Film Capacitors

Data Handbook BC05
1999

BEYSCHLAG
CENTRALAB
COMPONENTS

QUALITY ASSURED

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

PRODUCT SAFETY

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

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

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

NOTICE

By 1 January 1999 BC Components was set up as an independent company, formerly belonging to Philips Components. As a consequence it may initially happen that logos on products, documentation and packaging are not corresponding. This situation will solve itself.

We thank you for your understanding.

BC Components.

Film Capacitors

CONTENTS

DEFINITIONS

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

LIFE SUPPORT APPLICATIONS

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

INTRODUCTION

FILM CAPACITORS

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

Film dielectrics used in BC Components film capacitor products

PARAMETER	DIELECTRIC[1]						UNIT
	P	KT	PEN	KC	KPS	KP	
Dielectric constant:							
at 1 kHz	3.0	3.3	3.0	2.8	3.0	2.2	
Dissipation factor:							
at 1 kHz	50	50	40	12	3	1	10^{-4}
at 10 kHz	120	110	–	50	6	2	10^{-4}
at 100 kHz	200	170	–	100	12	2	10^{-4}
at 1 MHz	300	200	–	110	18	4	10^{-4}
Volume resistivity	10^{+16}	10^{+17}	10^{+17}	10^{+17}	10^{+17}	10^{+18}	Ωcm
Dielectric strength	100	400	300	300	250	600	V/μm
Maximum application temperature	100	125	125	125	150	105	°C
Power density:							
at 10 kHz	67	50	40	21	2.5	0.6	W/cm^3
Dielectric absorption	–	0.2	1.2	0.06	0.05	0.01	%

Note

1. P = paper; KT = polyethylene terephthalate; PEN = polyethylene naphtalate; KC = polycarbonate; KPS = polyphenylene sulfide; KP = polypropylene.

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

The dielectric polyphenylene sulfide (KPS) has a high melting point allows it to be used in a non-encapsulated SMD product. The properties of KPS determine the stability of the product characteristics.

Polypropylene film is used in high frequency or high voltage applications due to its very low dissipation factor and high dielectric strength.

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

Typical properties as functions of temperature or frequency are illustrated in Figs 1 to 4.

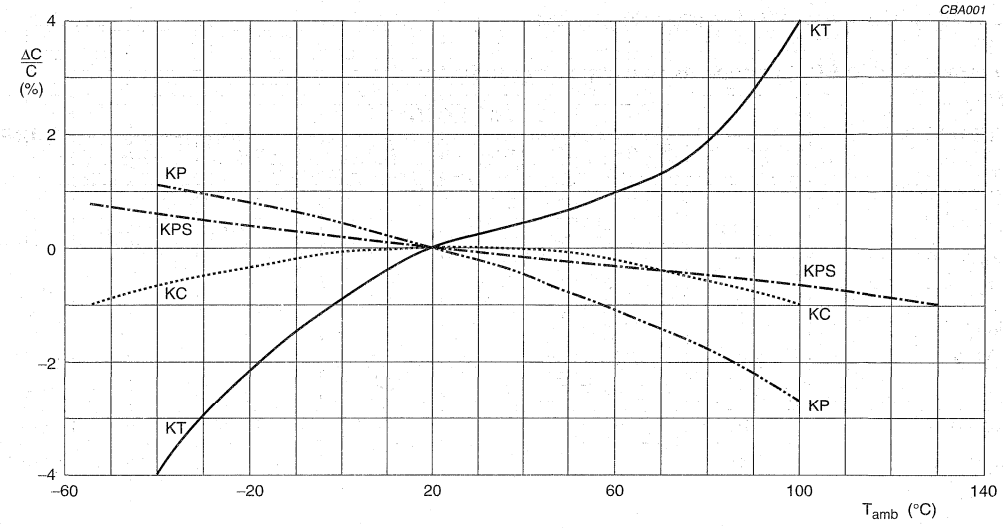


Fig.1 Capacitance change as a function of ambient free air temperature at 1 kHz; typical curves.

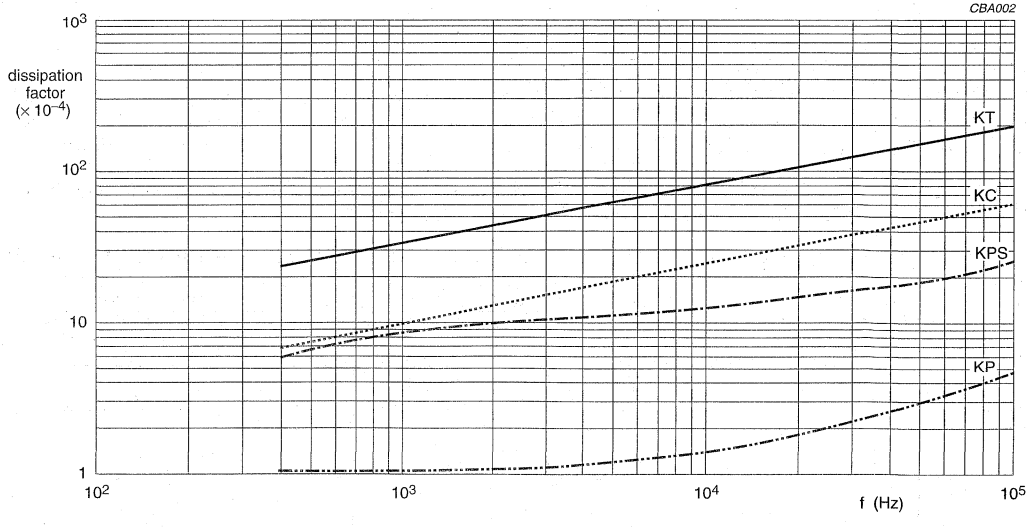


Fig.2 Dissipation factor as a function of frequency at 20 °C; typical curves.

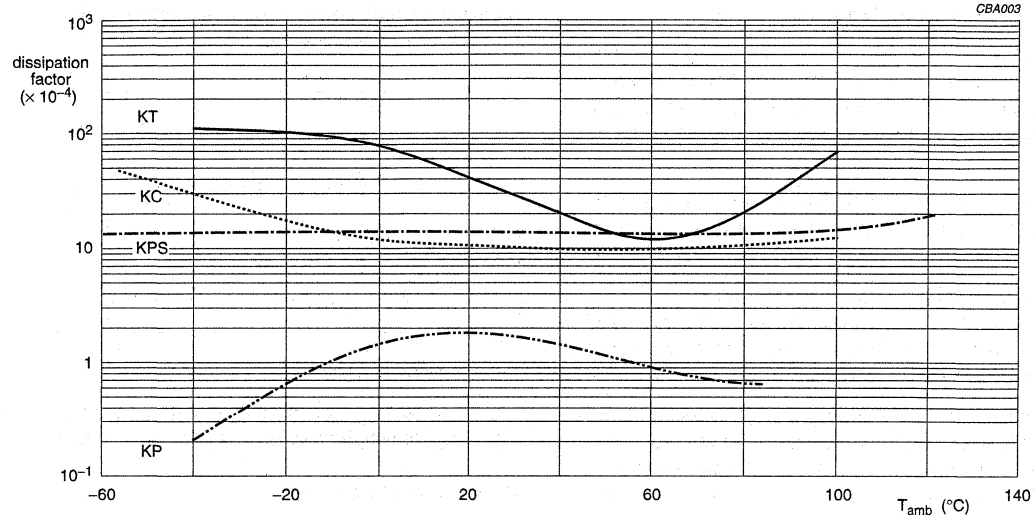


Fig.3 Dissipation factor as a function of ambient free air temperature at 1 kHz; typical curves.

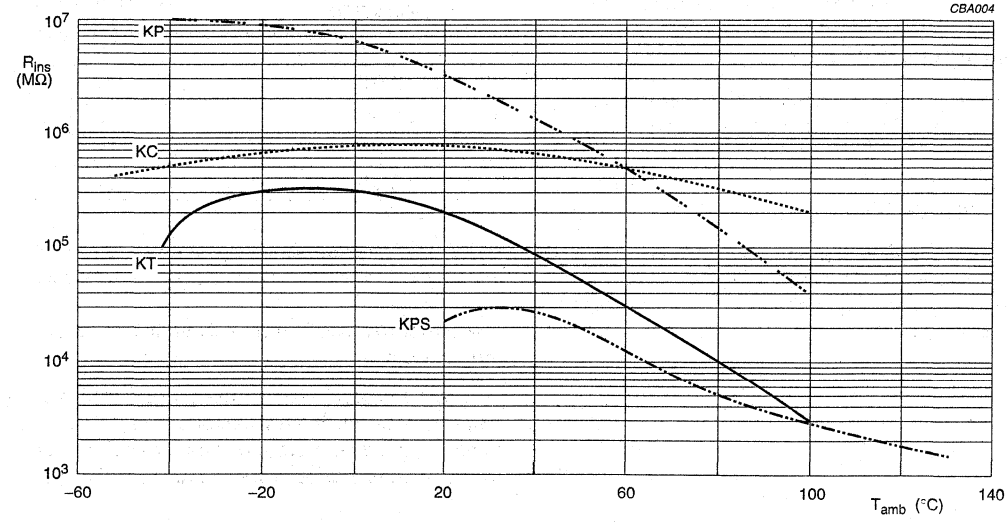


Fig.4 Insulation resistance as a function of ambient free air temperature; typical curves.

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.

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

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

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

GENERAL DEFINITIONS

Rated 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 or DC voltage which may be applied continuously to a capacitor at its upper category temperature.

Rated AC voltage (U_{Rac})

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

Capacitance

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

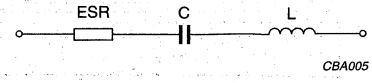


Fig.5 Simplified equivalent circuit.

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 ±2%.

Tolerance coding in accordance with *"IEC 60062"*

PERCENTAGE OF DEVIATION	LETTER CODE
±1.0%	F
±2.0%	G
±5.0%	J
±10.0%	K
±20.0%	M

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

Temperature coefficient and cyclic drift of capacitance

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

TEMPERATURE COEFFICIENT OF CAPACITANCE

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

TEMPERATURE CYCLIC DRIFT OF CAPACITANCE

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

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 δ) is the power loss of the capacitor divided by the reactive power of the capacitor at a sinusoidal voltage of specified frequency.

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

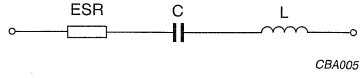


Fig.6 Simplified equivalent circuit.

Insulation resistance and time constant

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

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

Ambient temperature

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

Climatic category

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

Category temperature range

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

Upper category temperature

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

Lower category temperature

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

Rated temperature

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

Maximum application temperature

The equivalent of the upper category temperature.

Self-healing

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

Temperature characteristic of capacitance

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

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

Storage temperature

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

Maximum power dissipation

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

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

$$P = ESR \times I^2$$

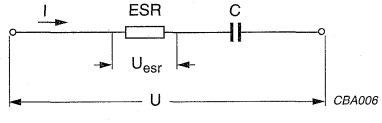


Fig.7 Simplified equivalent circuit.

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

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

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

or with $ESR = \tan\delta / \omega C$

the formula becomes:

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

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

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

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 δ at the k-th harmonic.

TEST INFORMATION

Robustness of leads

TENSILE STRENGTH OF LEADS (Ua)
(LOAD IN LEAD AXIS DIRECTION)

Lead diameter 0.5, 0.6 and 0.8 mm: load 10 N, 10 s.

BENDING (Ub)

Lead diameter 0.5, 0.6 and 0.8 mm: load 5 N, 4 × 90°.

Lead diameter 1.0 mm: load 10 N, 4 × 90°.

TORSION (Uc) (FOR AXIAL CAPACITORS ONLY)

Severity 1: three rotations of 360°.

Severity 2: two rotations of 180°.

Rapid change of temperature (Na)

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

Dry heat (Ba)

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

Damp heat cyclic (Db)

This test determines the suitability of capacitors for use and storage under conditions of high humidity when combined with cyclic temperature changes and, in general, producing condensation on the surface of the capacitor.

One cycle consists of 24 hours exposure to 55 °C and 95 to 100% relative humidity (RH).

Cold (Aa)

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

Damp heat steady state (Ca)

This test determines the suitability of capacitors for use and storage under conditions of high humidity.
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.

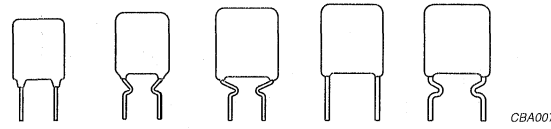
Solvent resistance of components

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 to be used, as they may attack the capacitor or the encapsulation.

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

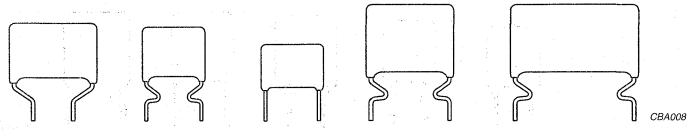
SELECTION GUIDE

Film capacitors — Selection guide

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

Notes

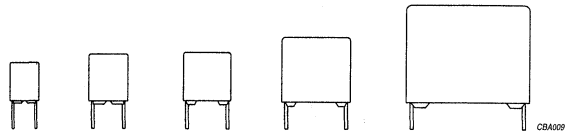
1. Pitch size in shaded cells: A = 5.0 mm; L = 5.0 mm (bent back 7.5/5); B = 7.5 mm.
2. Intermediate values of E12-series are also available.

MKT 467/468 and MKT/MKT 468					
					
metallized polyester					Dielectric
epoxy lacquered					Encapsulation
IEC 60384-2					Qualified to
55/100/56					Climatic category
loose; taped					Packaging[1]
±10%, ±5%					Tolerance
U_{Rdc} (V)					C
100	250	400	630	1000	(µF)[2]
					0.00022
					0.00033
					0.00047
					0.00068
					0.001
					0.0015
					0.0022
					0.0033
					0.0047
					0.0068
			E		0.01
				F	0.015
		E	D F		0.022
	E	D F		G	0.033
			G	H	0.047
E	D F	G	H[3]		0.068
D F	G	H			0.1
G	H[3]				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.

General purpose film capacitors — Selection guide

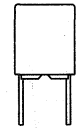
	MKT 370/371/372/373
	
Dielectric	metallized polyester
Encapsulation	potted with epoxy resin
Qualified to	IEC 60384-2
Climatic category	55/100/56
Packaging[1]	loose; taped
Tolerance	±10%, ±5%
C	U_{Rdc} (V)

C (µF)[2]	63	100	250	400
0.00022				
0.00033				
0.00047				
0.00068				
0.001				A
0.0015				A
0.0022				A
0.0033				A
0.0047			A	A B E
0.0068			A	A B E
0.01			A B	A B E
0.015		A	A B	A B E
0.022		A B	A B	A B E
0.033		A B	A B	A B E
0.047		A B	A B	A B E
0.068	A B	A B	A B E	A B E
0.1	A B	A B	A B E	F(3) F(4)
0.15	A B	A B	A B E	F(3) F(4)
0.22	A B	A B E	A B E	F(3) F(4)
0.33	A B	A B E	F(3) F(4)	F(3) F(4)
0.47	A B	A B E	F(3) F(4)	F(3) F(4) G(4)
0.68	A B	F(3) F(4)	F(3) F(4)	G(3) G(4)
1.0	A B	F(3) F(4)	F(3) F(4)	G(3) H(4)
1.5	A B	F(3) F(4)	G(3) G(4)	H(3) H(4)
2.2		F(3) F(4)	G(3) G(4)	
3.3		G(4)	H(3) H(4)	
4.7		G(4)	H(3) H(4)	
6.8		G(4) H(4)		
10		G(3) H(4)		
15		H(3) H(4)		

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. New range.
4. Maintenance type.

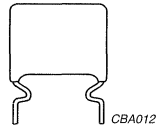
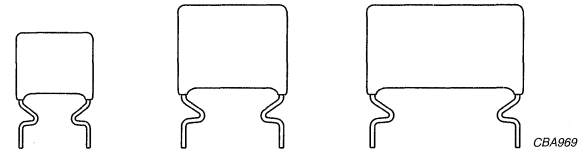
General purpose film capacitors — Selection guide

MKT 470				
 CBA010				
metallized polyester				Dielectric
potted with epoxy resin				Encapsulation
IEC 60384-2				Qualified to
55/125/56				Climatic category
loose; taped				Packaging
±10%, ±5%				Tolerance
U_{Rdc} (V)				C
63	100	250	400	(µF)[1]
				0.00022
				0.00033
				0.00047
				0.00068
			Pitch = 5 mm	0.001
				0.0015
				0.0022
				0.0033
				0.0047
				0.0068
		Pitch = 5 mm		0.01
				0.015
	Pitch = 5 mm			0.022
				0.033
				0.047
Pitch = 5 mm				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. Intermediate values of E12-series are also available.
2. Case size in shaded cells.

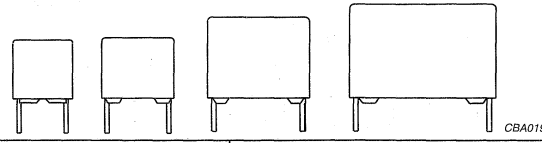
General purpose film capacitors — Selection guide

	MKPS 395	KT 347			
	 CBA012	 CBA969			
Dielectric	metallized PPS	polyester			
Encapsulation	lacquered	lacquered			
Qualified to	–	IEC 60384-11			
Climatic category	55/125/56	40/100/21			
Packaging[1]	loose and taped	loose			
Tolerance	±10%, ±5%	±20%, ±10%			
C	U_{Rdc} (V)	U_{Rdc} (V)			
(µF)[2]	63	100	250	400	630
0.00022					
0.00033					
0.00047					
0.00068					
0.001					E
0.0015					E
0.0022					E
0.0033					E
0.0047				E	E
0.0068				E	E
0.01	E		E	E	F
0.015	E	E	E	F	F
0.022	E	E	F	F	G
0.033	E	E	F	G	G
0.047	E	F	G	G	H
0.068		F	G	H	H
0.1		G	H	H	
0.15		G	H		
0.22		H			
0.33		H			
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: 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.

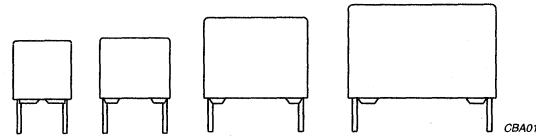
Interference suppression film capacitors — Selection guide

MKP 336 6	MKP 336 1	MKP 338 2	
	 CBA019		
Y2	X1	X2	Class
metallized polypropylene			Dielectric
potted with epoxy resin			Encapsulation
IEC 60384-14, 2nd edition; EN 132400			Qualified to
	CBA968	CBA968	Approvals
55/100/21/C	55/100/21/C	55/105/56/B	Climatic category
$\leq 10 \times 10^{-4}$	$\leq 70 \times 10^{-4}$	$\leq 70 \times 10^{-4}$	Tan δ (10 kHz)
>15000 MΩ	>15000 MΩ	>15000 MΩ	R_{ins} for C ≤ 330 nF
–	>5000 s	>5000 s	RC for C > 330 nF
200 V/µs	200 V/µs	100 V/µs	Pulse slope at U_R
loose; taped			Packaging[1]
±20%, ±10%, ±10%			Tolerance
U_{Rac} (V) **250**	**U_{Rac} (V)** **275**	**U_{Rac} (V)** **275**	**C (µF) (E6-series)**
E	E	B	0.001
			0.0015
			0.0022
			0.0033
			0.0047
F			0.0068
	F		0.01
			0.015
			0.022
			0.033
			0.047
		C E	0.068
	G		0.1
		D F	0.15
	H		0.22
			0.33
		G	0.47
			0.68
			1.0
		H	1.5
			2.2

Note

1. Pitch size in shaded cells: B = 7.5 mm; 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.

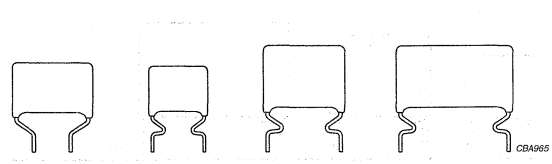
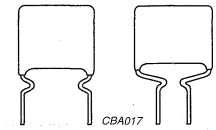
Interference suppression film capacitors — Selection guide

	MKP 336 2	MKP 335 5
	 CBA019	
Class	X2	X2
Dielectric	metallized polypropylene	
Encapsulation	potted with epoxy resin	
Qualified to	IEC 60384-14, 2nd edition; EN 132400	
Approvals	 CBA968	 CBA968
Climatic category	55/100/21/C	55/100/56/B
Tan δ (10 kHz)	$\leq 70 \times 10^{-4}$	$\leq 70 \times 10^{-4}$
R_{ins} for C ≤ 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) (E6-series)	**U_{Rac} (V) 275**	**U_{Rac} (V) 275**
0.001	E	
0.0015	E	
0.0022	E	
0.0033	E	
0.0047	E	
0.0068	E	
0.01	F	F
0.015	F	F
0.022	F	F
0.033	F	F
0.047	F	F
0.068	F	F
0.1	F	F
0.15	F	F
0.22	G	G
0.33	G	G
0.47	G	G
0.68	H	
1.0	H	
1.5	H	
2.2	H	

Note

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

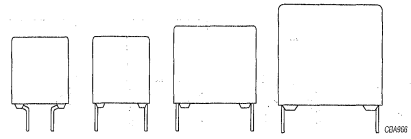
AC & Pulse film capacitors — Selection guide

KP/MKP 375					KP 374	
						
metallized polypropylene					polypropylene	Dielectric
epoxy lacquered					epoxy lacquered	Encapsulation
IEC 60384-17					IEC 384-13	Qualified to
55/105/56					55/100/56	Climatic category
loose; taped					loose; taped	Packaging[1]
±5%, ±3.5%					±10%, ±5%	Tolerance
U_{Rdc} (V)					U_{Rdc} (V)	C (µF)[2]
630	1000	1600	2000	2500	630	
	E		D F			0.0001
						0.00015
						0.00022
						0.00033
						0.00047
E		D F			A B	0.00068
				G H		0.001
						0.0015
					E	0.0022
D F	D F		G			0.0033
		G				0.0047
				H		0.0068
	G	H				0.01
G	H					0.015
						0.022
H						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: A = 5.0 mm; 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.

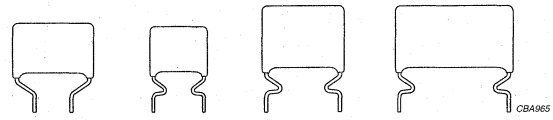
AC & Pulse film capacitors — Selection guide

	MMKP 383
	
Dielectric	double side polyster carrier and polypropylene
Encapsulation	potted with epoxy resin
Qualified to	IEC 60384-17
Climatic category	55/105/56
Packaging[1]	loose; taped
Tolerance	±5%

C (µF)[2]	U_{Rdc} (V)							
	250	400	630	1000	1400	1600	2000	2500
0.001							D F	G
0.0015								
0.0022					D F			
0.0033						D F		
0.0047								
0.0068								
0.01								
0.015				D F			G	
0.022					G	G		F
0.033			D F				H	
0.047		D F			H	H		
0.068				G				
0.1	D F							
0.15				H				
0.22			G					
0.33		G	H					
0.47	G	H						
0.68								
1.0	H							
1.5								
2.2								
3.3								
4.7								
6.8								

Notes

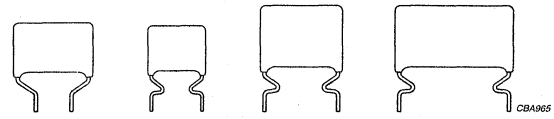
1. Pitch size in shaded cells: D = 7.5 mm (bent back 15/7.5); F = 15.0 mm; G = 22.5 mm; H = 27.5 mm.
2. Intermediate values of E24-series are also available.

MKP 479				
				
metallized polypropylene				Dielectric
epoxy lacquered				Encapsulation
IEC 60384-17				Qualified to
55/105/56				Climatic category
loose; taped				Packaging[1]
±5%				Tolerance
U_{Rdc} (V)				C
160	250	400	630	(µF)[2]
				0.001
				0.0015
				0.0022
				0.0033
				0.0047
				0.0068
			E	0.01
			E	0.015
		E	D F	0.022
	E	D F		0.033
E	D F	D F		0.047
D F	D F	G	H	0.068
G	G	H		0.1
H	H			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); 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.

AC & Pulse film capacitors — Selection guide

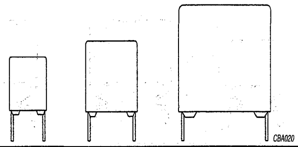
	MKP 479
	
Dielectric	metallized polypropylene
Encapsulation	epoxy lacquered
Qualified to	IEC 60384-17
Climatic category	55/105/56
Packaging[1]	loose; taped
Tolerance	±5%

C (µF)[2]	U_{RdC} (V)				
	1000	1250	1600	2000	2500
0.001					
0.0015				D F	G
0.0022					
0.0033					
0.0047			D F		
0.0068		D F			
0.01				G	
0.015	D F		G		H
0.022		G			
0.033				H	
0.047	G		H		
0.068		H			
0.1					
0.15	H				
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); 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.

MKP/MKP 378



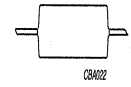
MKP/MKP 378	
metallized polypropylene	Dielectric
potted with epoxy resin	Encapsulation
IEC 60384-17	Qualified to
55/085/56	Climatic category
loose; taped	Packaging(1)
±5%	Tolerance

U_{Rdc} (V) 630	1000	1600	2000	2500	3000(3)	4000(3)	5000(3)	**C (µF)(2)**
						G	H	0.001
					G	G	H	0.0015
				G	G	G	H	0.0022
	F		G	G	G	G	H	0.0033
	F		G	G	G	G	H	0.0047
	F	G	G	G	H	G		0.0068
	F	G	G	H	H	G		0.01
F	G	G	H	H	H			0.015
F	G	G	H	H				0.022
F	G	H	H					0.033
F	G	H	H					0.047
G	H	H						0.068
G	H	H						0.1
G	H							0.15
H	H							0.22
H								0.33
H								0.47
H								0.68
								1.0
								1.5
								2.2
								3.3
								4.7
								6.8

Notes

1. Pitch size in shaded cells: F = 15.0 mm; G = 22.5 mm; H = 27.5 mm.
2. Intermediate values of E24-series are also available.
3. E24-series are available on request.

