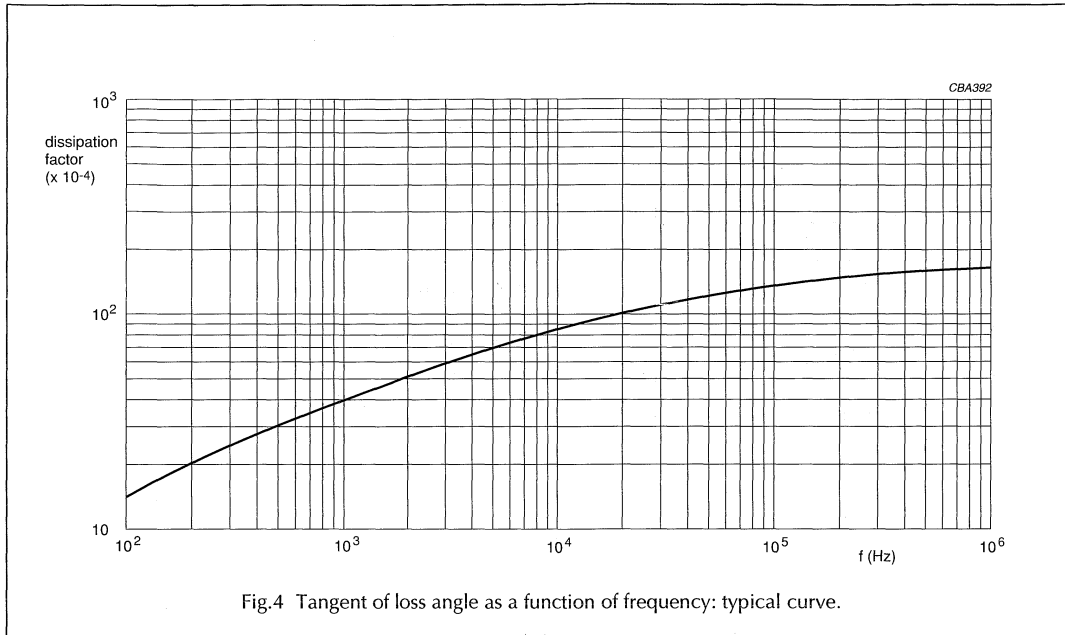
Storage temperature

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

RATINGS AND CHARACTERISTICS REFERENCE CONDITIONS

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 $50 \pm 2\%$.

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

Fluorescent lamp starter capacitors**KT 311**
90045/46/49/51/52**CHARACTERISTICS****Tangent of loss angle****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 terminations: for value see specific reference data.

MARKING**Product marking**

No marking.

DATA HANDBOOK SYSTEM

DATA HANDBOOK SYSTEM

BCcomponents data handbooks are available for selected product ranges and contain all relevant data available at the time of publication. Each handbook is revised and updated regularly.

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In accordance with "IEC publication 60 063".

E192	E96	E48	E192	E96	E48	E192	E96	E48	E192	E96	E48	E24	E12	E6	E3
100	100	100	178	178	178	316	316	316	562	562	562	10	10	10	10
101			180			320			569			11			
102	102		182	182		324	324		576	576		12	12		
104			184			328			583			13			
105	105	105	187	187	187	332	332	332	590	590	590	15	15	15	
106			189			336			597			16			
107	107		191	191		340	340		604	604		18	18		
109			193			344			612			20			
110	110	110	196	196	196	348	348	348	619	619	619	22	22	22	22
111			198			352			626			24			
113	113		200	200		357	357		634	634		27	27		
114			203			361			642			30			
115	115	115	205	205	205	365	365	365	649	649	649	33	33	33	
117			208			370			657			36			
118	118		210	210		374	374		665	665		39	39		
120			213			379			673			43			
121	121	121	215	215	215	383	383	383	681	681	681	47	47	47	47
123			218			388			690			51			
124	124		221	221		392	392		698	698		56	56		
126			223			397			706			62			
127	127	127	226	226	226	402	402	402	715	715	715	68	68	68	
129			229			407			723			75			
130	130		232	232		412	412		732	732		82	82		
132			234			417			741			91			
133	133	133	237	237	237	422	422	422	750	750	750				
135			240			427			759						
137	137		243	243		432	432		768	768					
138			246			437			777						
140	140	140	249	249	249	442	442	442	787	787	787				
142			252			448			796						
143	143		255	255		453	453		806	806					
145			258			459			816						
147	147	147	261	261	261	464	464	464	825	825	825				
149			264			470			835						
150	150		267	267		475	475		845	845					
152			271			481			856						
154	154	154	274	274	274	487	487	487	866	866	866				
156			277			493			876						
158	158		280	280		499	499		887	887					
160			284			505			898						
162	162	162	287	287	287	511	511	511	909	909	909				
164			291			517			920						
165	165		294	294		523	523		931	931					
167			298			530			942						
169	169	169	301	301	301	536	536	536	953	953	953				
172			305			542			965						
174	174		309	309		549	549		976	976					
176			312			556			988						

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