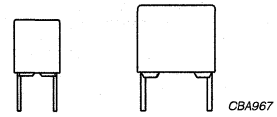
Precision film capacitors — Selection guide

	KP 460 to 464				
					
Dielectric	polypropylene				
Encapsulation	epoxy lacquered				
Qualified to	IEC 60384-13				
Climatic category	40/100/56				
Packaging[1][2]	loose; taped				
Tolerance	±5%, ±2%, ±1%				
C	U_{Rdc} (V)				
(pF)[2]	63	160	250	400	630
47					J
68					J
100					J
150					J
220					J
330					J
470					J
680				J	K
1000				J	K
1500			J	K	K
2200			J	K	K
3300			J	K	K
4700		J	J	K	K
6800	J	J	K	K	K
10000	K	K	K	K	K
15000	K	K	K	K	K
22000	K	K	K	K	K
33000	K	K	K	K	K
47000	K	K	K	K	K
68000	K	K	K	K	K
100000	K	K	K	K	K
150000	K	K	K	K	K
162000	K	K	K	K	K

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.

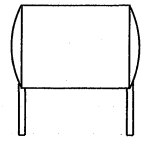
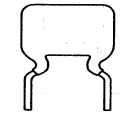
Precision film capacitors — Selection guide

MKP 416 to 420					
 CBA967					
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
63	160	250	400	630	(µF)[2]
					0.0001
					0.00015
					0.00022
					0.00033
					0.00047
					0.00068
					0.001
				A	0.0015
				A	0.0022
			A	A	0.0033
			A	A	0.0047
			A	A	0.0068
		A	A	E	0.01
		A	A	E	0.015
		A	E	E	0.022
	A	A	E	E	0.033
A	A	A	E	E	0.047
A	A	E	E		0.068
A	E	E			0.1
E	E	E			0.15
E	E				0.22
					0.33
					0.47
					0.68

Notes

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

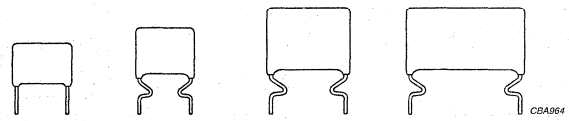
Fluorescent lamp starter capacitors — Selection guide

	KT 311 90028	KT 311 90032/90033 KT 311 90036
	 CBA024	 CBA025
Dielectric	polyester; polypropylene	polyester
Encapsulation		epoxy lacquered
Qualified to	IEC 60155 and IEC 60384-11	IEC 60384-11
Climatic category	40/100/21	40/125/56
Packaging[1]	loose; taped	loose
Tolerance		±20%
C (µF)[2]	**U_{Rac} (V)** **250**	**U_{Rac} (V)** **250**
0.0012		7.5
0.0030		7.5
0.0056	11.5	

Notes

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

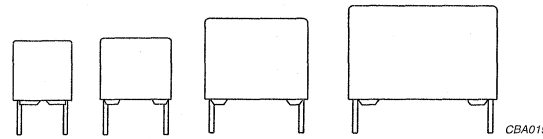
General purpose film capacitors — Selection guide

MKT 368/369					MAINTENANCE TYPE
					
metallized polyester					Dielectric
epoxy lacquered					Encapsulation
IEC 60384-2					Qualified to
55/100/56					Climatic category
loose; taped					Packaging[1]
±10%, ±5%					Tolerance
U_{Rdc} (V)					C
63	100	250	400	630	(µF)[2]
					0.00022
					0.00033
					0.00047
					0.00068
			E		0.001
					0.0015
					0.0022
					0.0033
					0.0047
					0.0068
				E	0.01
					0.015
					0.022
		E		F	0.033
			F		0.047
	E				0.068
		F		G	0.1
E			G		0.15
	F	G		H	0.22
			H		0.33
	G	H			0.47
					0.68
					1.0
					1.5
	H				2.2
					3.3
					4.7
					6.8
					10
					15

Notes

1. Pitch size in shaded cells: 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.

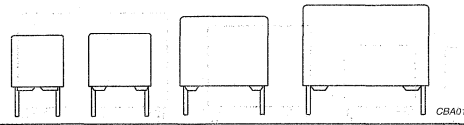
General purpose film capacitors — Selection guide

MAINTENANCE TYPE	MKC 344			
	 CBA019			
Dielectric	metallized polycarbonate			
Encapsulation	potted with epoxy resin			
Qualified to	IEC 60384-6			
Climatic category	55/100/56			
Packaging[1]	loose; taped			
Tolerance	±10%, ±5%			
C	U_{Rdc} (V)			
(µF)[2]	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			E	E
0.015			E	E
0.022			E	E
0.033			E	F
0.047		E	F	F
0.068		E	F	F
0.1	E	F	F	G
0.15	E	F	G	G
0.22	E	F	G	H
0.33	F	G	H	H
0.47	F	G	H	
0.68	F	G	H	
1.0	G	H		
1.5	G	H		
2.2	G	H		
3.3	H			
4.7	H			
6.8				
10				
15				

Notes

1. Pitch size in shaded cells: 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.

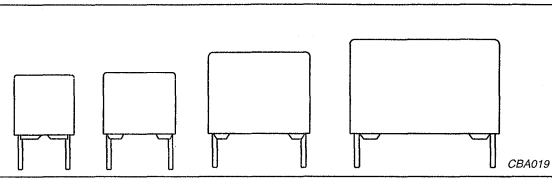
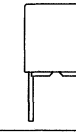
Interference suppression film capacitors — Selection guide

MKT-P 330 4	MKT/MKT 331 6	MP-KT 333 4	MKP 335 1	MAINTENANCE TYPE
 CBA019				
X2	X2	X2	X2	Class
metallized polyester and paper	metallized polyester	metallized paper and polyester	metallized polypropylene	Dielectric
potted with epoxy resin				Encapsulation
IEC 60384-14; first edition 1981	IEC 60384-14, 2nd edition; EN 132400			Qualified to
CBA015	CBA013	CBA013	CBA013	Approvals
40/085/21	55/100/56/C	40/085/21C	40/085/21C	Climatic category
$\leq 130 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 200 \times 10^{-4}$	$\leq 70 \times 10^{-4}$	Tan δ (10 kHz)
>15000 MΩ	>30000 MΩ	>15000 MΩ	>30000 MΩ	R_{ins} for C ≤ 330 nF
>5000 s	–	>5000 s	>10000 s	RC for C > 330 nF
100 V/µs	100 to 200 V/µs	250 to 1500 V/µs	100 V/µs	Pulse slope at U_R
loose; taped	loose; taped	loose; taped	loose; taped	Packaging[1]
±20%, ±10%	±20%, ±10%	±10%	±20%, ±10%	Tolerance
U_{Rac} (V) **250**	**U_{Rac} (V)** **300**	**U_{Rac} (V)** **250**	**U_{Rac} (V)** **250**	**C (µF) (E6-series)**
				0.001
				0.0015
				0.0022
				0.0033
				0.0047
				0.0068
F	F	F	F	0.01
F	F	F	F	0.015
F	F	F	F	0.022
F	F	F	F	0.033
F	F	F	F	0.047
F	F	F	F	0.068
F	F	G	F	0.1
G	G	G	G	0.15
G	G	G	G	0.22
G	H	H	G	0.33
H	H	H	H	0.47
H	H	H	H	0.68
H	H	H	H	1.0
H	H	H	H	1.5
H	H	H	H	2.2

Note

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

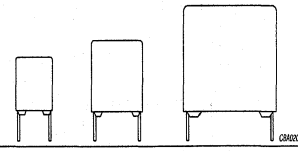
AC & Pulse film capacitors — Selection guide

MAINTENANCE TYPE	MKP 379				MKP 380				
	 CBA019				 CBA010				
Dielectric	metallized polypropylene				metallized polypropylene				
Encapsulation	potted with epoxy resin				potted with epoxy resin				
Qualified to	IEC 60384-17				IEC 60384-17				
Climatic category	55/085/56				55/085/56				
Packaging[1]	loose; taped				loose; taped				
Tolerance	±5%				±10%, ±5%				
C	U_{Rdc} (V)				U_{Rdc} (V)				
(µF)[2]	160	250	400	630	100	160	250	400	630
0.001									
0.0015									A
0.0022									A
0.0033				B (3)				A	A
0.0047				B (3)				A	A
0.0068				B (3)			A	A	A
0.01			B (3)	E		A	A	A	A
0.015		B (3)	B (3)	E	A	A	A	A	A
0.022	B (3)	B (3)	E	E	A	A	A	A	A
0.033	B (3)	B (3)	E	F	A	A	A	A	A
0.047	B (3)	E	F	F	A	A	A	A	A
0.068	B (3)	E	F	F	A	A	A	A	A
0.1	E	F	F	F	A	A	A	A	A
0.15	E	F	F	G	A	A	A	A	A
0.22	F	F	F	G	A	A	A	A	A
0.33	F	F	G	G	A	A	A	A	A
0.47	F	F	G	H	A	A	A	A	A
0.68	F	G	H	H	A	A	A	A	A
1.0	G	G	H	H	A	A	A	A	A
1.5	G	H	H	H	A	A	A	A	A
2.2	H	H	H	H	A	A	A	A	A
3.3	F	H	H	H	A	A	A	A	A
4.7	F	H	H	H	A	A	A	A	A
6.8	F	H	H	H	A	A	A	A	A

Notes

1. Pitch size in shaded cells: A = 5.0 mm; B = 7.5 mm; 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.
3. Available on request.

AC & Pulse film capacitors — Selection guide

KP/MMKP 376				MAINTENANCE TYPE
				
metallized polypropylene				Dielectric
potted with epoxy resin				Encapsulation
IEC 60384-17				Qualified to
55/100/56				Climatic category
loose; taped				Packaging[1]
±5%, ±3.5%				Tolerance
U_{RdC} (V)				C
630	1000	1600	2000	(µF)[2]
				0.0001
				0.00015
				0.00022
				0.00033
				0.00047
				0.00068
			F	0.001
			F	0.0015
		F	F	0.0022
		F	G	0.0033
	F	F	G	0.0047
F	F	G	G	0.0068
F	F	G	G	0.01
F	G	G	G	0.015
F	G	G	F	0.022
G	G	H	F	0.033
G	G	H	F	0.047
G	H	H	F	0.068
H	H	H	F	0.1
H	H	H	F	0.15
H	H	H	F	0.22
H	H	H	F	0.33
H	H	H	F	0.47
H	H	H	F	0.68

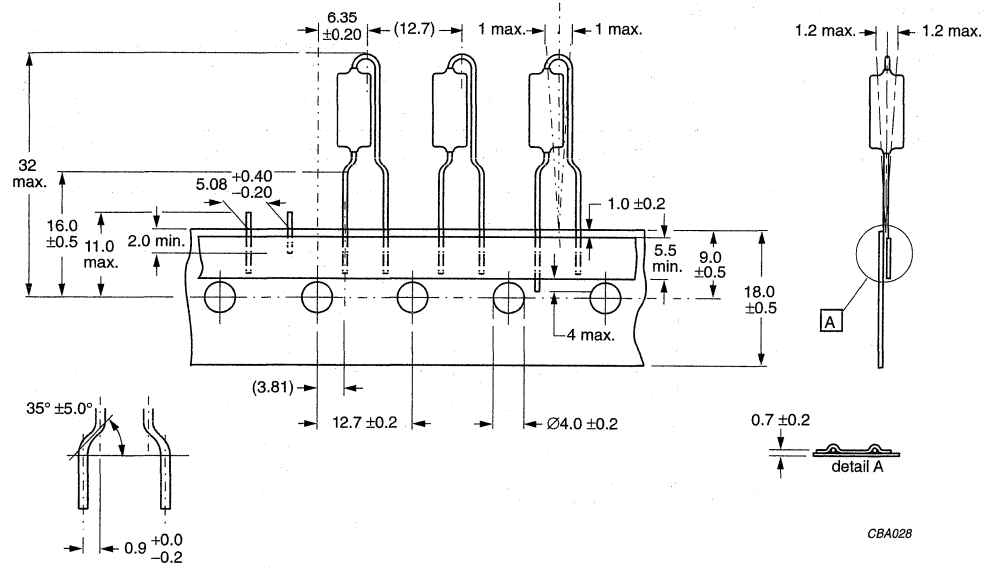
Notes

1. Pitch size in shaded cells: F = 15.0 mm; G = 22.5 mm; H = 27.5 mm.
2. Intermediate values of E24-series are also available.

PACKAGING

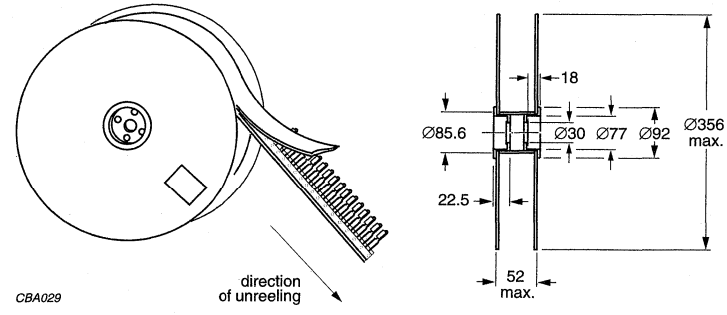
AXIAL UNIDIRECTIONAL FILM CAPACITORS

Series: 460 to 464



(1) Dimensions in mm.
(2) Cumulative pitch error:
1.0 mm per 20 spacings
0.5 mm per 4 spacings.

Fig.1 Outline of axial unidirectional taped capacitors.



Dimensions in mm.

Fig.2 Outline of tape mounted on reel.

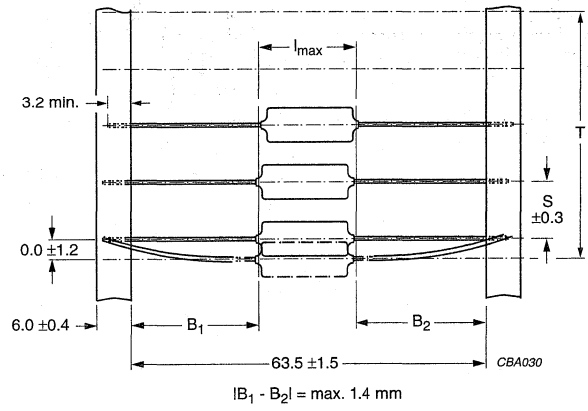
AXIAL FILM CAPACITORS

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 ≤ n < 100**
≤5	5	5 (n–1) ±2	5 (n–1) ±4
>5	10	10 (n–1) ±2	10 (n–1) ±4

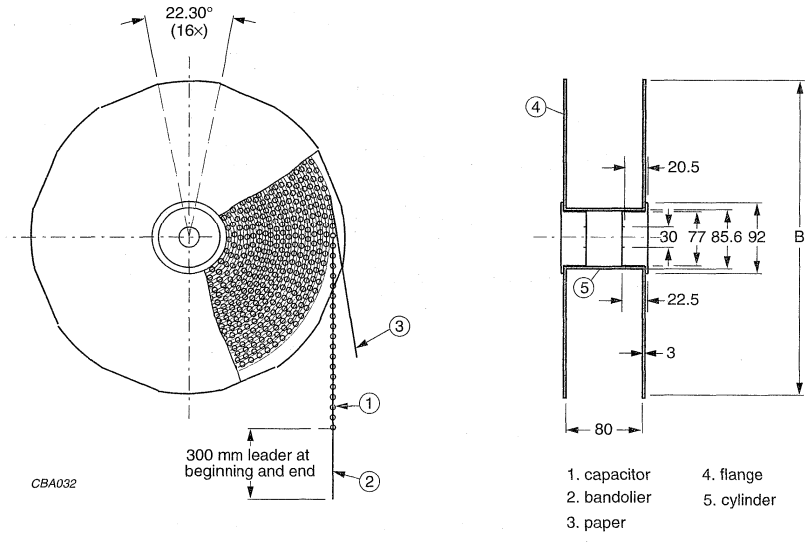


Dimensions in mm.

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

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



Dimensions in mm.

Fig.4 Outlines of packing axial taped capacitors.

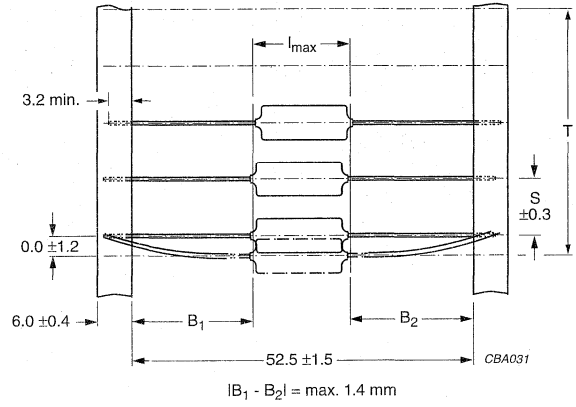
Characteristics of tape

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

TAPE DISTANCE: 52.5 ±1.5 mm

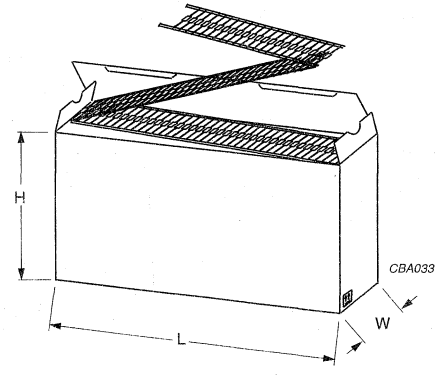
Distance T for number (n) of capacitors

d_{max} (mm)	S (mm)	T FOR NUMBER (n) OF CAPACITORS	
		n < 50	50 ≤ n < 100
≤5	5	5 (n–1) ±2	5 (n–1) ±4
>5	10	10 (n–1) ±2	10 (n–1) ±4



Dimensions in mm.

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



Dimensions in mm.

Fig.6 Outline of ammopack.

Characteristics of tape

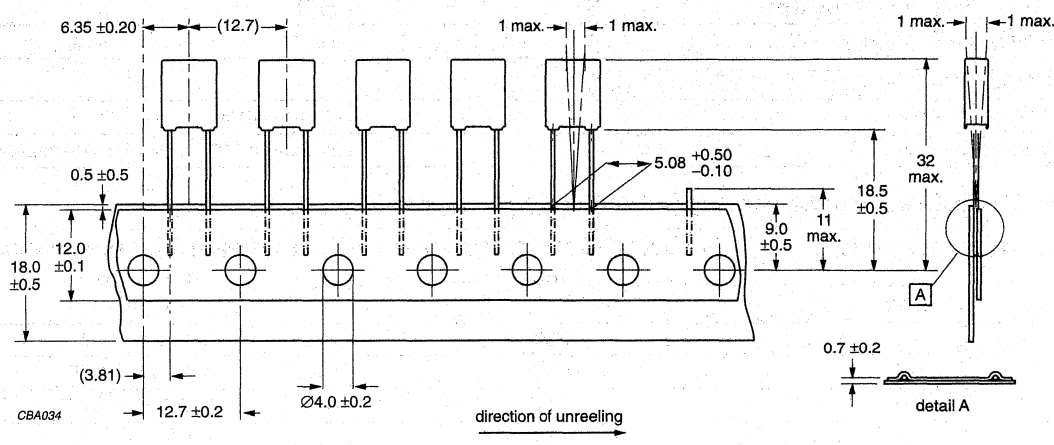
DESCRIPTION	VALUE
Pull-out force of the component	≥2 N
Peel-off force of adhesive tape	≥6 N
Tearing force of tape	≥10 N
Storage conditions	
Storage temperature	−25 to +40 °C
Relative humidity	maximum 80% without condensation

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

RADIAL POTTED FILM CAPACITORS

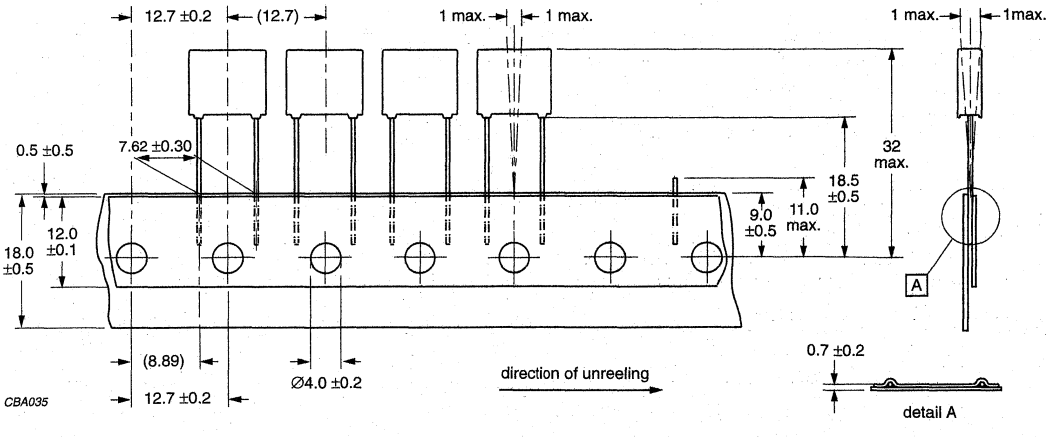
Series: 370; pitch = 5.08 mm



Dimensions in mm.

Fig.7 Outline of taped capacitors: pitch = 5.08 mm.

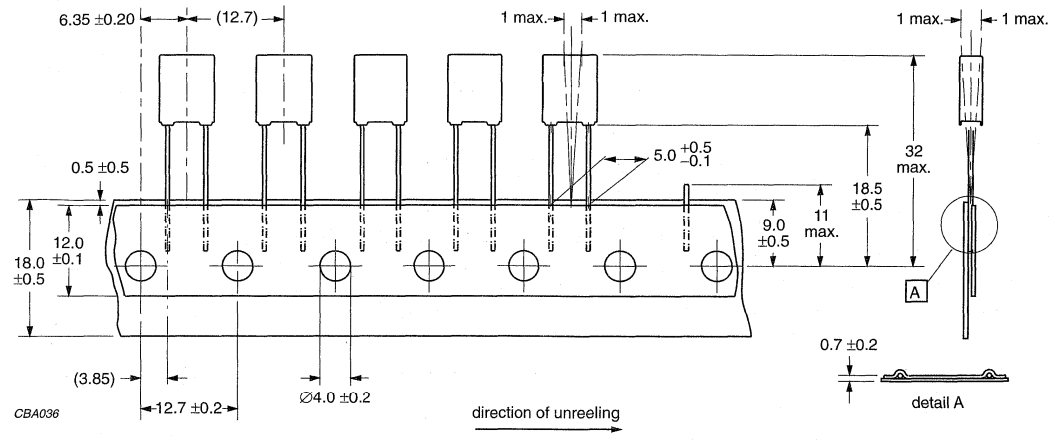
Series: 371; pitch = 7.62 mm



Dimensions in mm.

Fig.8 Outline of taped capacitors: pitch = 7.62 mm.

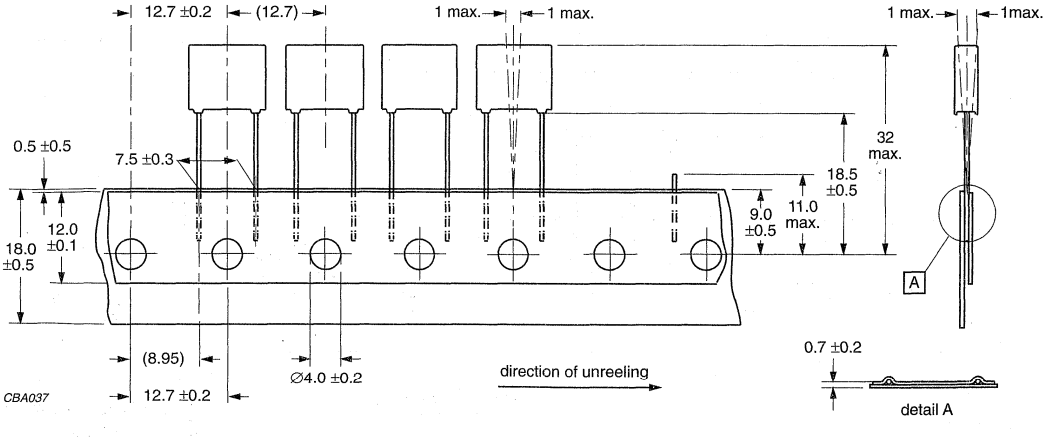
Series: 380, 416 to 420 and 470; pitch = 5 mm



Dimensions in mm.

Fig.9 Outline of taped capacitors: pitch = 5 mm.

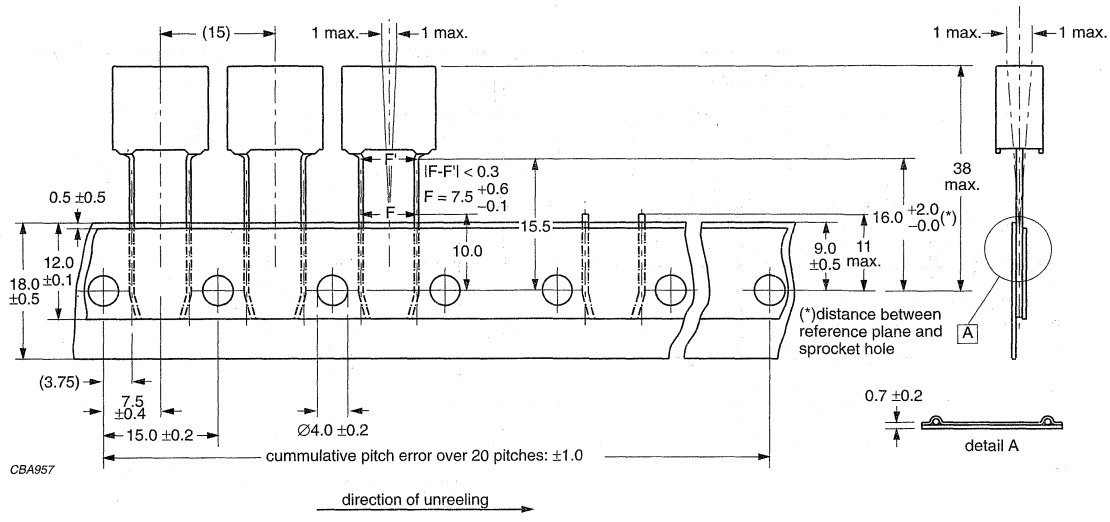
Series: 338 and 379; pitch = 7.5 mm



Dimensions in mm.

Fig.10 Outline of taped capacitors: pitch = 7.5 mm.

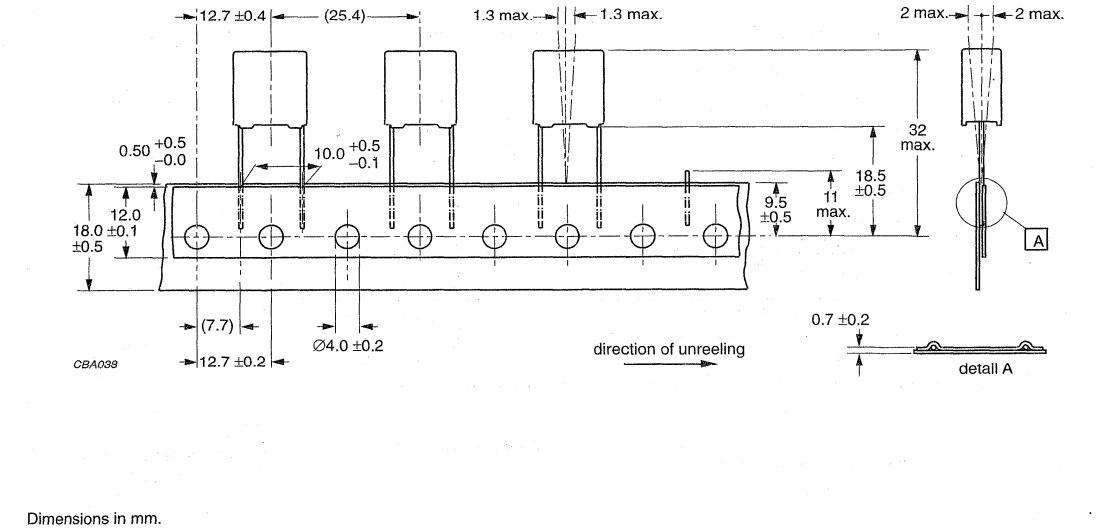
Series: 338; original pitch = 10 mm (bent back pitch = 7.5 mm)



Dimensions in mm.

Fig.11 Outline of taped capacitors: original pitch = 10 mm (bent back pitch = 7.5 mm).

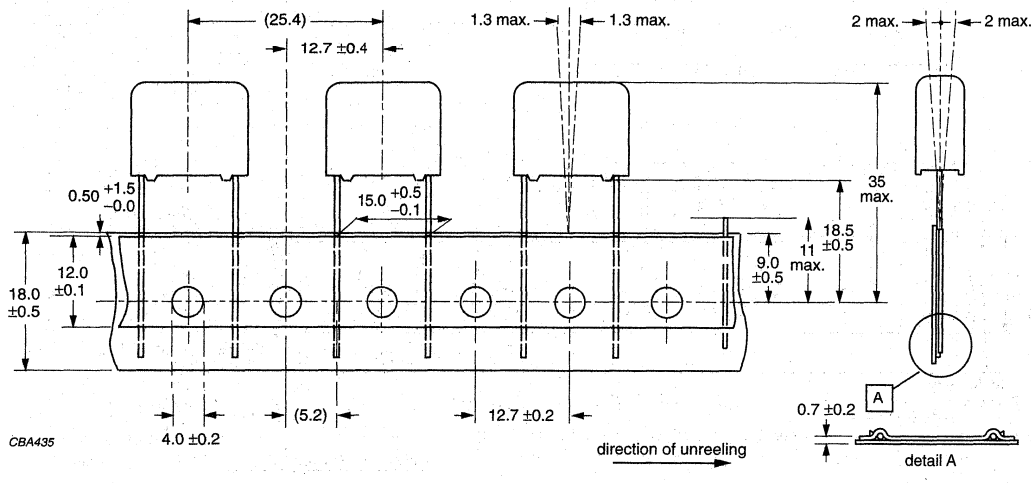
Series: 344, 336, 338, 372, 379 and 416 to 420; pitch = 10 mm



Dimensions in mm.

Fig.12 Outline of taped capacitors: pitch = 10 mm.

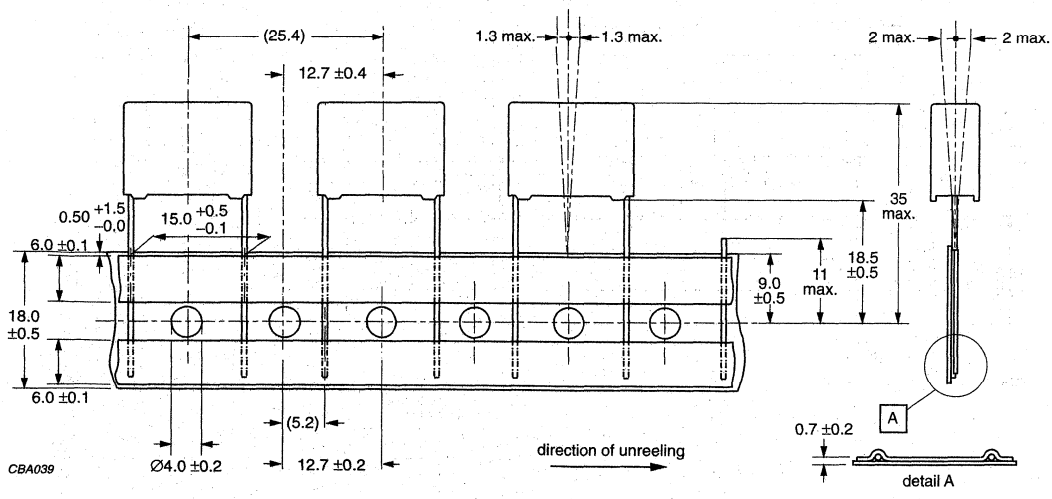
Series: 335; pitch = 15 mm



Dimensions in mm.

Fig.13 Outline of taped capacitors: pitch = 15 mm.

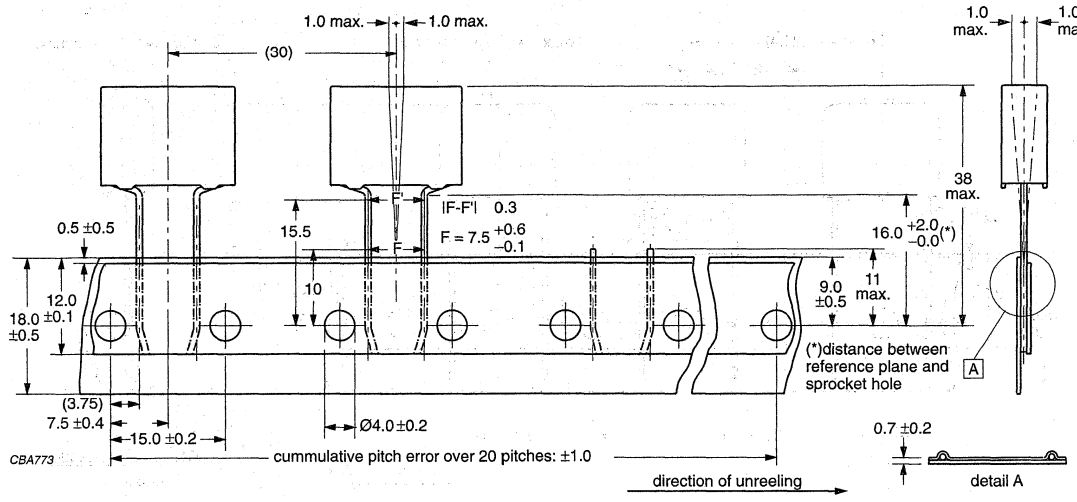
Series: 330, 331, 333, 336, 338, 344, 373, 376, 378, 379 and 383; pitch = 15 mm



Dimensions in mm.

Fig.14 Outline of taped capacitors: pitch = 15 mm.

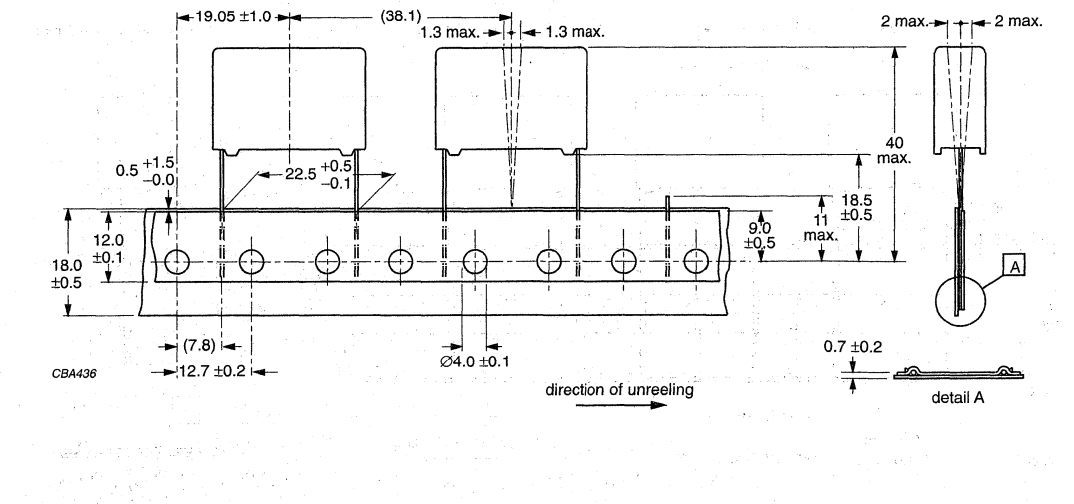
Series: 338 and 383; original pitch = 15 mm (bent back pitch = 7.5 mm)



Dimensions in mm.

Fig.15 Outline of taped capacitors: original pitch = 15 mm (bent back pitch = 7.5 mm).

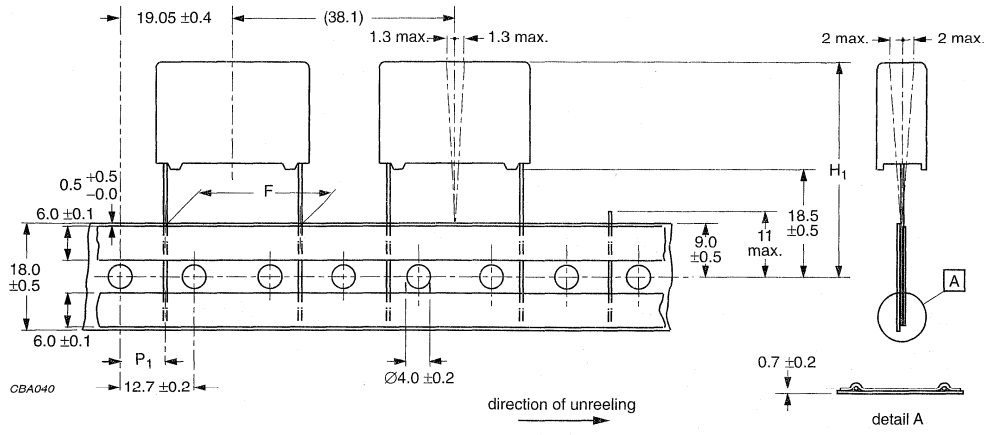
Series: 335; pitch = 22.5 mm



Dimensions in mm.

Fig.16 Outline of taped capacitors: pitch = 22.5 mm.

Series: 330, 331, 333, 336, 338, 344, 373, 376, 378, 379 and 383; pitch = 22.5 mm



Dimensions in mm.

For tape dimensions see Table 1.

Fig.17 Outline of taped capacitors: pitch = 22.5 mm.

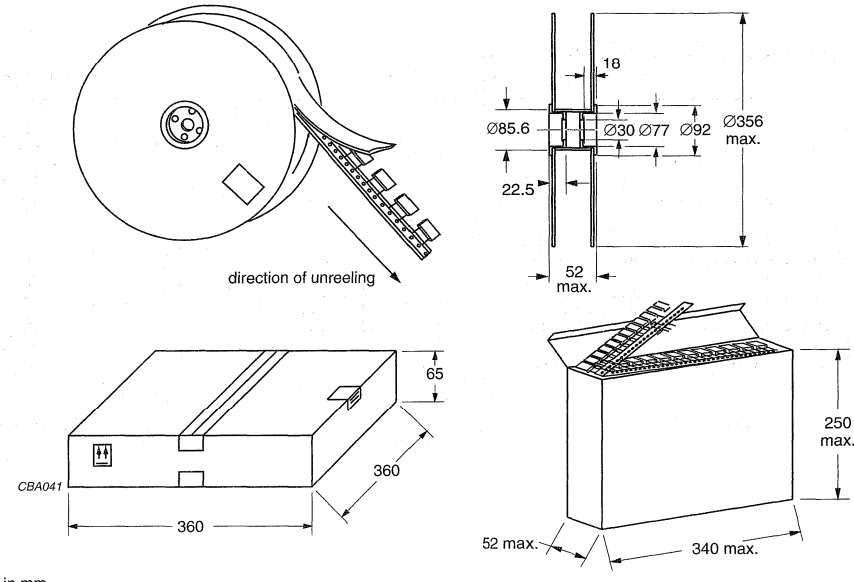
Table 1 Tape dimensions; see Fig.17

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%

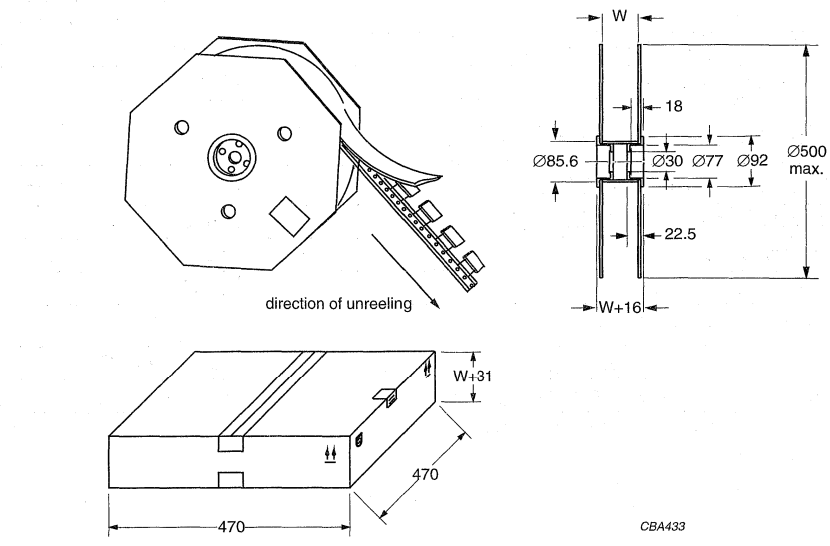
Series: 370, 371, 380, 416 to 420 and 470



Dimensions in mm.

Fig.18 Outlines of reel and ammopack: series 370, 371, 380, 416 to 420 and 470.

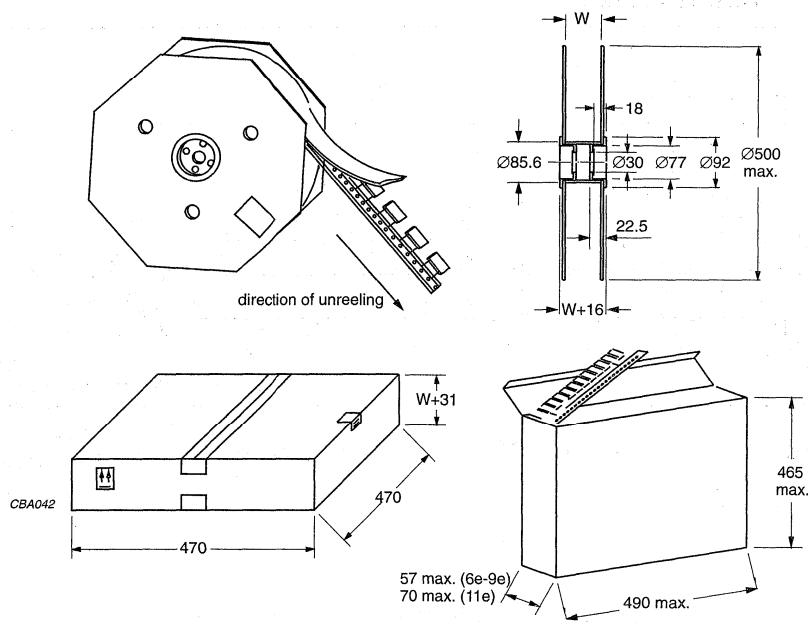
Series: 335



Dimensions in mm.

Fig.19 Outlines of reel and ammopack.

Series: 330, 330, 331, 333, 336, 338, 344, 373, 376, 378, 379 and 383



Dimensions in mm.

Fig.20 Outlines of reel and ammopack: various series from 330 4 to 383.

W as a function of product height

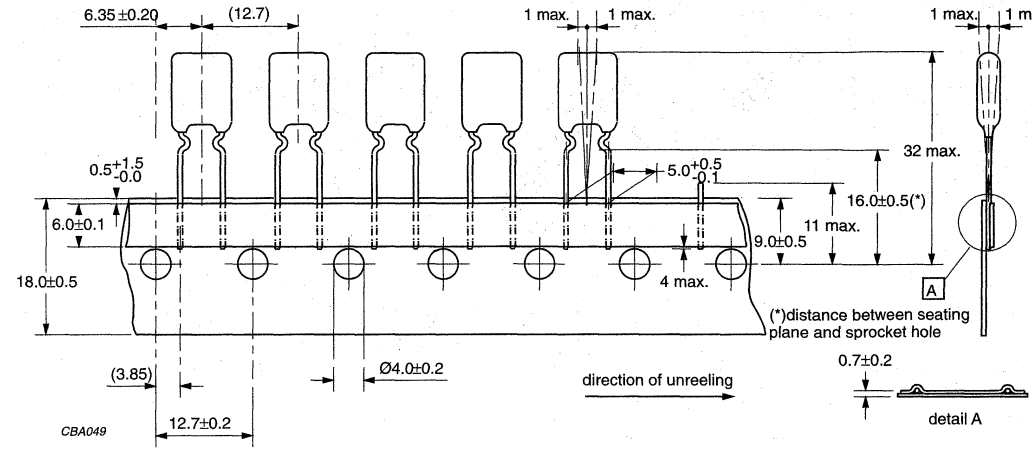
h (mm)	W ±2 (mm)
9.0	40
10.0 up to and including 15.0	45
15.5 up to and including 19.5	50
21.0 up to and including 23.0	55
25.0 up to and including 28.0	60
31.0	65

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).

RADIAL LACQUERED FILM CAPACITORS

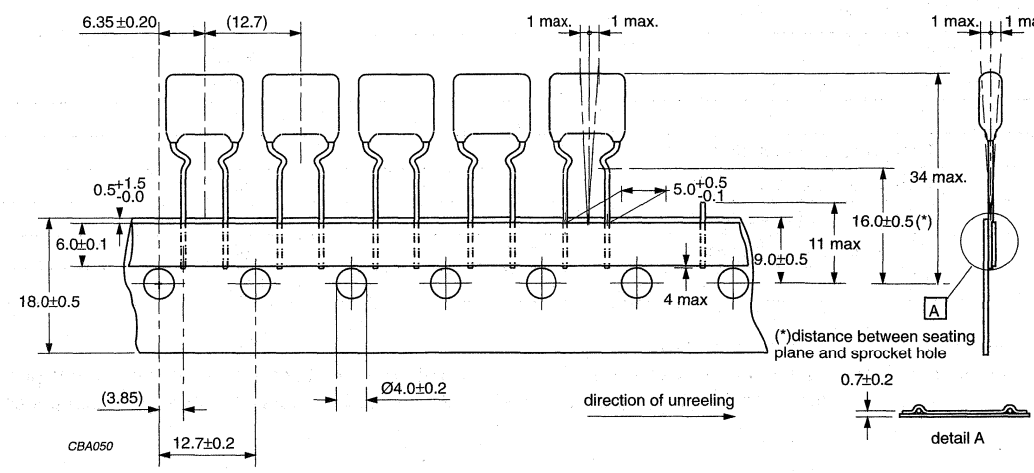
Series: 365; pitch = 5.0 mm (kinked leads)



Dimensions in mm.

Fig.21 Outline of taped capacitors: pitch = 5.0 mm.

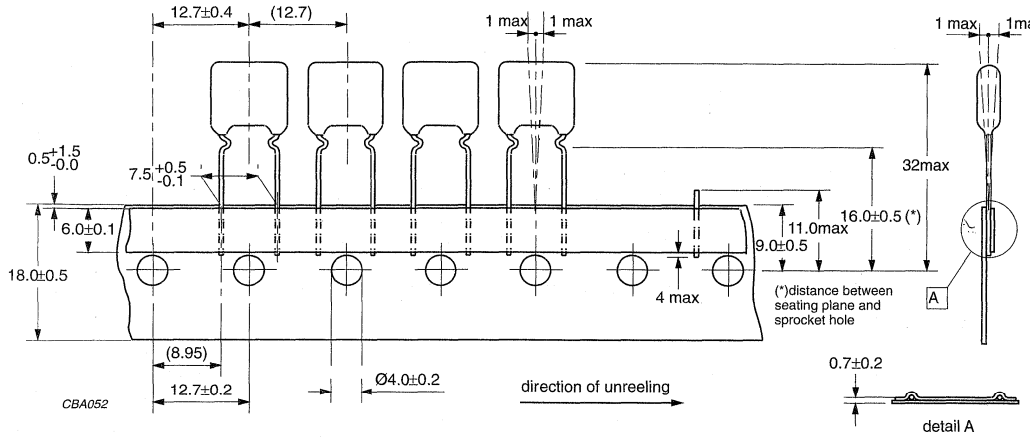
Series: 365; pitch = 5.0 mm (bent back leads)



Dimensions in mm.

Fig.22 Outline of taped capacitors: pitch = 5.0 mm.

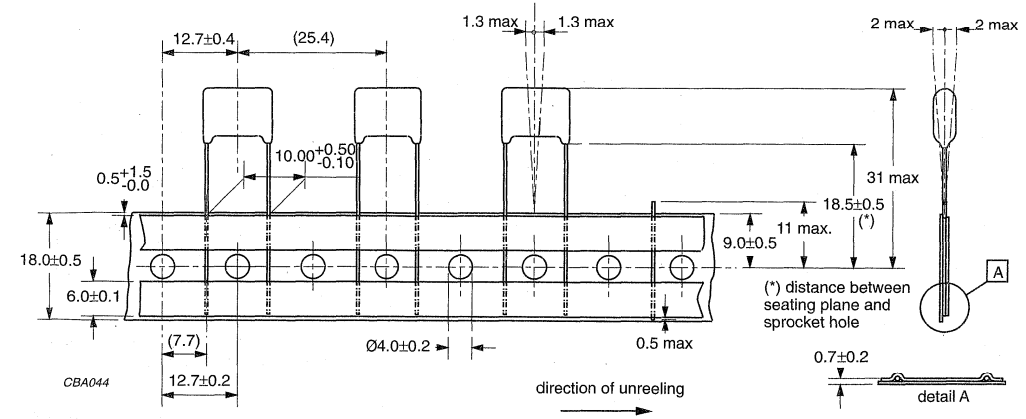
Series: 365; pitch = 7.5 mm



Dimensions in mm.

Fig.23 Outline of taped capacitors: pitch = 7.5 mm.

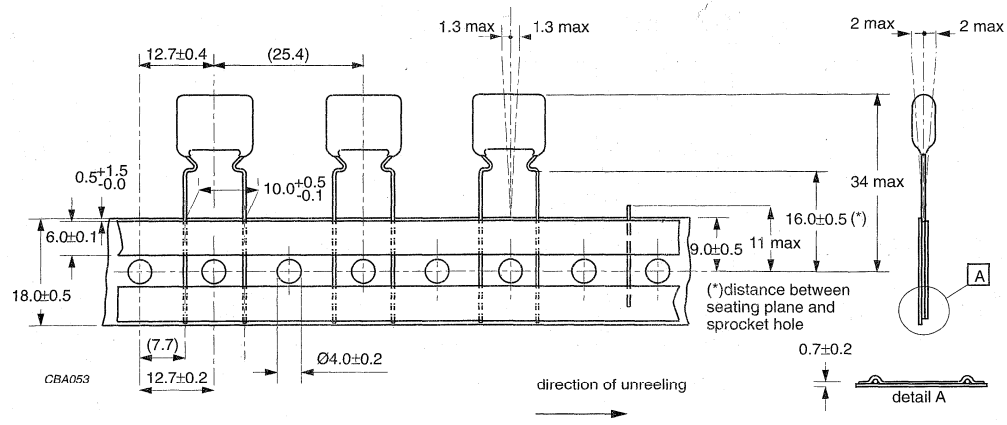
Series: 369; pitch = 10.0 mm



Dimensions in mm.

Fig.24 Outline of taped capacitors: pitch = 10.0 mm.

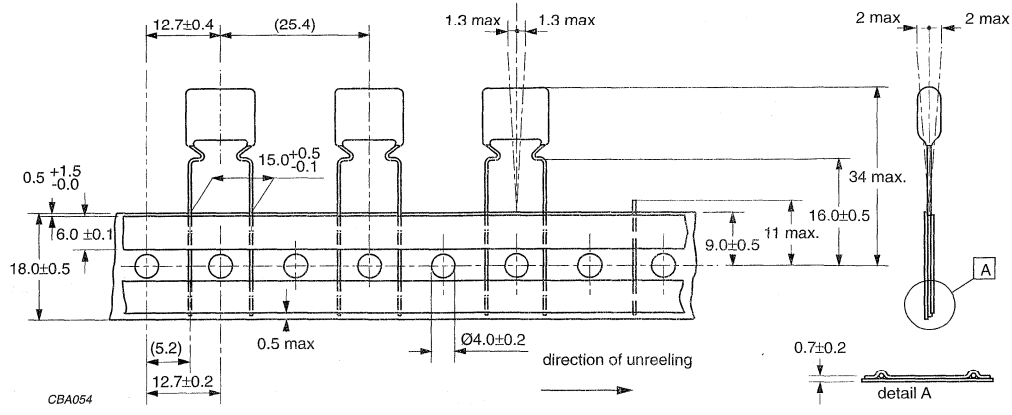
Series: 368, 375, 395, 467 and 479; pitch = 10.0 mm



Dimensions in mm.

Fig.25 Outline of taped capacitors: pitch = 10.0 mm.

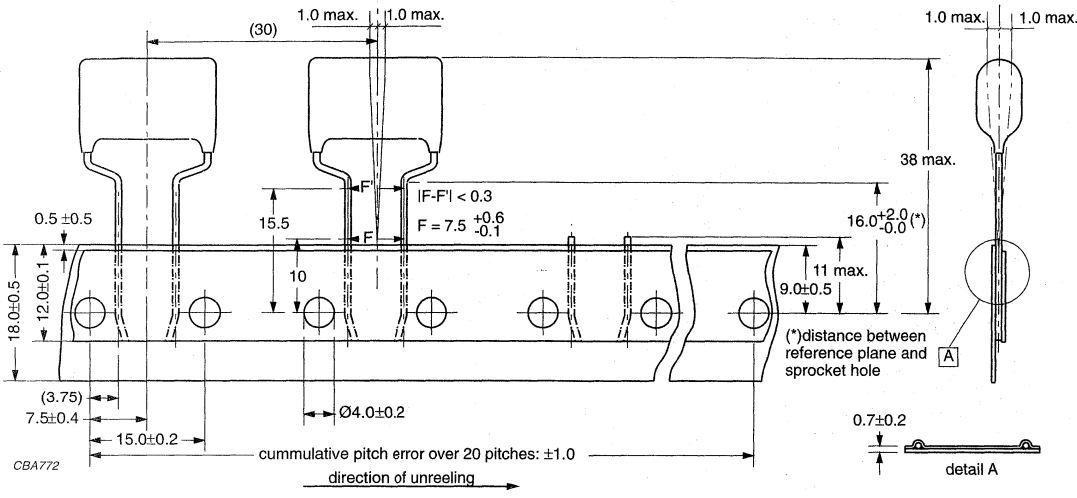
Series: 368, 375, 468 and 479; pitch = 15.0 mm



Dimensions in mm.

Fig.26 Outline of taped capacitors: pitch = 15.0 mm.

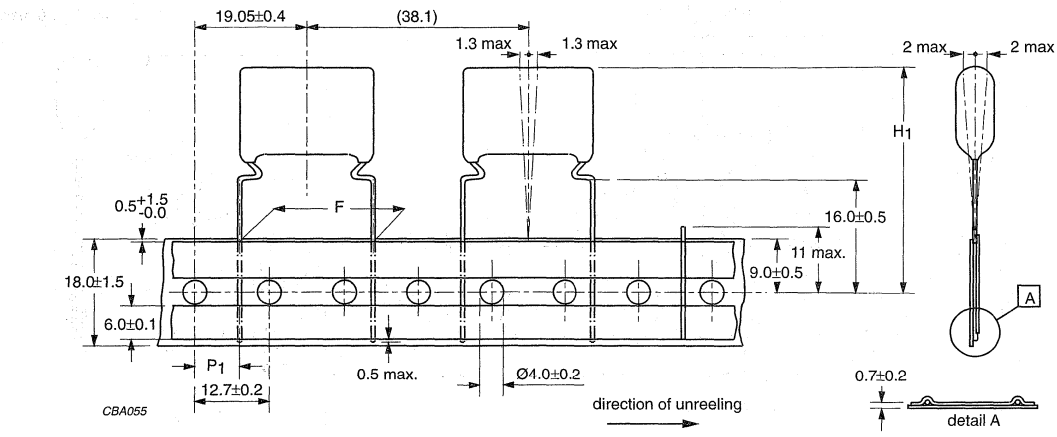
Series: 375, 468 and 479; original pitch = 15.0 mm (bent back pitch = 7.5 mm)



Dimensions in mm.

Fig.27 Outline of taped capacitors: original pitch = 15.0 mm (bent back pitch = 7.5 mm).

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



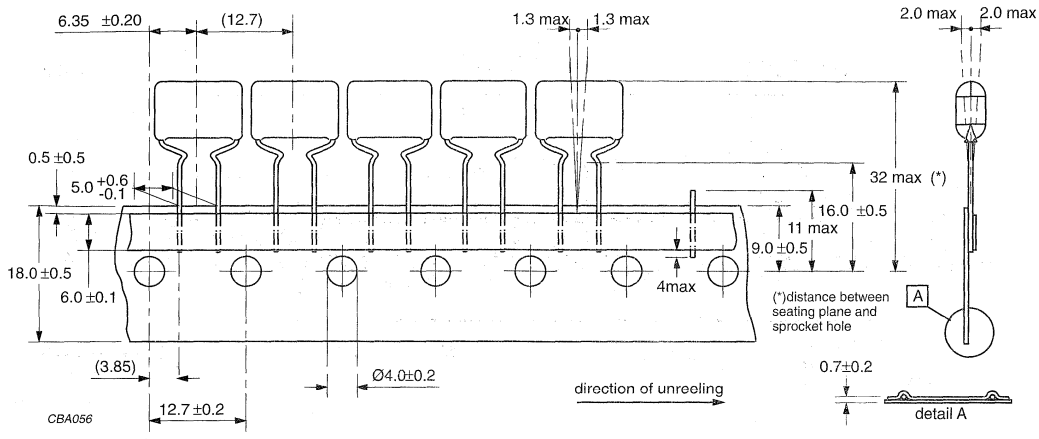
Dimensions in mm.
For tape dimensions see Table 2.

Fig.28 Outline of taped capacitors: pitch = 22.5 mm.

Table 2 Tape dimensions; see Fig.28

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

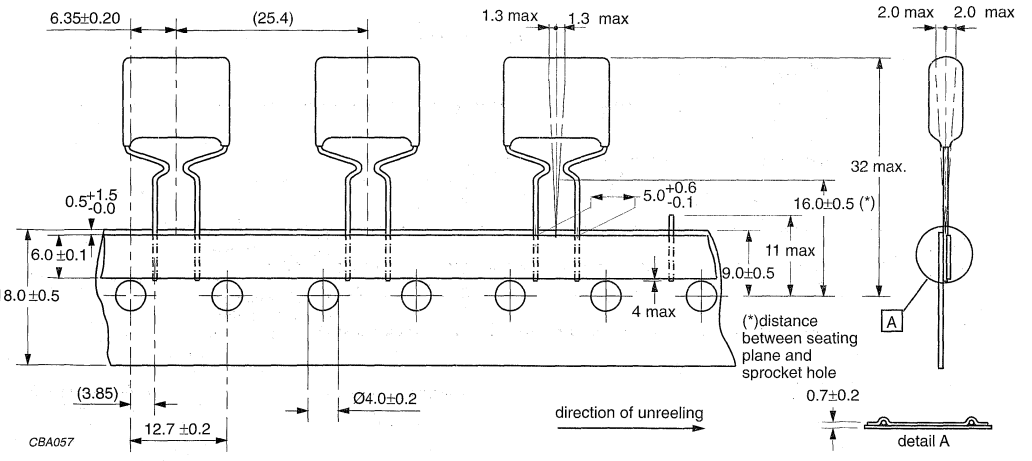
Series: 374; l_{max} = 11.5 mm and pitch = 5.0 mm



Dimensions in mm.

Fig.29 Outline of taped capacitors: l_{max} = 11.5 mm and pitch = 5.0 mm.

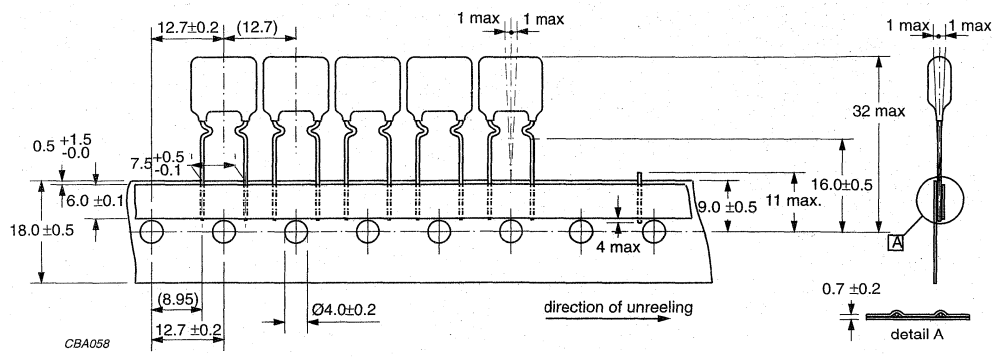
Series: 374; l_{max} = 14.0 mm and pitch = 5.0 mm



Dimensions in mm.

Fig.30 Outline of taped capacitors: l_{max} = 14.0 mm and pitch = 5.0 mm.

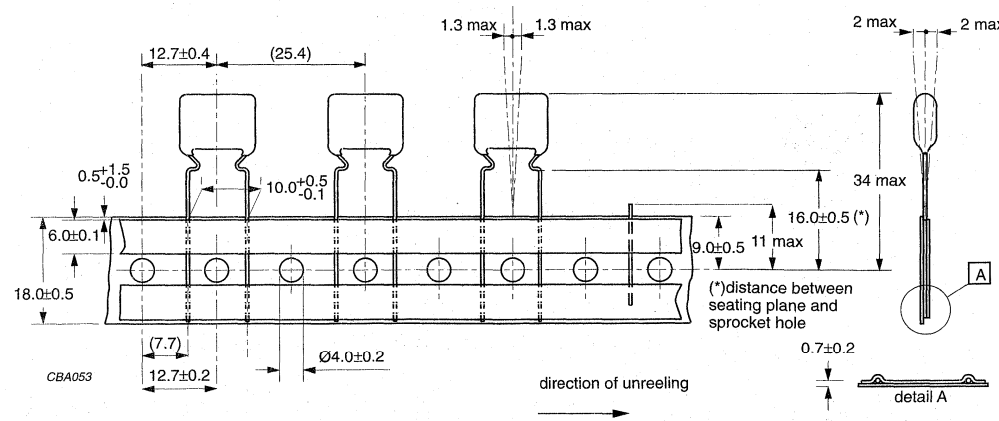
Series: 374; l_{max} = 11.5 mm and pitch = 7.5 mm



Dimensions in mm.

Fig.31 Outline of taped capacitors: l_{max} = 11.5 mm and pitch = 7.5 mm.

Series: 374; l_{max} = 14.0 mm and pitch = 10.0 mm



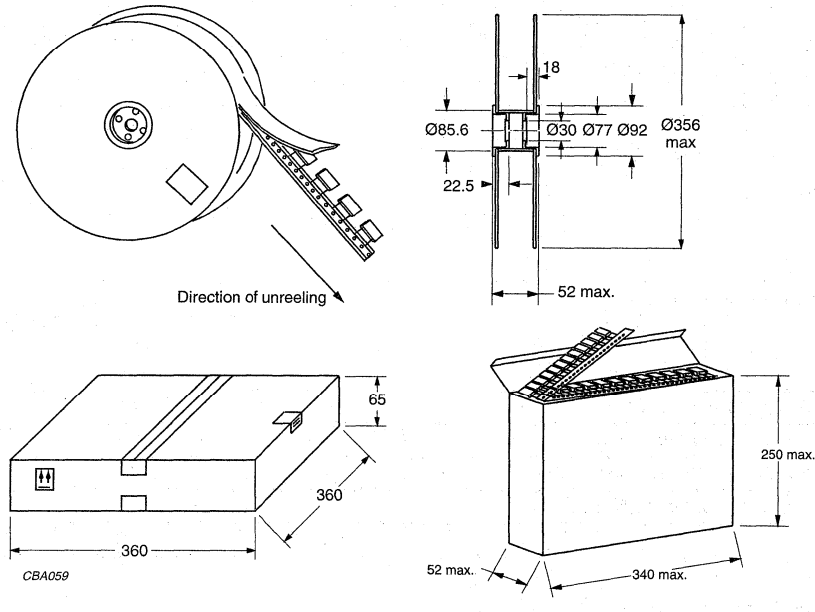
Dimensions in mm.

Fig.32 Outline of taped capacitors: l_{max} = 14.0 mm and pitch = 10.0 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%

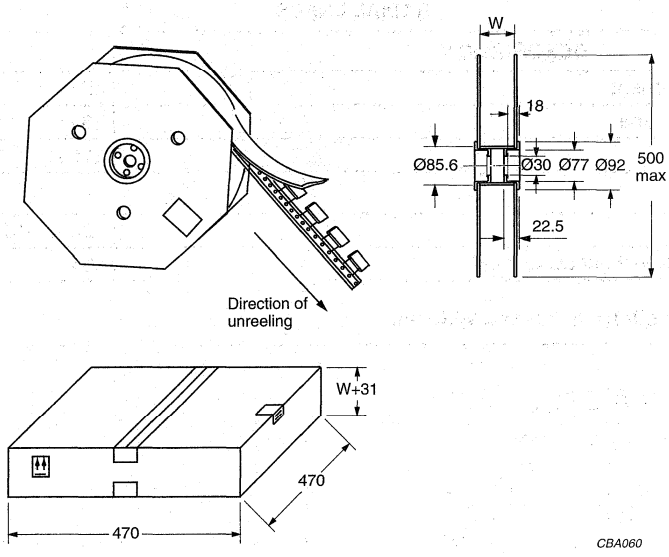
Series: 365, 374 and 479; pitch = 5, 7.5 and 10.0 mm



Dimensions in mm.

Fig.33 Outlines of reel and ammopack. Series: 365, 374 and 479.

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



Dimensions in mm.

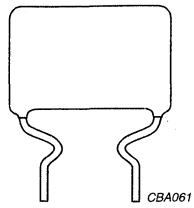
Fig.34 Outlines of reel. Series: 368, 369, 375, 467, 468 and 479.

W as a function of product height

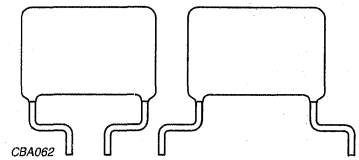
h_{max} (mm)	W ±2 (mm)
9.5 up to and including 13.5	40
14.0 up to and including 17.5	45
18.0 up to and including 22.5	50
23.0 up to and including 27.5	55
28.0	60

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

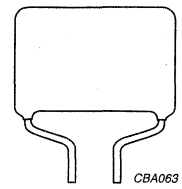
BENDING BACK OR BENDING OUT CAPABILITIES FOR RADIAL LACQUERED FILM CAPACITORS



a.



b.



c.

Fig.35 Outlines.

Bending capabilities

MAX. BODY SIZE	ORIGINAL PITCH	BENT BACK PITCH	BENT OUT PITCH	PACKING
Bending shape (see Fig.35a)				
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.35b)				
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.35c)				
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

AXIAL UNIDIRECTIONAL FILM CAPACITORS

Series: 460 to 464

DIMENSIONS $d_{max} \times l_{max}$ (mm)	TAPED ON REEL TAPE DISTANCE 63.5 mm	LOOSE IN BOX	UNIDIRECTIONAL
	SPQ	SPQ	SPQ
l_t = 30.0 mm			
5.0 × 11.0	2500	250	1000
l_t = 28.0 mm			
6.0 × 15.0	1500	250	–
6.5 × 15.0	1500	250	–
7.0 × 15.0	1000	200	–
7.5 × 15.0	1000	150	–
8.0 × 15.0	1000	150	–
8.5 × 15.0	1000	150	–

RADIAL POTTED FILM CAPACITORS

Series: 330 4, 331 6, 333 4, 344, 335 1, 370 to 373, 376, 378, 379, 380, 470

DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	LOOSE IN BOX short leads	LOOSE IN BOX long leads	AMMOPACK	REEL
	SPQ	SPQ	SPQ	SPQ
Pitch = 5.08 mm; sprocket hole distance = 12.7 mm				
2.5 × 6.5 × 7.2	2000	1000	2000	2000
3.5 × 8.0 × 7.2	2000	1000	1500	1500
4.5 × 9.0 × 7.2	2000	1000	1000	1000
6.0 × 11.0 × 7.2	2000	1000	750	1000
Pitch = 7.62 mm; sprocket hole distance = 12.7 mm				
2.5 × 6.5 × 10.0	1000	1000	2000	2000
3.0 × 8.0 × 10.0	1000	1000	1500	1500
4.0 × 9.0 × 10.0	1000	1000	1000	1500
5.0 × 10.5 × 10.0	1000	1000	1000	1000
Pitch = 5.0 mm; sprocket hole distance = 12.7 mm				
2.5 × 6.5 × 7.2	2000	1000	2000	2000
3.5 × 8.0 × 7.2	2000	1000	1500	1500
4.5 × 9.0 × 7.2	2000	1000	1000	1000
6.0 × 11.0 × 7.2	2000	1000	750	1000
Pitch = 10.0 mm; sprocket hole distance = 12.7 mm				
4.0 × 9.0 × 12.5	1000	–	750	1400
4.0 × 10.0 × 12.5	1000	–	750	1400
5.0 × 11.0 × 12.5	1000	–	600	1100
6.0 × 12.0 × 12.5	1000	–	–	900
Pitch = 15.0 mm; sprocket hole distance = 12.7 mm				
5.0 × 11.0 × 17.5	1000	1000	–	1100
6.0 × 12.0 × 17.5	1000	1000	–	900
7.0 × 13.5 × 17.5	1000	500	–	800
8.5 × 15.0 × 17.5	1000	500	–	650
10.0 × 16.5 × 17.5	500	–	–	600
Pitch = 22.5 mm; sprocket hole distance = 12.7 mm				
6.0 × 15.5 × 26.0	200	–	–	600
7.0 × 16.5 × 26.0	200	500	–	550
8.5 × 18.0 × 26.0	200	500	–	450
10.0 × 19.5 × 26.0	200	500	–	350
Pitch = 27.5 mm; sprocket hole distance = 12.7 mm				
9.0 × 19.0 × 31.0	100	–	–	–
11.0 × 21.0 × 31.0	100	125	–	–
13.0 × 23.0 × 31.0	100	125	–	–
15.0 × 25.0 × 31.0	100	125	–	–
18.0 × 28.0 × 31.0	100	125	–	–
21.0 × 31.0 × 31.0	50	75	–	–

Packaging information — Packing quantities

Series: 335 5, 336 1, 336 2, 336 6, 338 2, 383, 416 to 420

DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	LOOSE IN BOX short leads	LOOSE IN BOX long leads	AMMOPACK	REEL
	SPQ	SPQ	SPQ	SPQ
Pitch = 5.0 mm; sprocket hole distance = 12.7 mm				
3.5 × 8.0 × 7.2	3000	–	1500	–
4.5 × 9.0 × 7.2	2000	–	1000	–
6.0 × 11.0 × 7.2	1500	–	750	–
Pitch = 7.5 mm; sprocket hole distance = 12.7 mm				
4.0 × 9.0 × 10.0	1500	1000	1250	1400
5.0 × 10.5 × 10.0	1000	1250	1000	1100
6.0 × 11.5 × 10.0	750	1000	750	–
Pitch = 10.0 mm; sprocket hole distance = 12.7 mm				
4.0 × 10.0 × 12.5	1000	1250	750	1400
5.0 × 11.0 × 12.5	1000	1000	600	1100
6.0 × 12.0 × 12.5	750	750	500	900
6.0 × 14.0 × 12.5	700	700	500	–
Pitch = 15.0 mm; sprocket hole distance = 12.7 mm				
5.0 × 11.0 × 17.5	1250	1000	–	1100
6.0 × 12.0 × 17.5	1000	1000	–	900
7.0 × 13.5 × 17.5	750	500	–	800
8.5 × 15.0 × 17.5	750	500	–	650
10.0 × 16.5 × 17.5	500	450	–	600
Pitch = 22.5 mm; sprocket hole distance = 12.7 mm				
6.0 × 15.5 × 26.0	200	250	–	600
7.0 × 16.5 × 26.0	200	250	–	550
8.5 × 18.0 × 26.0	200	250	–	450
10.0 × 19.5 × 26.0	200	200	–	350
12.0 × 22.0 × 26.0	100	200	–	300
Pitch = 27.5 mm; sprocket hole distance = 12.7 mm				
9.0 × 19.0 × 31.0	100	150	–	–
11.0 × 21.0 × 31.0	100	125	–	–
13.0 × 23.0 × 31.0	100	125	–	–
15.0 × 25.0 × 31.0	100	125	–	–
18.0 × 28.0 × 31.0	100	100	–	–
21.0 × 31.0 × 31.0	50	75	–	–

Bent back leads. Series: 338 2, 383

DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	LOOSE IN BOX short leads SPQ	LOOSE IN BOX long leads SPQ	AMMOPACK SPQ	REEL SPQ
Original pitch = 10.0 mm (bent back pitch = 7.5 mm); sprocket hole distance = 15.0 mm				
6.0 × 14.0 × 12.5	–	–	–	1600
Original pitch = 15.0 mm (bent back pitch = 7.5 mm); sprocket hole distance = 15.0 mm				
5.0 × 13.0 × 17.5	–	–	–	1000
6.0 × 14.0 × 17.5	–	–	–	800
7.0 × 15.5 × 17.5	–	–	–	700
8.5 × 17.0 × 17.5	–	–	–	550
10.0 × 18.5 × 17.5	–	–	–	500

RADIAL LACQUERED FILM CAPACITORS

Kinked leads. Series: 347, 365/366, 368

DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	LOOSE IN BOX SHORT LEADS	LOOSE IN BOX LONG LEADS	AMMOPACK	REEL
	SPQ	SPQ	SPQ	SPQ
Pitch = 5.0 mm			**sprocket hole distance = 12.7 mm**	
3.7 × 12.5 × 7.3	1000	1000	1500	1500
4.0 × 12.5 × 7.3	1000	1000	1500	1500
4.0 × 13.0 × 7.3	1000	1000	1500	1500
4.0 × 13.5 × 7.3	1000	1000	1500	1500
4.2 × 13.5 × 7.3	1000	1000	1000	1000
4.5 × 14.0 × 7.3	1000	1000	1000	1000
4.5 × 14.5 × 7.3	1000	1000	1000	1000
4.5 × 15.5 × 7.3	1000	1000	1000	1000
5.0 × 14.0 × 7.3	1000	1000	1000	1000
5.5 × 14.5 × 7.3	1000	1000	1000	1000
5.5 × 15.0 × 7.3	1000	1000	1000	1000
5.5 × 15.5 × 7.3	1000	1000	1000	1000
Pitch = 7.5 mm				
4.0 × 12.0 × 10.0	1000	1500	–	–
4.0 × 12.5 × 10.0	1000	1500	–	–
4.0 × 13.0 × 10.0	1000	1500	–	–
4.0 × 14.0 × 10.0	1000	1500	–	–
4.5 × 13.0 × 10.0	1000	1500	–	–
4.5 × 13.5 × 10.0	1000	1500	–	–
4.5 × 14.0 × 10.0	1000	1500	–	–
5.0 × 13.5 × 10.0	1000	1250	–	–
5.0 × 14.0 × 10.0	1000	1250	–	–
5.5 × 14.0 × 10.0	1500	1250	–	–
5.5 × 15.5 × 10.0	1250	1000	–	–
4.5 × 13.0 × 10.5	1000	1000	–	–
5.0 × 13.0 × 10.5	1000	1000	–	–
5.0 × 13.5 × 10.5	1000	1000	–	–
5.5 × 13.5 × 10.5	1000	1000	–	–
5.5 × 14.0 × 10.5	1000	1000	–	–
5.5 × 14.5 × 10.5	1000	1000	–	–
6.0 × 14.5 × 10.5	1000	1000	–	–
6.0 × 15.0 × 10.5	1000	1000	–	–

Packaging information

Packing quantities

DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	LOOSE IN BOX SHORT LEADS SPQ	LOOSE IN BOX LONG LEADS SPQ	AMMOPACK SPQ	REEL SPQ
Pitch = 10.0 mm			**sprocket hole distance = 12.7 mm**	
3.7 × 12.7 × 12.5	2000	1000	–	1500
3.9 × 12.9 × 12.5	2000	1000	–	1500
4.0 × 12.8 × 12.5	2000	1000	–	1300
4.0 × 12.9 × 12.5	2000	1000	–	1500
4.0 × 13.0 × 12.5	2000	1000	–	1500
4.1 × 13.2 × 12.5	2000	1000	–	1500
4.2 × 12.9 × 12.5	2000	1000	–	1300
4.2 × 13.2 × 12.5	2000	1000	–	1300
4.3 × 13.1 × 12.5	2000	1000	–	1300
4.3 × 13.3 × 12.5	2000	1000	–	1500
4.3 × 13.4 × 12.5	2000	1000	–	1200
4.4 × 13.4 × 12.5	2000	1000	–	1200
4.6 × 13.4 × 12.5	2000	1000	–	1200
4.5 × 13.5 × 12.5	2000	1000	–	1500
4.5 × 13.6 × 12.5	2000	1000	–	1200
4.6 × 13.5 × 12.5	2000	1000	–	1300
4.6 × 13.6 × 12.5	2000	1000	–	1500
4.6 × 13.7 × 12.5	2000	1000	–	1300
4.7 × 13.7 × 12.5	2000	1000	–	1200
4.9 × 13.9 × 12.5	2000	1000	–	1100
5.1 × 14.1 × 12.5	2000	1000	–	1100
5.3 × 14.3 × 12.5	2000	1000	–	1000
5.5 × 14.5 × 12.5	2000	1000	–	1000
5.9 × 14.9 × 12.5	2000	1000	–	900
6.0 × 15.0 × 12.5	2000	1000	–	900
4.5 × 12.0 × 13.5	2000	–	–	–
5.0 × 12.5 × 13.5	2000	–	–	–
5.5 × 13.0 × 13.5	2000	–	–	–
6.0 × 13.5 × 13.5	2000	–	–	–
6.5 × 14.0 × 13.5	2000	–	–	–
7.0 × 14.5 × 13.5	2000	–	–	–
4.5 × 12.5 × 14.0	2000	–	–	–
5.0 × 12.5 × 14.0	2000	–	–	–
5.5 × 13.0 × 14.0	2000	–	–	–
6.0 × 13.5 × 14.0	2000	–	–	–
6.5 × 14.0 × 14.0	2000	–	–	–
7.0 × 14.5 × 14.0	2000	–	–	–

Packaging information

Packing quantities

DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	LOOSE IN BOX SHORT LEADS SPQ	LOOSE IN BOX LONG LEADS SPQ	AMMOPACK SPQ	REEL SPQ
Pitch = 15.0 mm			**sprocket hole distance = 12.7 mm**	
4.8 × 14.0 × 17.5	2000	1000	–	1100
5.0 × 13.5 × 17.5	2000	1000	–	1200
5.0 × 13.7 × 17.5	2000	1000	–	1200
5.0 × 13.9 × 17.5	2000	1000	–	1200
5.0 × 14.0 × 17.5	2000	1000	–	1200
5.3 × 14.5 × 17.5	2000	1000	–	1000
5.4 × 14.5 × 17.5	2000	1000	–	1200
5.5 × 14.5 × 17.5	2000	1000	–	1100
5.7 × 15.0 × 17.5	1000	1000	–	900
6.0 × 15.0 × 17.5	2000	1000	–	1000
6.0 × 15.5 × 17.5	2000	1000	–	900
6.3 × 15.5 × 17.5	2000	1000	–	900
6.4 × 15.5 × 17.5	1000	1000	–	800
6.5 × 15.5 × 17.5	1000	1000	–	900
6.8 × 16.0 × 17.5	1000	1000	–	800
7.0 × 16.0 × 17.5	2000	1000	–	800
7.5 × 16.5 × 17.5	1000	1000	–	800
8.0 × 17.0 × 17.5	1000	1000	–	750
5.5 × 14.0 × 19.0	2000	–	–	–
6.0 × 14.5 × 19.0	2000	–	–	–
7.0 × 15.5 × 19.0	2000	–	–	–
7.5 × 16.0 × 19.0	2000	–	–	–
8.0 × 16.5 × 19.0	2000	–	–	–
8.5 × 17.0 × 19.0	1000	–	–	–
Pitch = 22.5 mm			**sprocket hole distance = 12.7 mm**	
5.0 × 17.0 × 26.0	1000	1000	–	800
5.5 × 17.5 × 26.0	1000	1000	–	750
5.6 × 17.5 × 26.0	1000	1000	–	800
6.0 × 18.0 × 26.0	1000	1000	–	650
6.1 × 18.0 × 26.0	1000	1000	–	750
6.3 × 18.5 × 26.0	1000	1000	–	650
6.4 × 18.5 × 26.0	1000	1000	–	650
7.1 × 19.0 × 26.0	1000	1000	–	550
6.6 × 18.5 × 26.0	1000	1000	–	600
7.0 × 19.0 × 26.0	1000	1000	–	650
7.2 × 19.0 × 26.0	1000	1000	–	550
7.2 × 19.5 × 26.0	1000	1000	–	550
7.5 × 19.5 × 26.0	1000	500	–	600
8.0 × 20.0 × 26.0	1000	500	–	500
8.0 × 21.0 × 26.0	1000	500	–	500
8.5 × 21.5 × 26.0	1000	500	–	500
9.0 × 22.0 × 26.0	1000	500	–	450
10.0 × 23.0 × 26.0	1000	500	–	400
7.5 × 18.0 × 27.0	1000	–	–	–

Packaging information — Packing quantities

DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	LOOSE IN BOX SHORT LEADS	LOOSE IN BOX LONG LEADS	AMMOPACK	REEL
	SPQ	SPQ	SPQ	SPQ
7.5 × 18.5 × 27.0	1000	–	–	–
8.0 × 19.5 × 27.0	500	–	–	–
9.0 × 20.0 × 27.0	500	–	–	–
10.0 × 21.0 × 27.0	500	–	–	–
11.0 × 22.0 × 27.0	500	–	–	–
Pitch = 27.5 mm				
7.5 × 20.5 × 30.0	500	500	–	–
8.0 × 21.0 × 30.0	500	500	–	–
8.5 × 21.5 × 30.0	500	500	–	–
9.0 × 22.0 × 30.0	500	500	–	–
9.5 × 22.5 × 30.0	500	500	–	–
10.0 × 23.0 × 30.0	500	500	–	–
10.5 × 23.5 × 30.0	500	250	–	–
11.0 × 24.0 × 30.0	500	250	–	–
11.5 × 24.5 × 30.0	500	250	–	–
12.0 × 25.0 × 30.0	500	250	–	–
12.5 × 25.5 × 30.0	500	250	–	–
10.5 × 22.5 × 32.0	500	–	–	–
11.5 × 23.5 × 32.0	500	–	–	–
12.5 × 24.5 × 32.5	250	–	–	–
14.0 × 26.0 × 32.5	250	–	–	–
15.5 × 27.5 × 32.5	250	–	–	–

Straight leads. Series: 367, 369

DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	LOOSE IN BOX SHORT LEADS SPQ	LOOSE IN BOX LONG LEADS SPQ	AMMOPACK SPQ	REEL SPQ
Pitch = 5.0 mm				
3.7 × 7.5 × 7.3	1000	1000	–	–
4.0 × 7.5 × 7.3	1000	1000	–	–
4.0 × 8.0 × 7.3	1000	1000	–	–
4.0 × 8.5 × 7.3	1000	1000	–	–
4.2 × 8.5 × 7.3	1000	1000	–	–
4.5 × 9.0 × 7.3	1000	1000	–	–
4.5 × 10.5 × 7.3	1000	1000	–	–
4.5 × 11.5 × 7.3	1000	1000	–	–
5.0 × 10.0 × 7.3	1000	1000	–	–
5.5 × 10.5 × 7.3	1000	1000	–	–
5.5 × 11.0 × 7.3	1000	1000	–	–
5.5 × 11.5 × 7.3	1000	1000	–	–
Pitch = 7.5 mm				
4.0 × 8.0 × 10.0	1000	1000	–	–
4.0 × 8.5 × 10.0	1000	1000	–	–
4.0 × 10.0 × 10.0	1000	1000	–	–
4.5 × 9.0 × 10.0	1000	1000	–	–
4.5 × 9.5 × 10.0	1000	1000	–	–
4.5 × 10.0 × 10.0	1000	1000	–	–
5.0 × 9.5 × 10.0	1000	1250	–	–
5.0 × 10.0 × 10.0	1500	1250	–	–
5.5 × 10.0 × 10.0	1500	1000	–	–
5.5 × 11.5 × 10.0	1500	1000	–	–
4.5 × 8.5 × 10.5	1000	1000	–	–
4.5 × 9.0 × 10.5	1000	1000	–	–
5.0 × 9.0 × 10.5	1000	1000	–	–
5.0 × 9.5 × 10.5	1000	1000	–	–
5.5 × 9.5 × 10.5	1000	1000	–	–
5.5 × 10.0 × 10.5	1000	1000	–	–
5.0 × 10.5 × 10.5	1000	1000	–	–

Packaging information

Packing quantities

DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	LOOSE IN BOX SHORT LEADS SPQ	LOOSE IN BOX LONG LEADS SPQ	AMMOPACK SPQ	REEL SPQ
Pitch = 10.0 mm			**sprocket hole distance = 12.7 mm**	
3.7 × 8.8 × 12.5	2000	1000	–	1500
3.8 × 9.0 × 12.5	2000	1000	–	1300
3.9 × 8.8 × 12.5	2000	1000	–	1500
3.9 × 8.9 × 12.5	2000	1000	–	1500
4.0 × 8.6 × 12.5	2000	1000	–	1500
4.0 × 8.7 × 12.5	2000	1000	–	1500
4.0 × 8.8 × 12.5	2000	1000	–	1500
4.0 × 9.0 × 12.5	2000	1000	–	1500
4.0 × 9.1 × 12.5	2000	1000	–	1500
4.0 × 9.2 × 12.5	2000	1000	–	1300
4.1 × 8.7 × 12.5	2000	1000	–	1300
4.1 × 8.8 × 12.5	2000	1000	–	1500
4.1 × 9.3 × 12.5	2000	1000	–	1300
4.2 × 9.1 × 12.5	2000	1000	–	1300
4.2 × 9.2 × 12.5	2000	1000	–	1300
4.2 × 9.3 × 12.5	2000	1000	–	1300
4.3 × 8.9 × 12.5	2000	1000	–	1500
4.3 × 9.3 × 12.5	2000	1000	–	1500
4.3 × 9.5 × 12.5	2000	1000	–	1200
4.4 × 8.9 × 12.5	2000	1000	–	1200
4.4 × 9.4 × 12.5	2000	1000	–	1200
4.5 × 8.7 × 12.5	2000	1000	–	1500
4.5 × 8.8 × 12.5	2000	1000	–	1500
4.5 × 9.0 × 12.5	2000	1000	–	1500
4.5 × 9.4 × 12.5	2000	1000	–	1200
4.6 × 8.8 × 12.5	2000	1000	–	1300
4.6 × 9.1 × 12.5	2000	1000	–	1500
4.6 × 9.2 × 12.5	2000	1000	–	1300
4.6 × 9.4 × 12.5	2000	1000	–	1300
4.7 × 9.7 × 12.5	2000	1000	–	1200
4.7 × 9.8 × 12.5	2000	1000	–	1200
4.9 × 9.2 × 12.5	2000	1000	–	1100
5.1 × 10.2 × 12.5	2000	1000	–	1100
5.3 × 9.5 × 12.5	2000	1000	–	1000
5.5 × 10.7 × 12.5	2000	1000	–	1000
5.9 × 9.9 × 12.5	2000	1000	–	900
6.0 × 11.1 × 12.5	2000	1000	–	900

Bent back leads. Series: 365

DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	LOOSE IN BOX SHORT LEADS SPQ	LOOSE IN BOX LONG LEADS SPQ	AMMOPACK SPQ	REEL SPQ
Pitch = 5.0 mm			**sprocket hole distance = 12.7 mm**	
4.0 × 13.5 × 10.0	–	–	1500	1500
4.5 × 13.0 × 10.0	–	–	1250	1250
4.5 × 14.0 × 10.0	–	–	1000	1000
5.0 × 13.5 × 10.0	–	–	1000	1250
5.0 × 14.5 × 10.0	–	–	1000	1000
5.5 × 14.0 × 10.0	–	–	1000	1000
5.5 × 15.0 × 10.0	–	–	1000	1000
5.5 × 15.5 × 10.0	–	–	1000	1000
4.5 × 14.0 × 10.5	–	–	1000	1000
5.0 × 14.5 × 10.5	–	–	1000	1000
5.5 × 15.0 × 10.5	–	–	1000	1000
6.0 × 15.5 × 10.5	–	–	1000	1000

Packaging information — Packing quantities

Series: 374

DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	LOOSE IN BOX short leads SPQ	LOOSE IN BOX LONG LEADS SPQ	AMMOPACK SPQ	REEL SPQ
Pitch = 5.0 mm; l_{max} = 11.5 mm			**sprocket hole distance = 12.7 mm**	
4.5 × 14.0 × 11.5	–	–	1250	1250
5.0 × 14.5 × 11.5	–	–	1000	1250
5.5 × 15.0 × 11.5	–	–	1000	1000
6.0 × 15.5 × 11.5	–	–	1000	1000
Pitch = 5.0 mm; l_{max} = 14.0 mm			**sprocket hole distance = 12.7 mm**	
4.5 × 14.0 × 14.0	–	–	–	1300
5.0 × 14.5 × 14.0	–	–	–	1200
5.5 × 15.0 × 14.0	–	–	–	1100
6.0 × 15.5 × 14.0	–	–	–	1000
6.5 × 16.5 × 14.0	–	–	–	900
Pitch = 7.5 mm; l_{max} = 11.5 mm			**sprocket hole distance = 12.7 mm**	
4.5 × 12.5 × 11.5	2000	–	–	–
4.5 × 14.0 × 11.5	–	–	–	1250
5.0 × 13.0 × 11.5	2000	–	–	–
5.0 × 14.5 × 11.5	–	–	–	1250
5.5 × 13.5 × 11.5	1500	–	–	–
5.5 × 15.0 × 11.5	–	–	–	1000
6.0 × 15.5 × 11.5	–	–	–	1000
Pitch = 10.0 mm; l_{max} = 14.0 mm				
4.5 × 12.5 × 14.0	2000	–	–	–
5.0 × 13.0 × 14.0	2000	–	–	–
5.5 × 13.5 × 14.0	2000	–	–	–
6.0 × 14.0 × 14.0	1750	–	–	–
6.5 × 14.5 × 14.0	1500	–	–	–

Packaging information

Packing quantities

Kinked leads. Series: 375, 395, 467, 479

DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	LOOSE IN BOX short leads	LOOSE IN BOX long leads	AMMOPACK	REEL
	SPQ	SPQ	SPQ	SPQ
Pitch = 10.0 mm			**sprocket hole distance = 12.7 mm**	
4.1 × 13.1 × 12.5	2000	1500	–	1500
4.4 × 13.4 × 12.5	2000	1500	–	1500
4.5 × 13.5 × 12.5	2000	1500	–	1300
4.6 × 13.6 × 12.5	2000	1500	–	1300
4.8 × 13.8 × 12.5	2000	1250	–	1300
4.9 × 13.9 × 12.5	2000	1250	–	1200
5.0 × 13.9 × 12.5	1500	1250	–	1200
5.0 × 14.0 × 12.5	1500	1250	–	1200
5.2 × 14.2 × 12.5	1500	1000	–	1200
5.3 × 14.3 × 12.5	2000	1000	–	1200
5.4 × 14.3 × 12.5	1500	1000	–	1200
5.4 × 14.4 × 12.5	1500	1000	–	1100
5.5 × 14.5 × 12.5	1500	1000	–	1100
5.6 × 14.6 × 12.5	1500	1000	–	1100
5.8 × 14.8 × 12.5	1500	1000	–	1100
5.9 × 14.9 × 12.5	1500	1000	–	1100
6.0 × 15.0 × 12.5	1250	1000	–	1000
6.5 × 15.5 × 12.5	1000	–	–	900
5.0 × 13.0 × 14.5	2000	–	–	1200
5.5 × 13.5 × 14.5	2000	–	–	1100
6.0 × 14.0 × 14.5	1750	–	–	1000
6.5 × 14.5 × 14.5	1500	–	–	900
Pitch = 15.0 mm			**sprocket hole distance = 12.7 mm**	
6.0 × 15.0 × 17.5	1500	–	–	1000
6.5 × 15.5 × 17.5	1500	–	–	900
7.0 × 16.0 × 17.5	1250	–	–	800
7.5 × 16.5 × 17.5	1250	–	–	800
8.0 × 17.0 × 17.5	1000	–	–	750
8.5 × 17.5 × 17.5	1000	–	–	700
9.0 × 18.0 × 17.5	1000	–	–	650
9.5 × 18.5 × 17.5	900	–	–	600
5.0 × 14.0 × 18.5	2000	–	–	1200
5.5 × 14.5 × 18.5	2000	–	–	1100
6.0 × 15.0 × 18.5	2000	–	–	1000
6.5 × 15.5 × 18.5	1500	–	–	900
7.0 × 16.0 × 18.5	1500	–	–	800
7.5 × 16.5 × 18.5	1250	–	–	800
8.0 × 17.0 × 18.5	1250	–	–	750
8.5 × 17.5 × 18.5	1000	–	–	700

Packaging information

Packing quantities

DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	LOOSE IN BOX short leads	LOOSE IN BOX long leads	AMMOPACK	REEL
	SPQ	SPQ	SPQ	SPQ
9.0 × 18.0 × 18.5	1000	–	–	650
9.5 × 18.5 × 18.5	900	–	–	600
Pitch = 22.5 mm			**sprocket hole distance = 12.7 mm**	
6.0 × 19.0 × 26.0	800	–	–	650
6.5 × 18.5 × 26.0	800	–	–	600
6.5 × 19.5 × 26.0	750	–	–	600
7.0 × 19.0 × 26.0	700	–	–	550
7.0 × 20.0 × 26.0	650	–	–	550
7.5 × 19.5 × 26.0	650	–	–	500
7.5 × 20.5 × 26.0	600	–	–	500
8.0 × 21.0 × 26.0	550	–	–	500
8.5 × 21.5 × 26.0	500	–	–	450
9.0 × 22.0 × 26.0	450	–	–	450
9.5 × 22.5 × 26.0	450	–	–	400
10.0 × 23.0 × 26.0	400	–	–	400
10.5 × 23.5 × 26.0	350	–	–	350
11.0 × 24.0 × 26.0	350	–	–	350
11.5 × 24.5 × 26.0	350	–	–	350
Pitch = 27.5 mm				
6.0 × 19.0 × 30.0	1000	–	–	–
7.0 × 20.0 × 30.0	800	–	–	–
7.5 × 20.5 × 30.0	750	–	–	–
8.0 × 21.0 × 30.0	650	–	–	–
8.5 × 21.5 × 30.0	600	–	–	–
9.0 × 22.0 × 30.0	550	–	–	–
9.5 × 22.5 × 30.0	550	–	–	–
10.0 × 22.5 × 30.0	500	–	–	–
10.0 × 23.0 × 30.0	500	–	–	–
10.5 × 23.0 × 30.0	450	–	–	–
10.5 × 23.5 × 30.0	450	–	–	–
11.0 × 23.0 × 30.0	450	–	–	–
11.0 × 24.0 × 30.0	450	–	–	–
11.5 × 24.5 × 30.0	400	–	–	–
12.0 × 25.0 × 30.0	350	–	–	
12.5 × 25.5 × 30.0	350	–	–	–
13.0 × 26.0 × 30.0	350	–	–	–
13.0 × 26.5 × 30.0	300	–	–	–
13.5 × 26.5 × 30.0	300	–	–	–
14.0 × 27.0 × 30.0	300	–	–	–
14.0 × 27.5 × 30.0	300	–	–	–
14.5 × 27.5 × 30.0	300	–	–	–

Packaging information

Packing quantities

DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	LOOSE IN BOX short leads	LOOSE IN BOX long leads	AMMOPACK	REEL
	SPQ	SPQ	SPQ	SPQ
15.0 × 28.0 × 30.0	250	–	–	–
15.0 × 29.0 × 30.0	250	–	–	–
15.5 × 29.5 × 30.0	250	–	–	–
9.5 × 22.5 × 31.0	550	–	–	–
10.0 × 23.0 × 31.0	450	–	–	–
10.5 × 23.5 × 31.0	450	–	–	–
11.0 × 24.0 × 31.0	400	–	–	–
11.5 × 24.5 × 31.0	400	–	–	–
12.0 × 25.0 × 31.0	350	–	–	–
12.5 × 25.5 × 31.0	350	–	–	–
13.0 × 26.0 × 31.0	300	–	–	–
13.5 × 26.5 × 31.0	300	–	–	–
14.0 × 27.0 × 31.0	300	–	–	–
14.5 × 27.5 × 31.0	250	–	–	–
15.0 × 28.0 × 31.0	250	–	–	–

Kinked leads. Series: 468

DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	LOOSE IN BOX short leads	LOOSE IN BOX long leads	AMMOPACK	REEL
	SPQ	SPQ	SPQ	SPQ
Pitch = 15.0 mm			**sprocket hole distance = 12.7 mm**	
5.0 × 14.0 × 17.5	2000	1250	–	1200
5.5 × 14.5 × 17.5	2000	1250	–	1100
5.8 × 15.0 × 17.5	1750	1250	–	1100
5.9 × 15.0 × 17.5	1750	1250	–	1000
6.0 × 15.0 × 17.5	2000	1250	–	1000
6.5 × 15.5 × 17.5	1500	1000	–	900
6.5 × 16.0 × 17.5	1250	1000	–	800
7.0 × 15.5 × 17.5	1500	1000	–	800
7.0 × 16.0 × 17.5	1500	1000	–	800
7.3 × 16.5 × 17.5	1500	1000	–	800
7.4 × 16.5 × 17.5	1250	1000	–	800
7.4 × 19.5 × 17.5	1000	1000	–	800
7.5 × 16.5 × 17.5	1250	1000	–	800
7.5 × 19.5 × 17.5	1250	1000	–	800
7.9 × 17.0 × 17.5	1250	1000	–	750
8.0 × 17.0 × 17.5	1000	1000	–	750
8.0 × 20.0 × 17.5	1000	900	–	750
8.4 × 20.5 × 17.5	750	850	–	700
8.5 × 17.5 × 17.5	1000	1000	–	700
8.5 × 20.5 × 17.5	1000	850	–	700
Pitch = 22.5 mm			**sprocket hole distance = 12.7 mm**	
6.5 × 18.5 × 26.0	1000	750	–	650
7.0 × 19.0 × 26.0	1000	700	–	550
7.0 × 19.5 × 26.0	900	700	–	550
7.5 × 19.5 × 26.0	1000	650	–	550
7.5 × 20.0 × 26.0	750	600	–	500
8.0 × 21.0 × 26.0	750	500	–	500
8.5 × 21.5 × 26.0	750	500	–	450
9.0 × 22.0 × 26.0	750	500	–	450
9.5 × 22.5 × 26.0	700	500	–	400
9.8 × 23.0 × 26.0	750	450	–	400
9.9 × 23.0 × 26.0	750	450	–	400
10.0 × 23.0 × 26.0	700	450	–	400
10.5 × 23.5 × 26.0	500	400	–	350
11.0 × 24.0 × 26.0	500	400	–	350
11.5 × 24.0 × 26.0	600	400	–	350
12.5 × 25.5 × 26.0	500	300	–	350
13.5 × 26.5 × 26.0	400	300	–	300
13.5 × 26.6 × 26.0	450	300	–	300
14.9 × 28.0 × 26.0	250	250	–	250
15.0 × 28.0 × 26.0	400	250	–	250

Packaging information — Packing quantities

DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	LOOSE IN BOX short leads SPQ	LOOSE IN BOX long leads SPQ	AMMOPACK SPQ	REEL SPQ
Pitch = 27.5 mm				
11.5 × 24.5 × 30.0	450	300	–	–
12.5 × 25.5 × 30.0	350	250	–	–
14.0 × 27.0 × 30.0	300	200	–	–
15.0 × 28.0 × 30.0	250	200	–	–

Packaging information — Packing quantities

Series: MKT/MKT 468

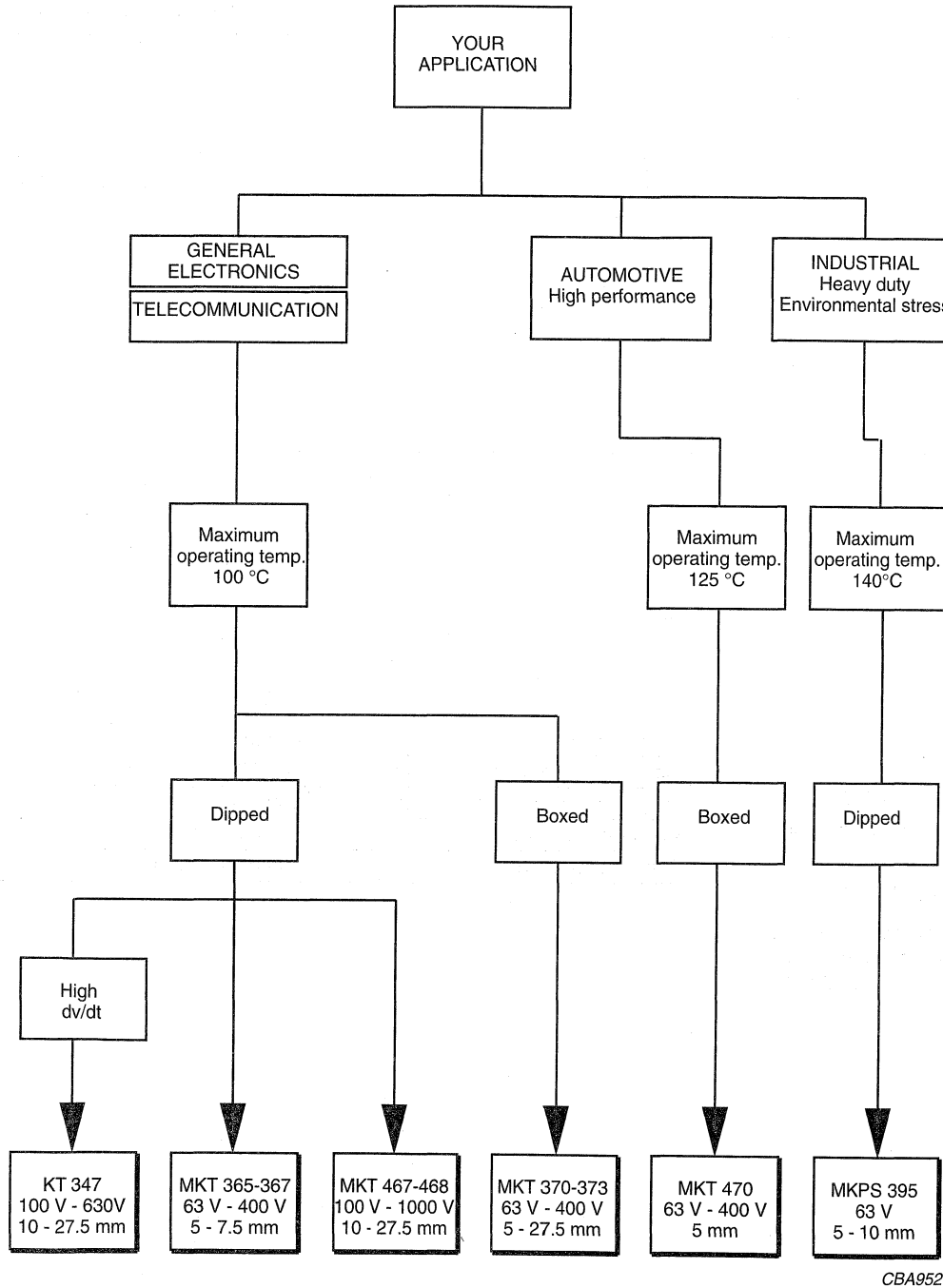
DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	LOOSE IN BOX short leads SPQ	LOOSE IN BOX LONG LEADS SPQ	AMMOPACK SPQ	REEL SPQ
Pitch = 15.0 mm				
5.5 × 15.0 × 17.5	2000	–	–	–
6.0 × 15.0 × 17.5	1500	–	–	–
6.5 × 15.5 × 17.5	1500	–	–	–
8.0 × 17.0 × 17.5	1000	–	–	–
8.5 × 17.5 × 17.5	1000	–	–	–
9.5 × 18.5 × 17.5	900	–	–	–
Pitch = 22.5.0 mm				
7.0 × 20.0 × 26.0	900	–	–	–
7.5 × 20.5 × 26.0	750	–	–	–
8.5 × 21.5 × 26.0	750	–	–	–
9.0 × 22.0 × 26.0	750	–	–	–
10.0 × 23.0 × 26.0	600	–	–	–
Pitch = 27.5 mm				
10.0 × 23.0 × 30.0	500	–	–	–
11.0 × 24.5 × 30.0	450	–	–	–
12.0 × 25.5 × 30.0	350	–	–	–

Bent back leads. Series: 375, 468, 479

DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	LOOSE IN BOX short leads	LOOSE IN BOX long leads	AMMOPACK	REEL
	SPQ	SPQ	SPQ	SPQ
Original pitch = 15.0 mm (bent back pitch = 7.5 mm)			**sprocket hole distance = 15.0 mm**	
5.0 × 15.5 × 17.5	–	–	–	1000
5.5 × 16.0 × 17.5	–	–	–	900
6.0 × 16.5 × 17.5	–	–	–	800
6.5 × 17.0 × 17.5	–	–	–	750
7.0 × 17.5 × 17.5	–	–	–	700
7.5 × 18.0 × 17.5	–	–	–	650
7.5 × 21.0 × 17.5	–	–	–	650
8.0 × 18.5 × 17.5	–	–	–	600
8.0 × 21.5 × 17.5	–	–	–	600
8.5 × 19.0 × 17.5	–	–	–	550
8.5 × 22.0 × 17.5	–	–	–	550
9.0 × 19.5 × 17.5	–	–	–	550
9.5 × 20.0 × 17.5	–	–	–	500
5.0 × 15.5 × 18.5	–	–	–	1000
5.5 × 15.0 × 18.5	–	–	–	900
5.5 × 16.0 × 18.5	–	–	–	900
6.0 × 15.5 × 18.5	–	–	–	800
6.0 × 16.5 × 18.5	–	–	–	800
6.5 × 16.0 × 18.5	–	–	–	750
6.5 × 17.0 × 18.5	–	–	–	750
7.0 × 17.5 × 18.5	–	–	–	700
7.5 × 18.0 × 18.5	–	–	–	650
8.0 × 18.5 × 18.5	–	–	–	600
8.5 × 19.0 × 18.5	–	–	–	550
9.0 × 19.5 × 18.5	–	–	–	550
9.5 × 20.0 × 18.5	–	–	–	500
Pitch = 22.5 mm			**sprocket hole distance = 12.7 mm**	
7.0 × 20.0 × 30.0	800	–	–	550
7.5 × 20.5 × 30.0	750	–	–	500
8.0 × 21.0 × 30.0	650	–	–	500
8.5 × 21.5 × 30.0	550	–	–	450
9.0 × 22.0 × 30.0	550	–	–	450
9.5 × 22.5 × 30.0	500	–	–	400
10.0 × 23.0 × 30.0	450	–	–	400
10.5 × 23.5 × 30.0	450	–	–	350
11.0 × 24.0 × 30.0	400	–	–	350
11.5 × 24.5 × 30.0	400	–	–	350
12.0 × 25.0 × 30.0	350	–	–	300
12.5 × 25.5 × 30.0	350	–	–	300
13.5 × 26.5 × 30.0	300	–	–	300
14.0 × 27.5 × 30.0	300	–	–	300

GENERAL PURPOSE CAPACITORS

HOW TO SELECT



CBA952

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)

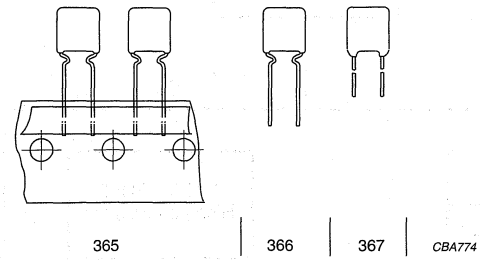


Fig.1 Simplified outlines.

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

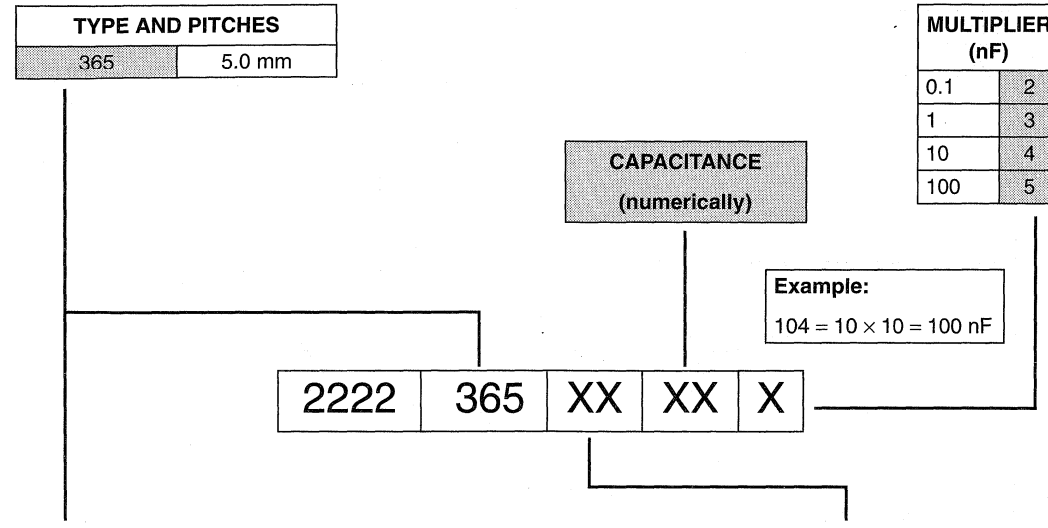
For more detailed data and test requirements see *"Type detail specification HQN-384-02/105"*.

QUICK REFERENCE DATA

DESCRIPTION	VALUE
Capacitance range (E12 series)	0.01 to 1.0 µF
Capacitance tolerance	±10%; ±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	55/100/56
Rated temperature	85 °C
Maximum application temperature	100 °C
Tangent of loss angle at 10 kHz	100×10^{-4}
Reference specification	IEC 60384-2
Performance grade	grade 1 (long life)

Metallized polyester film capacitors MKT 365

COMPOSITION OF CATALOGUE NUMBER



TYPE	PACKAGING	LEAD CONFIGURATION	C-TOL	63 V	100 V	250 V	400 V
365	ammopack	kinked leads; H = 16.0 mm; P_0 = 12.7 mm	±10%	75	85	–	–
			±5%	76	86	–	–
		bent back kinked leads; H = 16.0 mm; P_0 = 12.7 mm	±10%	15	25	45	55
			±5%	16	26	46	56
	taped on reel	kinked leads; H = 16.0 mm; P_0 = 12.7 mm	±10%	71	81	–	–
			±5%	72	82	–	–
		bent back kinked leads; H = 16.0 mm; P_0 = 12.7 mm	±10%	11	21	41	51
			±5%	12	22	42	52

Metallized polyester film capacitors MKT 365/366/367

TYPE AND PITCHES	
366	5.0 mm
367	7.5 mm

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

CAPACITANCE (numerically)

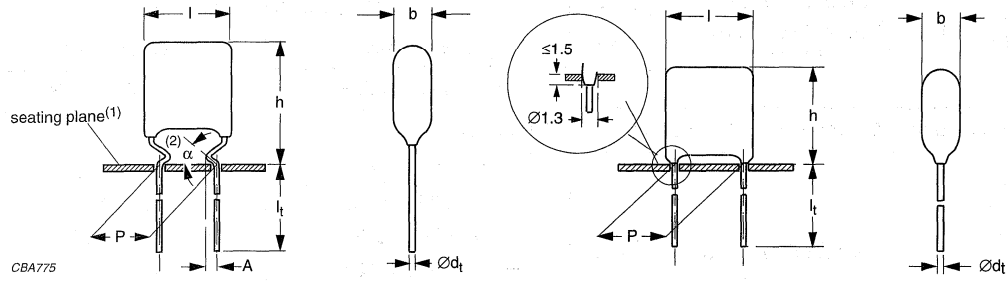
Example:
104 = 10 × 10 = 100 nF

2222	36.	XX	XX	X

TYPE	PACKAGING	LEAD CONFIGURATION	C-TOL	63 V	100 V	250 V	400 V
366	loose in box	kinked; lead length 4.0 mm	±10%	75	85	–	–
			±5%	76	86	–	–
		kinked; lead length 17.0 mm	±10%	71	81	–	–
			±5%	72	82	–	–
367	loose in box	straight; lead length 4.0 mm	±10%	75	85	–	–
			±5%	76	86	–	–
		straight; lead length 22.0 mm	±10%	71	81	–	–
			±5%	72	82	–	–
Available on request with pitch = 7.5 mm				**63 V**	**100 V**	**250 V**	**400 V**
366	loose in box	kinked; lead length 4.0 mm	±10%	15	25	45	55
			±5%	16	26	46	56
		kinked; lead length 17.0 mm	±10%	11	21	41	51
			±5%	12	22	42	52
367	loose in box	straight; lead length 4.0 mm	±10%	15	25	45	55
			±5%	16	26	46	56
		straight; lead length 22.0 mm	±10%	11	21	41	51
			±5%	12	22	42	52

MKT 365/366/367 GENERAL DATA

PITCH 5 mm (kinked and straight leads)



(1) Hole Ø1.0 for $d_t = 0.5$ mm.
(2) $0 \leq \alpha < 50°$.

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:			
$C \leq 0.1$ µF	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 225 \times 10^{-4}$
0.1 µF < C ≤ 0.47 µF	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 300 \times 10^{-4}$
0.47 µF < C ≤ 1.0 µF	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	–
Rated voltage pulse slope $(dU/dt)_R$ at 63 V (DC)	110 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 100 V; 1 minute	>5000 s		
R between interconnecting leads and casing; 100 V; 1 minute	>30000 MΩ		
Withstanding voltage DC (cut off current 10 mA); rise time 100 V/s	100 V; 1 minute		

Available 63 V DC versions

PACKAGING(1)	DIMENSIONS	LEAD CONFIGURATION	PITCH (mm)	FIRST 9 DIGITS OF CATALOGUE NUMBER		ORDERING
				C-tol = ±10%	C-tol = ±5%	
Ammopack	H = 16.0 mm; note 2	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 mm		5	2222 366 75...	2222 366 76...	on request
	l_t = 17.0 ±4.0 mm		5	2222 366 71...	2222 366 72...	on request
Loose in box	l_t = 4.0 +1.0/–0.5 mm	straight	5	2222 367 75...	2222 367 76...	on request
	l_t = 22.0 ±4.0 mm		5	2222 367 71...	2222 367 72...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

Metallized polyester film capacitors MKT 365/366/367

U_{Rdc} = 63 V; U_{Rac} = 40 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	
			C-tol = ±10%	C-tol = ±5%
			catalogue number(2)	last 5 digits(2)
Pitch = 5.0 +0.4/−0.2 mm; d_t = 0.50 ±0.05 mm; A = 1.7 ±0.3 mm				
0.047	4.0 × 12.5 (7.5) × 7.3	0.3	2222 365 75**473**	.. 76**473**
0.056			2222 365 75**563**	.. 76**563**
0.068			2222 365 75**683**	.. 76**683**
0.082			2222 365 75**823**	.. 76**823**
0.1			2222 365 75**104**	.. 76**104**
0.12			2222 365 75**124**	.. 76**124**
0.15	4.0 × 13.0 (8.0) × 7.3	0.3	2222 365 75**154**	.. 76**154**
0.18	4.0 × 13.5 (8.5) × 7.3	0.4	2222 365 75**184**	.. 76**184**
0.22	4.2 × 13.5 (8.5) × 7.3	0.4	2222 365 75**224**	.. 76**224**
0.27	4.5 × 14.0 (9.0) × 7.3	0.4	2222 365 75**274**	.. 76**274**
0.33	4.5 × 14.5 (10.5) × 7.3	0.4	2222 365 75**334**	.. 76**334**
0.39			2222 365 75**394**	.. 76**394**
0.47	4.5 × 15.5 (11.5) × 7.3	0.4	2222 365 75**474**	.. 76**474**
0.56	5.0 × 14.0 (10.0) × 7.3	0.4	2222 365 75**564**	.. 76**564**
0.68	5.5 × 14.5 (10.5) × 7.3	0.4	2222 365 75**684**	.. 76**684**
0.82	5.5 × 15.0 (11.0) × 7.3	0.5	2222 365 75**824**	.. 76**824**
1.0	5.5 × 15.5 (11.5) × 7.3	0.5	2222 365 75**105**	.. 76**105**

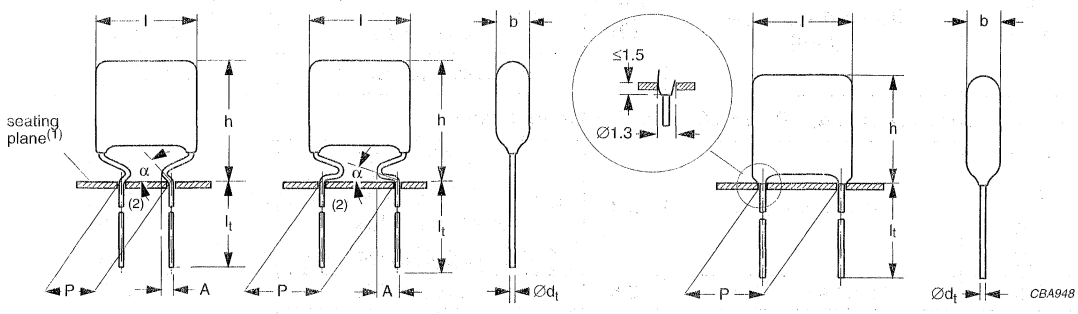
Notes

1. Dimensions in brackets for straight leads.
2. The shading indicates preferred types.

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)



(1) Hole Ø1.0 for d_t = 0.6 mm.
(2) $0 \leq \alpha < 50°$.

Fig.5 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:			
$C \leq 0.1\ \mu F$	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 225 \times 10^{-4}$
$0.1\ \mu F < C \leq 0.47\ \mu F$	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 300 \times 10^{-4}$
$0.47\ \mu F < C \leq 1.0\ \mu F$	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	–
Rated voltage pulse slope $(dU/dt)_R$ at 63 V (DC)	110 V/μs		
R between leads, for $C \leq 0.33\ \mu F$ at 10 V; 1 minute	>15000 MΩ		
RC between leads, for $C > 0.33\ \mu F$ at 100 V; 1 minute	>5000 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	100 V; 1 minute		

Available 63 V DC versions

PACKAGING(1)	DIMENSIONS	LEAD CONFIGURATION	PITCH (mm)	FIRST 9 DIGITS OF CATALOGUE NUMBER		ORDERING
				C-tol = ±10%	C-tol = ±5%	
Ammopack	H = 16.0 mm; note 2	bent back	5	2222 365 15...	2222 365 16...	preferred
Taped on reel			5	2222 365 11...	2222 365 12...	on request
Loose in box	l_t = 4.0 +1.0/−0.5 mm	kinked	7.5	2222 366 15...	2222 366 16...	on request
	l_t = 17.0 ±4.0 mm		7.5	2222 366 11...	2222 366 12...	on request
Loose in box	l_t = 4.0 +1.0/−0.5 mm	straight	7.5	2222 367 15...	2222 367 16...	on request
	l_t = 22.0 ±4.0 mm		7.5	2222 367 11...	2222 367 12...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

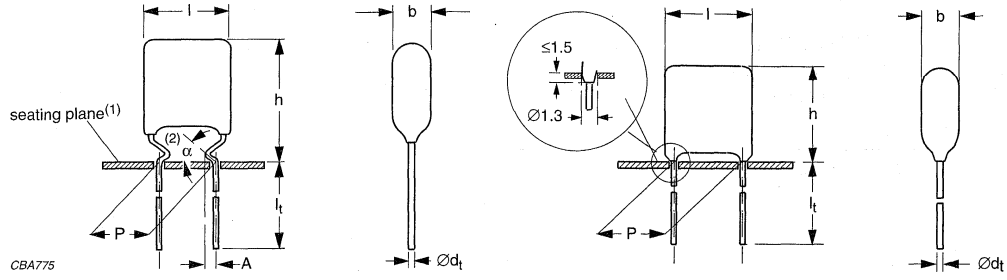
U_{Rdc} = 63 V; U_{Rac} = 40 V Pitch 5 mm (bent back leads)

C (µF)	DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	MASS (g)	PACKAGING	
			AMMOPACK; H = 16.0 mm	
			C-tol = ±10%	C-tol = ±5%
			catalogue number(1)	last 5 digits(1)
Pitch = 5.0 +0.4/−0.2 mm; d_t = 0.60 ±0.06 mm; A = 1.7 ±0.3 mm(2)				
0.12	4.0 × 13.5 × 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 × 14.0 × 10.0	0.5	2222 365 15274	.. 16274
0.33	5.0 × 14.5 × 10.0	0.6	2222 365 15334	.. 16334
0.39			2222 365 15394	.. 16394
0.47	5.5 × 15.0 × 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

Notes

1. The shading indicates preferred types.
2. Pitch = 7.5 mm (kinked and straight leads) is available on request; for dimensions and package quantities see *"Type detail specification HQN-384-02/105"*.

MKT 365/366/367 GENERAL DATA **PITCH 5 mm (kinked and straight leads)**



(1) Hole Ø1.0 for d_t = 0.5 mm.
(2) $0 \leq \alpha < 50°$.

Fig.6 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:			
$C \leq 0.1\ \mu F$	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 225 \times 10^{-4}$
$0.1\ \mu F < C \leq 0.47\ \mu F$	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 225 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 100 V (DC)	110 V/µs		
R between leads, for $C \leq 0.33\ \mu F$ at 100 V; 1 minute	>15000 MΩ		
RC between leads, for $C > 0.33\ \mu F$ at 100 V; 1 minute	>5000 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	160 V; 1 minute		

Available 100 V DC versions

PACKAGING(1)	DIMENSIONS	LEAD CONFIGURATION	PITCH (mm)	FIRST 9 DIGITS OF CATALOGUE NUMBER		ORDERING
				C-tol = ±10%	C-tol = ±5%	
Ammopack	H = 16.0 mm; note 2	kinked	5	2222 365 85...	2222 365 86...	preferred
Taped on reel			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 ±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 ±4.0 mm		5	2222 367 81...	2222 367 82...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

U_{Rdc} = 100 V; U_{Rac} = 63 V **Pitch 5 mm (kinked and straight leads)**

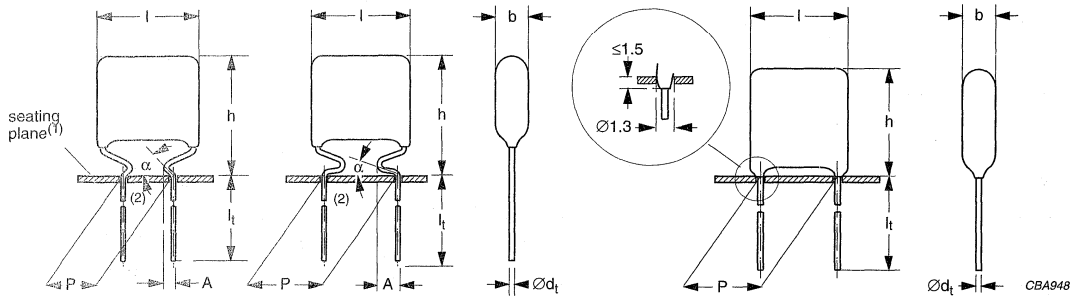
C (µF)	DIMENSIONS[1] $b_{max} \times h_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER	
			AMMOPACK; H = 16.0 mm	
			C-tol = ±10%	C-tol = ±5%
			catalogue number[2]	last 5 digits[2]
Pitch = 5.0 +0.4/–0.2 mm; d_t = 0.50 ±0.05 mm; A = 1.7 ±0.3 mm				
0.01	3.7 × 12.5 (7.5) × 7.3	0.3	2222 365 85**103**	.. 86**103**
0.012			2222 365 85**123**	.. 86**123**
0.015			2222 365 85**153**	.. 86**153**
0.018			2222 365 85**183**	.. 86**183**
0.022			2222 365 85**223**	.. 86**223**
0.027			2222 365 85**273**	.. 86**273**
0.033			2222 365 85**333**	.. 86**333**
0.039			2222 365 85**393**	.. 86**393**
0.047	4.0 × 12.5 (7.5) × 7.3	0.3	2222 365 85**473**	.. 86**473**
0.056			2222 365 85**563**	.. 86**563**
0.068			2222 365 85**683**	.. 86**683**
0.082	4.0 × 13.0 (8.0) × 7.3	0.3	2222 365 85**823**	.. 86**823**
0.1	4.0 × 13.5 (8.5) × 7.3	0.4	2222 365 85**104**	.. 86**104**
0.12			2222 365 85**124**	.. 86**124**
0.15			2222 365 85**154**	.. 86**154**
0.18			2222 365 85**184**	.. 86**184**
0.22	4.2 × 13.5 (8.5) × 7.3	0.4	2222 365 85**224**	.. 86**224**
0.27	4.5 × 14.0 (9.0) × 7.3	0.4	2222 365 85**274**	.. 86**274**

Notes

1. Dimensions in brackets for straight leads.
2. The shading indicates preferred types.

MKT 365/366/367 GENERAL DATA

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



(1) Hole Ø1.0 for d_t = 0.6 mm.
(2) $0 \leq \alpha < 50°$.

Fig.7 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:			
$C \leq 0.1$ µF	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 225 \times 10^{-4}$
0.1 µF < C ≤ 0.47 µF	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 225 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 100 V (DC)	110 V/µs		
R between leads, for C ≤ 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 interconnecting leads and casing; 100 V; 1 minute	>30000 MΩ		
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	160 V; 1 minute		

Available 100 V DC versions

PACKAGING(1)	DIMENSIONS	LEAD CONFIGURATION	PITCH (mm)	FIRST 9 DIGITS OF CATALOGUE NUMBER		ORDERING
				C-tol = ±10%	C-tol = ±5%	
Ammopack	H = 16.0 mm; note 2	bent back	5	2222 365 25...	2222 365 26...	preferred
Taped on reel			5	2222 365 21...	2222 365 22...	on request
Loose in box	l_t = 4.0 +1.0/–0.5 mm	kinked	7.5	2222 366 25...	2222 366 26...	on request
	l_t = 17.0 ±4.0 mm		7.5	2222 366 21...	2222 366 22...	on request
Loose in box	l_t = 4.0 +1.0/–0.5 mm	straight	7.5	2222 367 25...	2222 367 26...	on request
	l_t = 22.0 ±4.0 mm		7.5	2222 367 21...	2222 367 22...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

U_{Rdc} = 100 V; U_{Rac} = 63 V **Pitch 5 mm (bent back leads)**

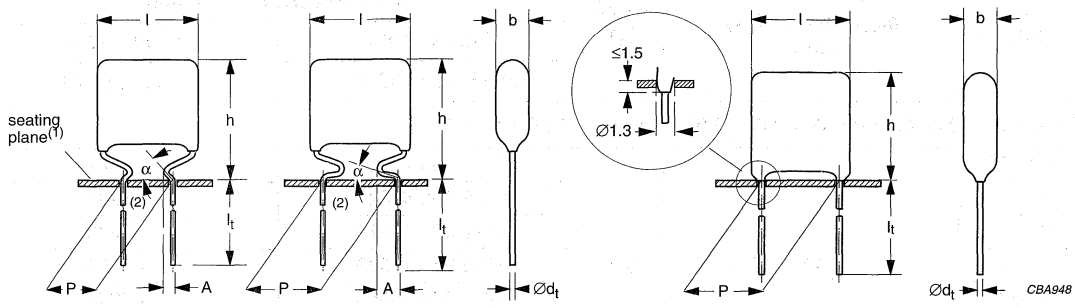
C (µF)	DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER	
			AMMOPACK; H = 16.0 mm	
			C-tol = ±10%	C-tol = ±5%
			catalogue number(1)	last 5 digits(1)
Pitch = 5.0 +0.4/–0.2 mm; d_t = 0.60 ±0.06 mm; A = 1.7 ±0.3 mm(2)				
0.039	4.0 × 13.5 × 10.0	0.4	2222 365 25**393**	.. 26393
0.047			2222 365 25**473**	.. 26473
0.056			2222 365 25**563**	.. 26563
0.068			2222 365 25**683**	.. 26683
0.082			2222 365 25**823**	.. 26823
0.1			2222 365 25**104**	.. 26104
0.12	4.5 × 14.0 × 10.5	0.5	2222 365 25**124**	.. 26124
0.15	5.0 × 14.5 × 10.5	0.6	2222 365 25**154**	.. 26154
0.18			2222 365 25**184**	.. 26184
0.22	5.5 × 15.0 × 10.5	0.7	2222 365 25**224**	.. 26224
0.27	6.0 × 15.5 × 10.5	0.7	2222 365 25**274**	.. 26274
0.33			2222 365 25**334**	.. 26334
0.39			2222 365 25**394**	.. 26394
0.47			2222 365 25**474**	.. 26474

Notes

1. The shading indicates preferred types.
2. Pitch = 7.5 mm (kinked and straight leads) is available on request; for dimensions and package quantities see *"Type detail specification HQN-384-02/105"*.

MKT 365/366/367 GENERAL DATA

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



(1) Hole Ø1.0 for d_t = 0.6 mm.
(2) $0 \leq \alpha < 50°$.

Fig.8 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:			
$C \leq 0.1\ \mu F$	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 225 \times 10^{-4}$
$0.1\ \mu F < C \leq 0.15\ \mu F$	$\leq 75 \times 10^{-4}$	$\leq 120 \times 10^{-4}$	$\leq 225 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 250 V (DC)	70 V/µs		
R between leads, for $C \leq 0.33\ \mu F$ at 100 V; 1 minute	>30000 MΩ		
R between interconnected 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		

Available 250 V DC versions

PACKAGING(1)	DIMENSIONS	LEAD CONFIGURATION	PITCH (mm)	FIRST 9 DIGITS OF CATALOGUE NUMBER		ORDERING
				C-tol = ±10%	C-tol = ±5%	
Ammopack	H = 16.0 mm; note 2	bent back	5	2222 365 45...	2222 365 46...	preferred
Taped on reel			5	2222 365 41...	2222 365 42...	on request
Loose in box	l_t = 4.0 +1.0/–0.5 mm	kinked	7.5	2222 366 45...	2222 366 46...	on request
	l_t = 17.0 ±4.0 mm		7.5	2222 366 41...	2222 366 42...	on request
Loose in box	l_t = 4.0 +1.0/–0.5 mm	straight	7.5	2222 367 45...	2222 367 46...	on request
	l_t = 22.0 ±4.0 mm		7.5	2222 367 41...	2222 367 42...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

Metallized polyester film capacitors MKT 365/366/367

U_{Rdc} = 250 V; U_{Rac} = 160 V **Pitch 5 mm (bent back leads)**

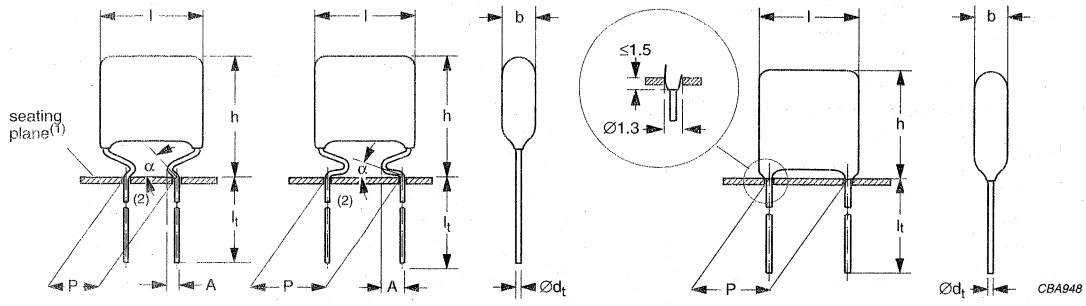
C (µF)	DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER	
			AMMOPACK; H = 16.0 mm	
			C-tol = ±10%	C-tol = ±5%
			catalogue number(1)	last 5 digits(1)
Pitch = 5.0 +0.4/–0.2 mm; d_t = 0.60 ±0.06 mm; A = 1.7 ±0.3 mm(2)				
0.018	4.0 × 13.5 × 10.0	0.4	2222 365 45**183**	.. 46**183**
0.022			2222 365 45**223**	.. 46**223**
0.027			2222 365 45**273**	.. 46**273**
0.033			2222 365 45**333**	.. 46**333**
0.039			2222 365 45**393**	.. 46**393**
0.047			2222 365 45**473**	.. 46**473**
0.056			2222 365 45**563**	.. 46**563**
0.068	4.5 × 13.0 × 10.0	0.5	2222 365 45**683**	.. 46**683**
0.082			2222 365 45**823**	.. 46**823**
0.1	5.0 × 13.5 × 10.0	0.6	2222 365 45**104**	.. 46**104**
0.12	5.5 × 14.0 × 10.0	0.6	2222 365 45**124**	.. 46**124**
0.15	5.5 × 15.5 × 10.0	0.7	2222 365 45**154**	.. 46**154**

Notes

1. The shading indicates preferred types.
2. Pitch = 7.5 mm (kinked and straight leads) is available on request; for dimensions and package quantities see *"Type detail specification HQN-384-02/105"*.

MKT 365/366/367 GENERAL DATA

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



(1) Hole Ø1.0 for d_t = 0.6 mm.
(2) $0 \leq \alpha < 50°$.

Fig.9 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:			
$C \leq 0.056$ µF	$\leq 75 \times 10^{-4}$	$\leq 120 \times 10^{-4}$	$\leq 200 \times 10^{-4}$
$C \leq 0.1$ µF	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 225 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 400 V (DC)	110 V/µs		
R between leads, for $C \leq 0.33$ µF at 100 V; 1 minute	>30000 MΩ		
R between interconnected leads and casing; 100 V; 1 minute	>30000 MΩ		
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	640 V; 1 minute		

Available 400 V DC versions

PACKAGING(1)	DIMENSIONS	LEAD CONFIGURATION	PITCH (mm)	FIRST 9 DIGITS OF CATALOGUE NUMBER		ORDERING
				C-tol = ±10%	C-tol = ±5%	
Ammopack	H = 16.0 mm; note 2	bent back	5	2222 365 55...	2222 365 56...	preferred
Taped on reel			5	2222 365 51...	2222 365 52...	on request
Loose in box	l_t = 4.0 +1.0/–0.5 mm	kinked	7.5	2222 366 55...	2222 366 56...	on request
	l_t = 17.0 ±4.0 mm		7.5	2222 366 51...	2222 366 52...	on request
Loose in box	l_t = 4.0 +1.0/–0.5 mm	straight	7.5	2222 367 55...	2222 367 56...	on request
	l_t = 22.0 ±4.0 mm		7.5	2222 367 51...	2222 367 52...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

Metallized polyester film capacitors MKT 365/366/367

U_{Rdc} = 400 V; U_{Rac} = 220 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	
			C-tol = ±10%	C-tol = ±5%
			catalogue number(1)	last 5 digits(1)
Pitch = 5.0 +0.4/−0.2 mm; d_t = 0.60 ±0.06 mm; A = 1.7 ±0.3 mm(2)				
0.0033	4.0 × 13.5 × 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 × 13.0 × 10.0	0.6	2222 365 55183	.. 56183
0.022	5.0 × 13.5 × 10.0	0.7	2222 365 55223	.. 56223
0.027	4.0 × 12.5 × 10.0	0.4	2222 365 55273	.. 56273
0.033	4.5 × 13.0 × 10.0	0.5	2222 365 55333	.. 56333
0.039	5.0 × 13.5 × 10.0	0.5	2222 365 55393	.. 56393
0.047	5.0 × 13.5 × 10.0	0.6	2222 365 55473	.. 56473
0.056	5.5 × 14.0 × 10.0	0.7	2222 365 55563	.. 56563

Notes

1. The shading indicates preferred types.
2. Pitch = 7.5 mm (kinked and straight leads) is available on request; for dimensions and package quantities see *"Type detail specification HQN-384-02/105"*.

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:
  - Copper clad steel wire for pitch = 5 mm (kinked and straight leads)
  - Copper wire for pitch = 5 mm (bent back leads) and pitch = 7.5 mm (kinked and straight leads).

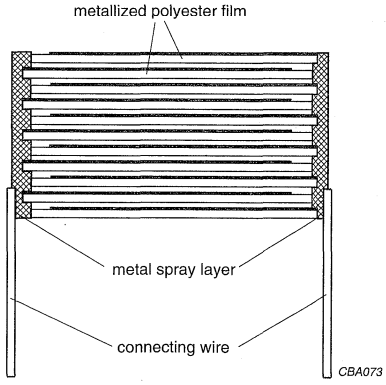


Fig.10 Construction.

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 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 ±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%.

CHARACTERISTICS

Capacitance

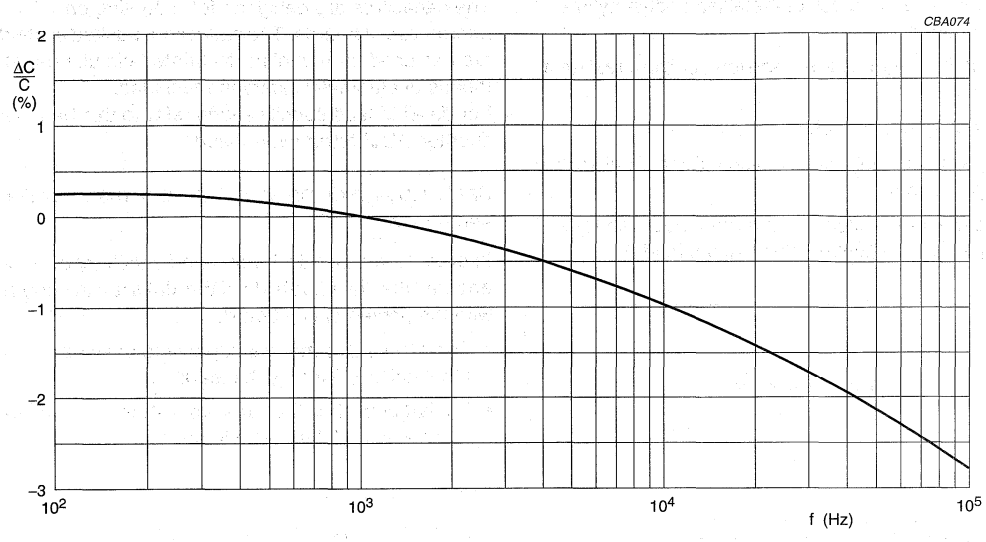


Fig.11 Capacitance change as a function of frequency: typical curve.

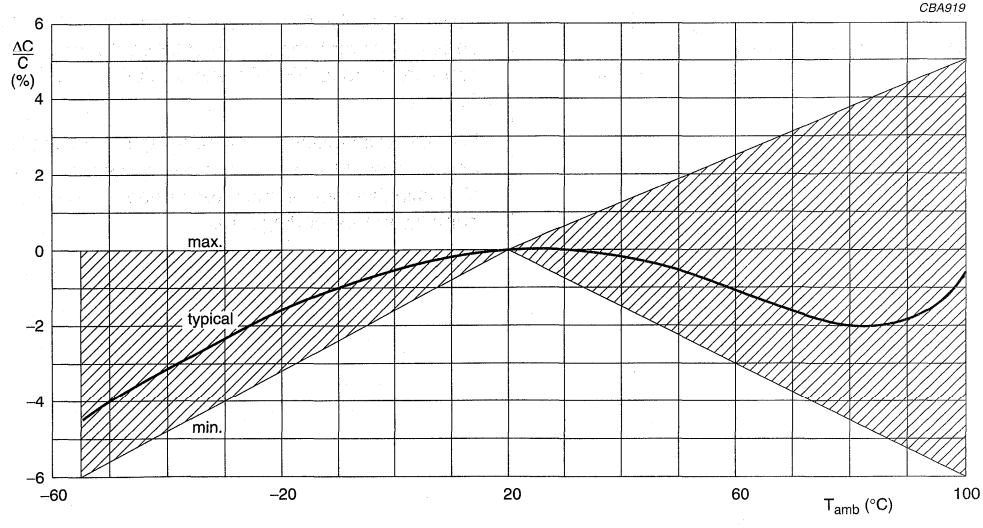


Fig.12 Capacitance change at 1 kHz as a function of ambient free air temperature.

Impedance

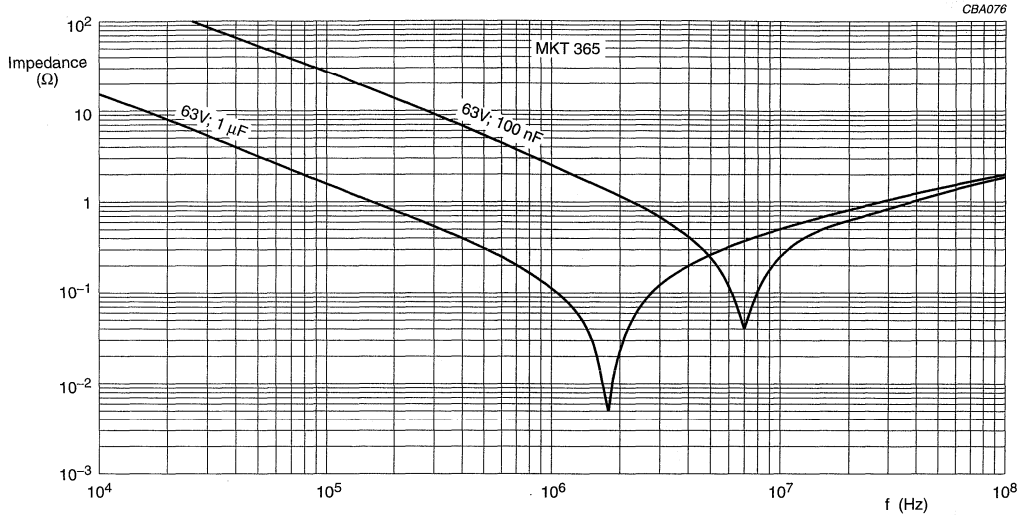


Fig.13 Impedance as a function of frequency: typical curves.

Maximum DC and AC voltage as a function of temperature

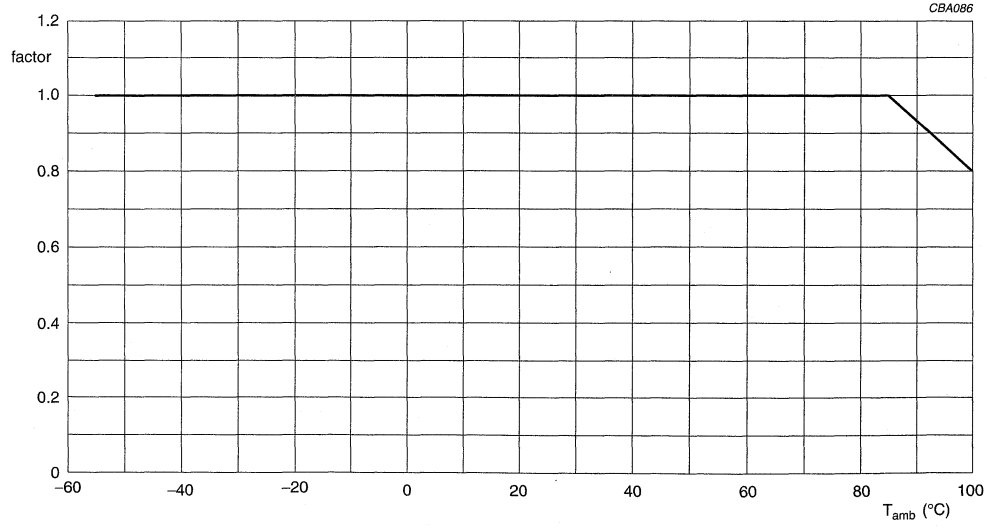


Fig.14 Multiplying factor for DC and AC voltage as a function of temperature.

Maximum RMS voltage (sinewave) as a function of frequency

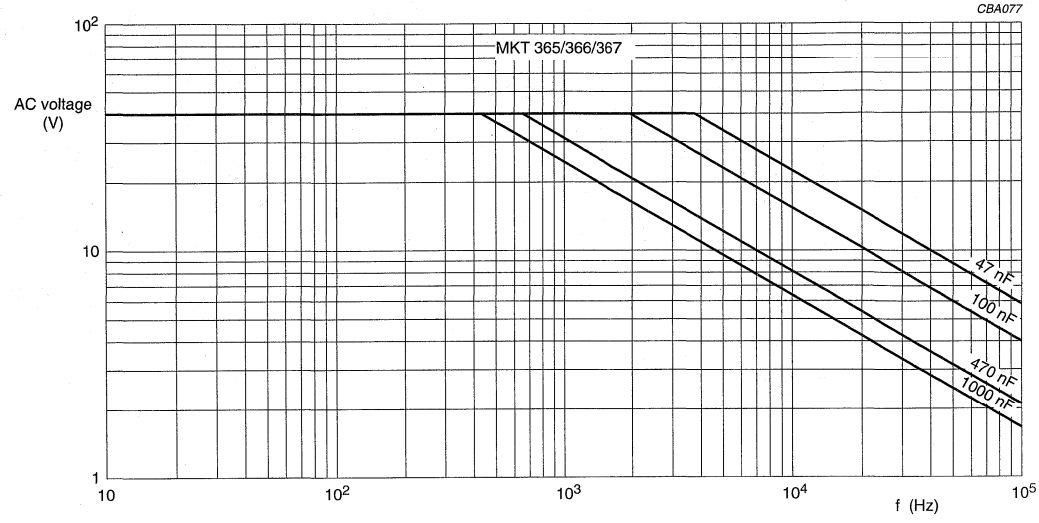


Fig.15 AC voltage (RS value) as a function of frequency at $T_{amb} \leq 85$ °C for $_{Rdc} = 63$ V.

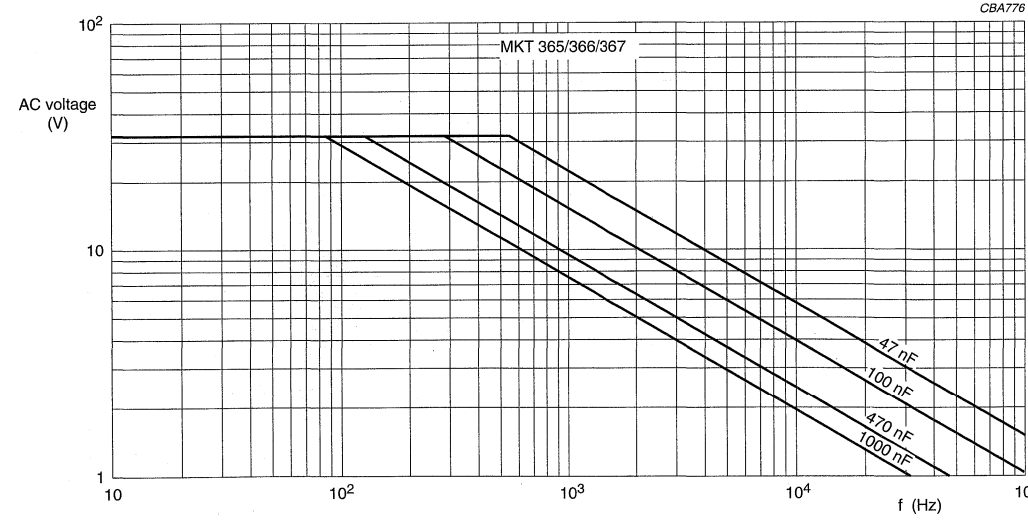


Fig.16 AC voltage (RMS value) as a function of frequency at 85 °C < $T_{amb} \leq 100$ °C for $U_{Rdc} = 63$ V.

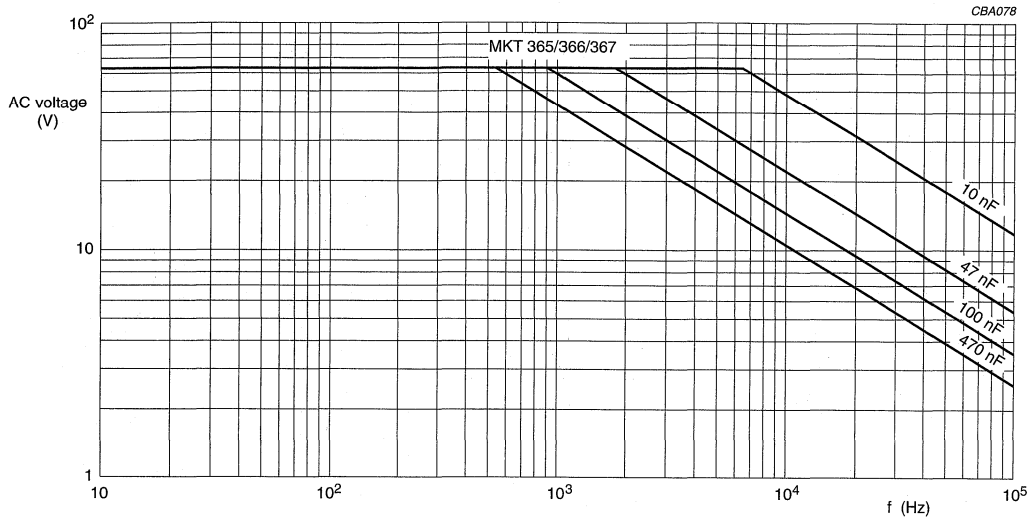


Fig.17 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C, for $U_{Rdc} = 100$ V.

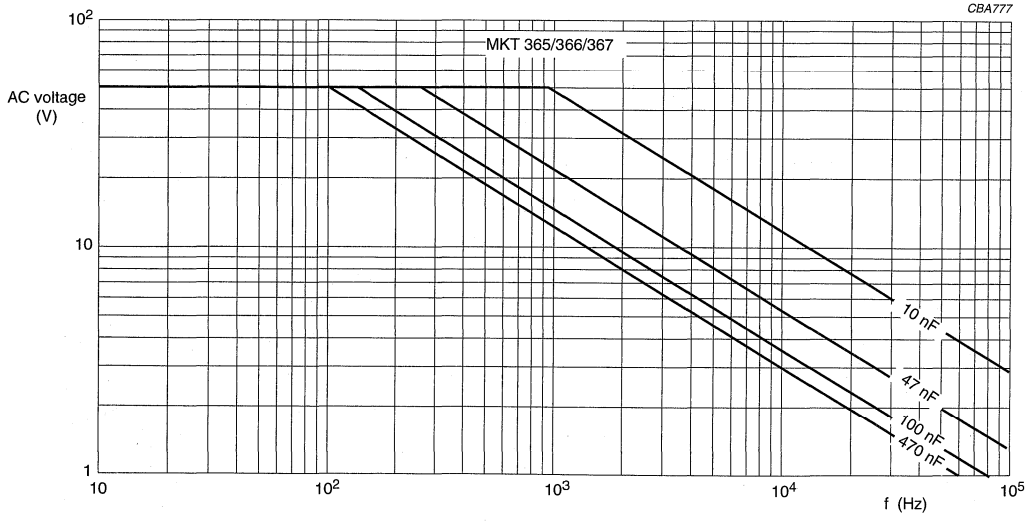


Fig.18 AC voltage (RMS value) as a function of frequency at 85 °C < $T_{amb} \leq 100$ °C for $U_{Rdc} = 100$ V.

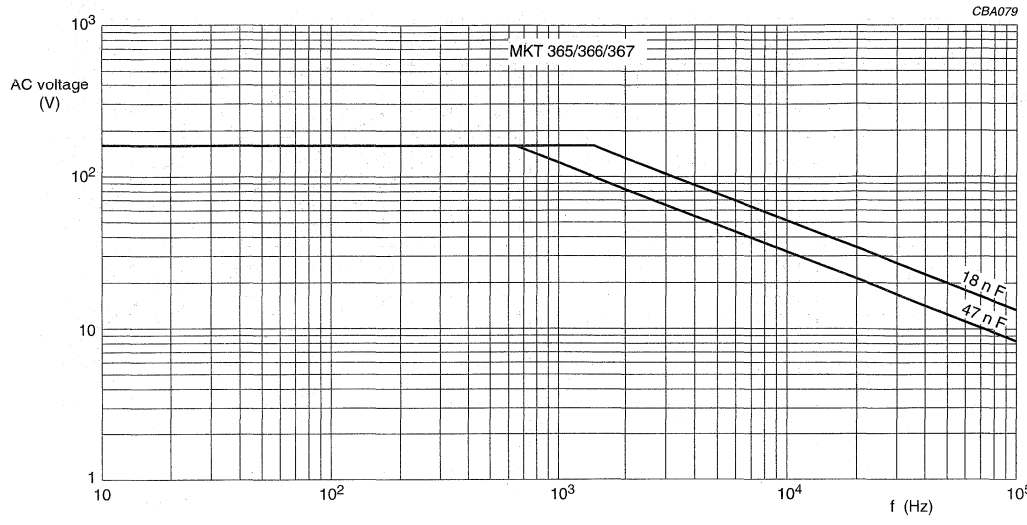


Fig.19 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C, for $U_{Rdc} = 250$ V.

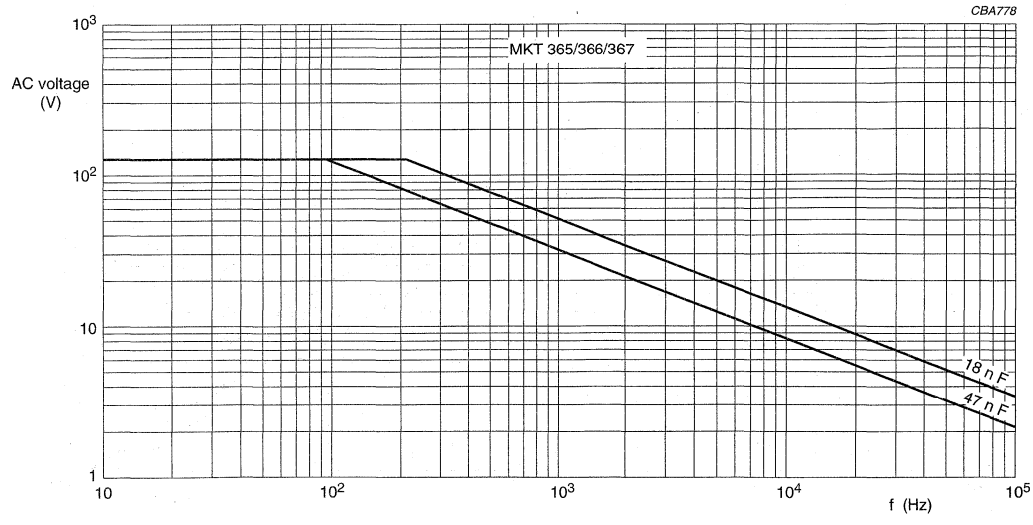


Fig.20 AC voltage (RMS value) as a function of frequency at 85 °C < $T_{amb} \leq 100$ °C for $U_{Rdc} = 250$ V.

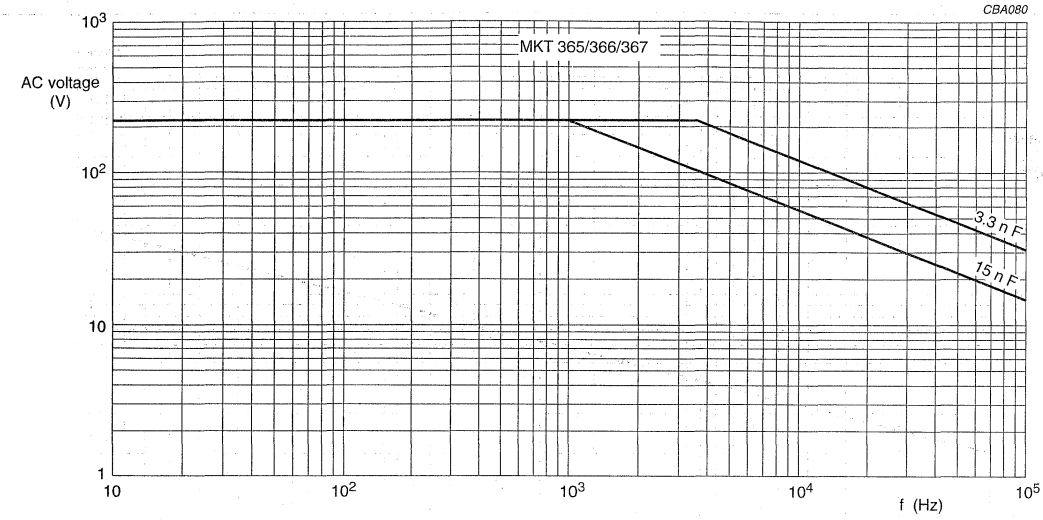


Fig.21 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C, for $U_{Rdc} = 400$ V.

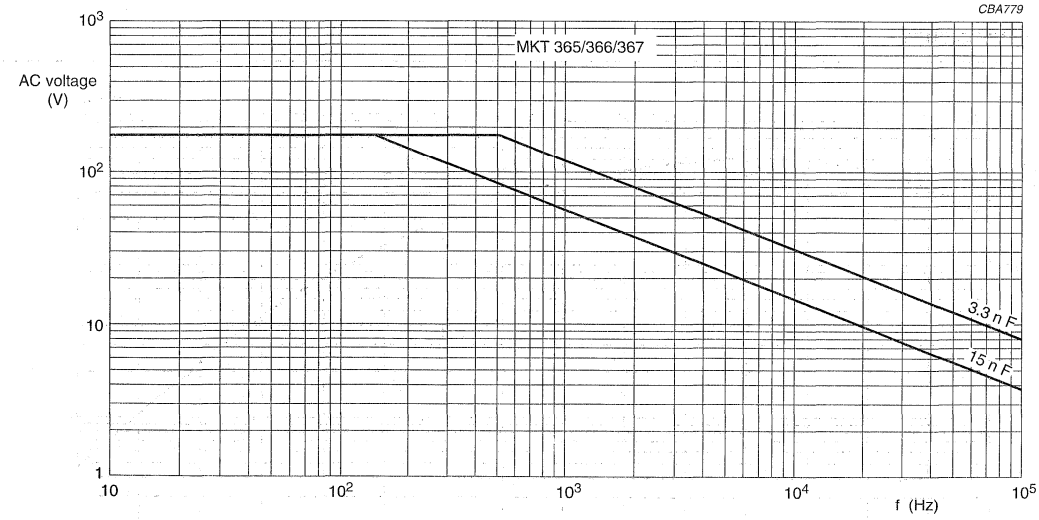


Fig.22 AC voltage (RMS value) as a function of frequency at 85 °C < $T_{amb} \leq 100$ °C for $U_{Rdc} = 400$ V.

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 15 to 22.

Tangent of loss angle

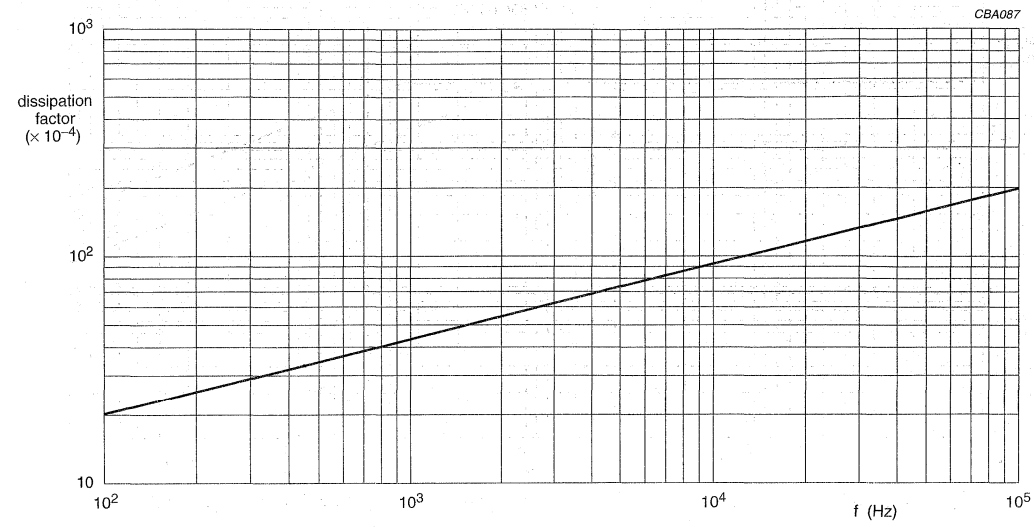


Fig.23 Tangent of loss angle as a function of frequency: typical curve.

Insulation resistance

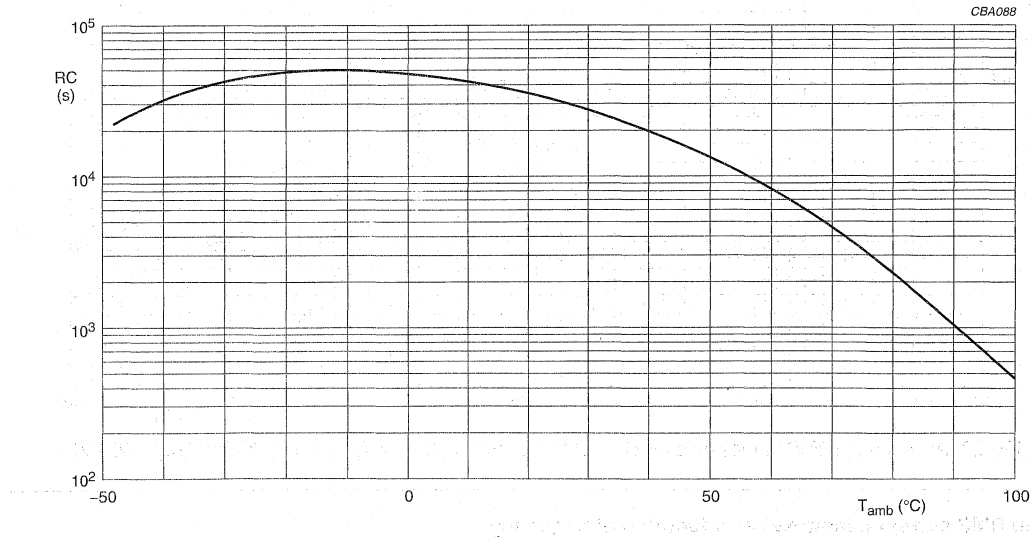


Fig.24 RC product as a function of ambient free air temperature: typical curve.

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

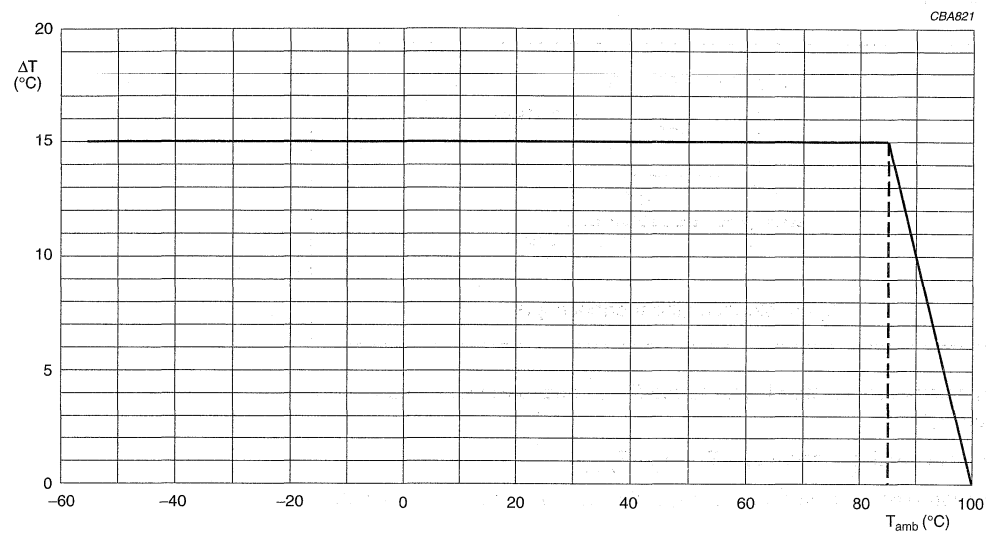


Fig.25 Maximum allowed component temperature rise as a function of the ambient temperature.

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.

Power dissipation can be calculated in accordance with 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).

Measuring the component temperature

A thermocouple must be attached to the capacitor body; see Fig.26.

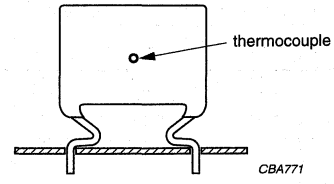


Fig.26 Mounting the thermocouple.

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

These capacitors are not suitable for mains applications as across-the-line capacitors without additional protection, as described below. These mains applications are strictly regulated by safety standards and therefore electromagnetic interference suppression capacitors conforming to 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 0.
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.
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	$T_{amb} \leq 85$ °C	85 °C < $T_{amb} \leq 100$ °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)	$1.6 \times U_{Rdc}$	$1.3 \times U_{Rdc}$

Example

C = 330 nF - 63 V used for the voltage signal shown in Fig.27.

U_{p-p} = 40 V; U_p = 35 V; T_1 = 100 µs; T_2 = 200 µs.

The ambient temperature is 35 °C.

Checking the conditions:

1. The peak voltage U_p = 35 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 V/100 µs = 0.4 V/µs.
   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_{max} = 4.5 mm and pitch = 5 mm will be $\frac{16.2\ \text{mW}}{2.5\ \text{mW/°C}} = 6.5\ °\text{C}$.

   This is lower than 15 °C temperature rise at 35 °C; see Fig.25.
5. Not applicable.
6. Not applicable.

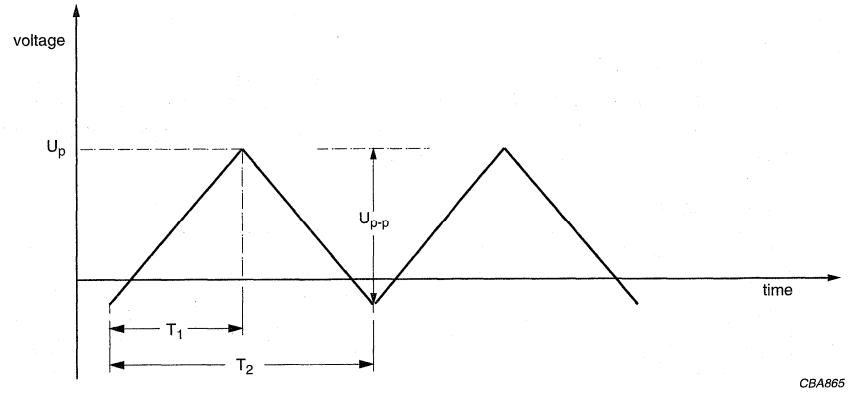


Fig.27 Voltage signal.

MARKING

Product marking

COUNTRY OF ORIGIN: BELGIUM

The capacitors are marked on the top with black ink (see Figs 28 and 29), containing the following information:

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

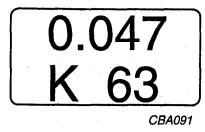


Fig.28 Example of marking for capacitors with pitch = 5 mm (kinked and straight leads).

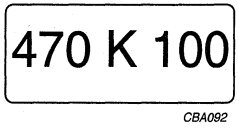


Fig.29 Example of marking for capacitors with pitch = 5 mm (bent back leads) and pitch = 7.5 mm (kinked and straight leads).

COUNTRY OF ORIGIN: PRC (PEOPLE'S REPUBLIC OF CHINA)

The capacitors are marked on the side with black ink (see Fig.30), containing the following information:

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

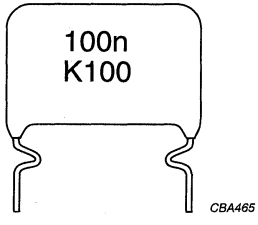
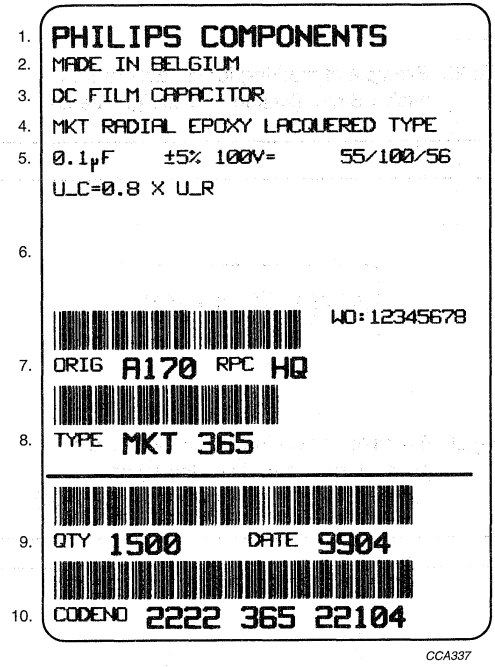


Fig.30 Example of marking for capacitors with pitch = 5 and 7.5 mm.

Package marking

The package containing the capacitors is marked as shown in Fig.31.

Please note:
In due time BC COMPONENTS
will replace PHILIPS COMPONENTS



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	• 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.31 Barcode label.

QUICK REFERENCE TEST REQUIREMENTS (see note 1)

TEST	PROCEDURE (quick reference)	REQUIREMENTS
Robustness of leads		
Tensile strength: *"IEC 60068-2-21"*	load 10 N; 10 s	no visible damage legible marking $\lvert\Delta C/C\rvert \leq 2\%$ $\Delta\tan\delta \leq 30 \times 10^{-4}$; note 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	
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	$\lvert\Delta C/C\rvert \leq 3\%$ $\Delta\tan\delta \leq 30 \times 10^{-4}$; note 2
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	$\lvert\Delta C/C\rvert \leq 5\%$ $\Delta\tan\delta \leq 50 \times 10^{-4}$; note 2 $R_{ins} \geq 50\%$ 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	$\lvert\Delta C/C\rvert \leq 5\%$ $\Delta\tan\delta \leq 50 \times 10^{-4}$; note 2 $R_{ins} \geq 50\%$ of specified value
Endurance (DC): *"IEC 60384-2"*	2000 hours: $1.25 \times U_{Rdc}$; 85 °C $1 \times U_{Rdc}$; 100 °C	$\lvert\Delta C/C\rvert \leq 5\%$ $\Delta\tan\delta \leq 30 \times 10^{-4}$; note 2 $R_{ins} \geq 50\%$ of specified value
Heat storage: *"IEC 60384-2"*	2000 hours; 100 °C	$\lvert\Delta C/C\rvert \leq 3\%$ $\Delta\tan\delta \leq 30 \times 10^{-4}$; note 2
Resistance to soldering heat with preheating: *"IEC 60384-2"*	body temperature: 100 °C; bath temperature: 260 °C; dwell time: 5 s	$\lvert\Delta C/C\rvert \leq 2\%$ ($C \leq 10$ nF) $\lvert\Delta C/C\rvert \leq 1\%$ ($C > 10$ nF) $\Delta\tan\delta \leq 30 \times 10^{-4}$; note 2

Notes

1. For detailed information, see *"Type detail specification HQN-384-02/105"*.
2. Measuring frequency 100 kHz for C ≤ 470 nF and 10 kHz for C > 470 nF.

Metallized polyester film capacitors

MKT 467/468
MKT/MKT 468

MKT RADIAL EPOXY LACQUERED TYPE

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

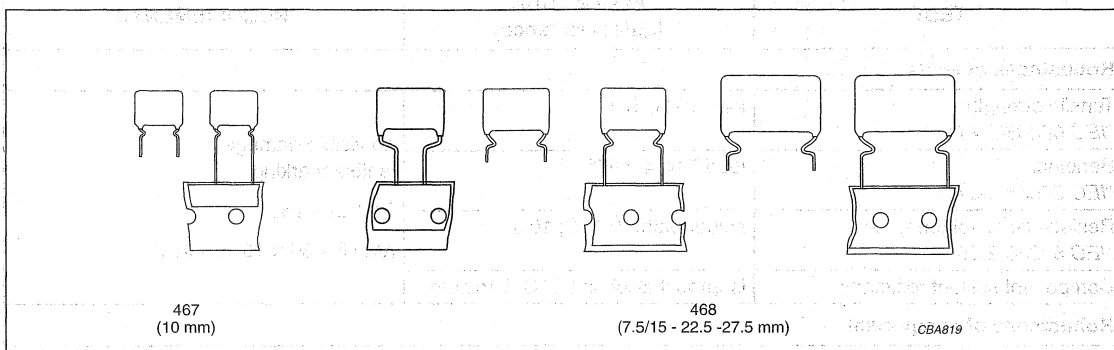


Fig.1 Simplified outlines.

APPLICATIONS

- Blocking and coupling
- Bypass and energy reservoir.

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
- Small stand-off pips allow removal of solder flux.

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	55/100/56
Rated temperature	85 °C
Maximum application temperature	100 °C
Tangent of loss angle at 10 kHz	100×10^{-4}
Reference specifications	IEC 60384-2
Performance grade	grade 1 (long life)

Metallized polyester film capacitors MKT 467

COMPOSITION OF CATALOGUE NUMBER

TYPE AND PITCHES	
467	10.0 mm

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

CAPACITANCE (numerically)

Example:
104 = 10 × 10 = 100 nF

2222	467	XX	XX	X

TYPE	PACKAGING	LEAD CONFIGURATION	C-TOL	100 V	250 V	400 V	630 V
467	loose in box	lead length 3.5 mm	±10%	04	16	28	40
			±5%	05	17	29	41
		lead length 19.0 mm	±10%	51	53	55	57
			±5%	52	54	56	58
	taped on reel	H = 16.0 mm; P_0 = 12.7 mm	±10%	06	18	30	42
			±5%	07	19	31	43

Metallized polyester film capacitors MKT 468

TYPE AND PITCHES	
MKT 468	15/7.5 mm
	15.0 mm
	22.5 mm
	27.5 mm
MKT/MKT 468	15.0 mm
	22.5 mm
	27.5 mm

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

CAPACITANCE (numerically)

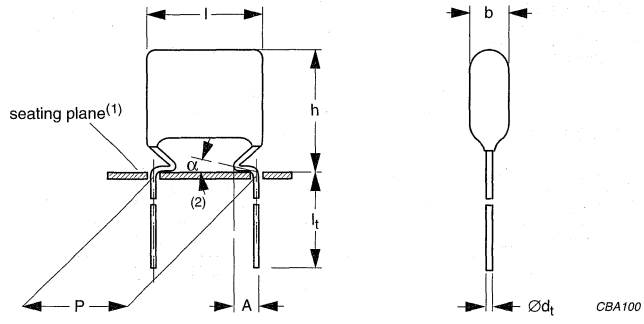
Example:
104 = 10 × 10 = 100 nF

2222	468	XX	XX	X

TYPE	PACKAGING	LEAD CONFIGURATION	C-TOL	100 V	250 V	400 V	630 V	1000 V
MKT 468	loose in box	lead length 3.5 mm	±10%	04	16	28	40	–
			±5%	05	17	29	41	–
		long leads	±10%	51	53	55	57	–
			±5%	52	54	56	58	–
	taped on reel	H = 16.0 mm; P_0 = 12.7 mm	±10%	06	18	30	42	–
			±5%	07	19	31	43	–
	taped on reel (bent back)	H = 16.0 mm; P_0 = 15.0 mm	±10%	61	63	65	67	–
			±5%	62	64	66	68	–
MKT/MKT 468	loose in box	lead length 3.5 mm	±10%	–	–	–	–	60

MKT 467 GENERAL DATA

PITCH 10 mm (kinked leads)



(1) Hole ∅1.0 for d_t = 0.6 mm.
(2) $0 \leq \alpha < 50°$.

Fig.4 Outline.

Specific reference data for the 100 V DC capacitors

DESCRIPTION	VALUE	
	at 1 kHz	at 10 kHz
Tangent of loss angle: 0.56 µF < C ≤ 1.0 µF	$\leq 75 \times 10^{-4}$	$\leq 120 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 100 V (DC)	30 V/µs	
RC between leads, for C > 0.33 µF at 100 V; 1 minute	>5000 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	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 = 3.5 ±0.5 mm	±10%	2222 467 04...	preferred
		±5%	2222 467 05...	preferred
	l_t = 19.0 ±4.0 mm	±10%	2222 467 51...	on request
		±5%	2222 467 52...	on request
Taped on reel	H = 16.0 mm; note 2	±10%	2222 467 06...	on request
		±5%	2222 467 07...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

U_{Rdc} = 100 V; U_{Rac} = 63 V

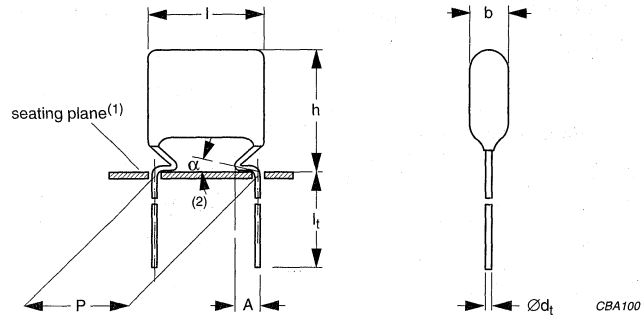
C (µF)	DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER	
			LOOSE IN BOX	
			C-tol = ±10%	C-tol = ±5%
			catalogue number(1)	last 5 digits(1)
Pitch = 10.0 ±0.4 mm; d_t = 0.60 ±0.06 mm; A = 2.0 ±0.5 mm				
0.56	4.6 × 13.6 × 12.5	0.5	2222 467 04**564**	.. 05**564**
0.68	5.0 × 14.0 × 12.5	0.6	2222 467 04**684**	.. 05**684**
0.82	5.5 × 14.5 × 12.5	0.7	2222 467 04**824**	.. 05**824**
1.0	6.0 × 15.0 × 12.5	0.7	2222 467 04**105**	.. 05**105**

Note

1. The shading indicates preferred types.

MKT 467 GENERAL DATA

PITCH 10 mm (kinked leads)



(1) Hole Ø1.0 for d_t = 0.6 mm.
(2) $0 \leq \alpha < 50°$.

Fig.5 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: 0.18 µF < C ≤ 0.22 µF	$\leq 75 \times 10^{-4}$	$\leq 120 \times 10^{-4}$	$\leq 225 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 250 V (DC)	120 V/µs		
R between leads, for C ≤ 0.33 µF at 100 V; 1 minute	>30000 MΩ		
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(1)	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	l_t = 3.5 ±0.5 mm	±10%	2222 467 16...	preferred
		±5%	2222 467 17...	preferred
	l_t = 19.0 ±4.0 mm	±10%	2222 467 53...	on request
		±5%	2222 467 54...	on request
Taped on reel	H = 16.0 mm; note 2	±10%	2222 467 18...	on request
		±5%	2222 467 19...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

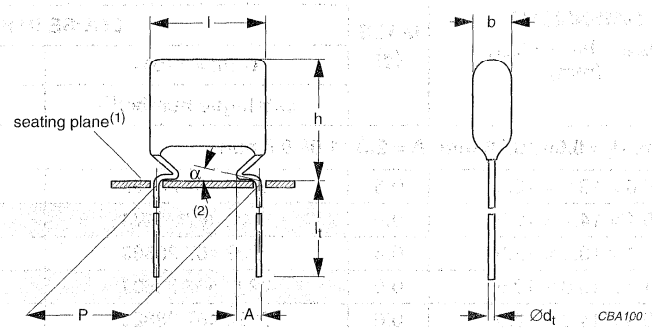
U_{Rdc} = 250 V; U_{Rac} = 160 V

C (µF)	DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER	
			LOOSE IN BOX	
			C-tol = ±10%	C-tol = ±5%
			catalogue number(1)	last 5 digits(1)
Pitch = 10.0 ±0.4 mm; d_t = 0.60 ±0.06 mm; A = 2.0 +1.0/–0.5 mm				
0.18	5.2 × 14.2 × 12.5	0.5	2222 467 16**184**	.. 17**184**
0.22	5.8 × 14.8 × 12.5	0.6	2222 467 16**224**	.. 17**224**

Note

1. The shading indicates preferred types.

MKT 467 GENERAL DATA **PITCH 10 mm (kinked leads)**



(1) Hole Ø1.0 for d_t = 0.6 mm.
(2) $0 \leq \alpha < 50°$.

Fig.6 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 ≤ 0.1 µF	$\leq 75 \times 10^{-4}$	$\leq 120 \times 10^{-4}$	$\leq 200 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 400 V (DC)	170 V/µs		
R between leads, for C ≤ 0.33 µF at 100 V; 1 minute	>30000 MΩ		
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	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 ±0.5 mm	±10%	2222 467 28...	preferred
		±5%	2222 467 29...	preferred
	l_t = 19.0 ±4.0 mm	±10%	2222 467 55...	on request
		±5%	2222 467 56...	on request
Taped on reel	H = 16.0 mm; note 2	±10%	2222 467 30...	on request
		±5%	2222 467 31...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

U_{Rdc} = 400 V; U_{Rac} = 200 V

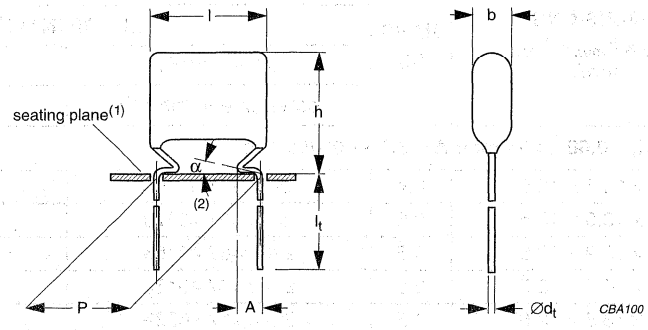
C (µF)	DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER	
			LOOSE IN BOX	
			C-tol = ±10%	C-tol = ±5%
			catalogue number[1]	last 5 digits[1]
Pitch = 10.0 ±0.4 mm; d_t = 0.60 ±0.06 mm; A = 2.0 +1.0/−0.5 mm				
0.039	5.0 × 13.9 × 12.5	0.5	2222 467 28**393**	.. 29**393**
0.047	5.4 × 14.4 × 12.5	0.6	2222 467 28**473**	.. 29**473**
0.056	4.4 × 13.4 × 12.5	0.4	2222 467 28**563**	.. 29**563**
0.068	4.8 × 13.8 × 12.5	0.5	2222 467 28**683**	.. 29**683**
0.082	5.4 × 14.3 × 12.5	0.6	2222 467 28**823**	.. 29**823**
0.1	5.6 × 14.6 × 12.5	0.7	2222 467 28**104**	.. 29**104**

Note

1. The shading indicates preferred types.

MKT 467 GENERAL DATA

PITCH 10 mm (kinked leads)



(1) Hole ∅1.0 for d_t = 0.6 mm.
(2) $0 \leq \alpha < 50°$.

Fig.7 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: $C \leq 0.033$ µF	$\leq 75 \times 10^{-4}$	$\leq 120 \times 10^{-4}$	$\leq 200 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 630 V (DC)	120 V/µs		
R between leads, for $C \leq 0.33$ µF at 500 V; 1 minute	>30000 MΩ		
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(1)	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	l_t = 3.5 ±0.5 mm	±10%	2222 467 40...	preferred
		±5%	2222 467 41...	preferred
	l_t = 19.0 ±4.0 mm	±10%	2222 467 57...	on request
		±5%	2222 467 58...	on request
Taped on reel	H = 16.0 mm; note 2	±10%	2222 467 42...	on request
		±5%	2222 467 43...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

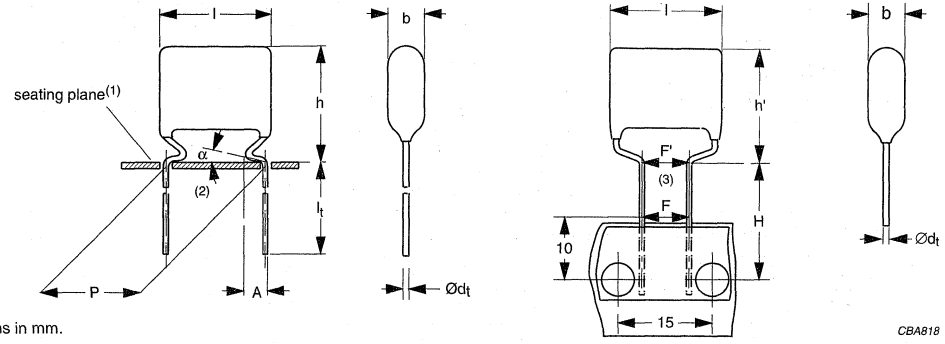
U_{Rdc} = 630 V; U_{Rac} = 250 V

C (µF)	DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER	
			LOOSE IN BOX	
			C-tol = ±10%	C-tol = ±5%
			catalogue number(1)	last 5 digits(1)
Pitch = 10.0 ±0.4 mm; d_t = 0.60 ±0.06 mm; A = 2.0 +1.0/–0.5 mm				
0.01	4.1 × 13.1 × 12.5	0.4	2222 467 40**103**	.. 41**103**
0.012	4.5 × 13.5 × 12.5	0.5	2222 467 40**123**	.. 41**123**
0.015	4.9 × 13.9 × 12.5	0.5	2222 467 40**153**	.. 41**153**
0.018	5.4 × 14.4 × 12.5	0.6	2222 467 40**183**	.. 41**183**
0.022	4.8 × 13.8 × 12.5	0.5	2222 467 40**223**	.. 41**223**
0.027	5.3 × 14.3 × 12.5	0.6	2222 467 40**273**	.. 41**273**
0.033	5.9 × 14.9 × 12.5	0.6	2222 467 40**333**	.. 41**333**

Note

1. The shading indicates preferred types.

MKT 468 GENERAL DATA **PITCH 15/22.5 mm; PITCH 7.5 mm (bent back leads)**



Dimensions in mm.

(1) Hole Ø1.3 for d_t = 0.8 mm.

(2) $0 \leq \alpha < 50°$.

(3) $|F - F'| < 0.3$ mm.; F = 7.5 +0.6/–0.1 mm.

Fig.8 Outline.

Specific reference data for the 100 V DC capacitors

DESCRIPTION	VALUE	
	at 1 kHz	at 10 kHz
Tangent of loss angle: C ≤ 10.0 µF	$\leq 75 \times 10^{-4}$	$\leq 120 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 100 V (DC): l_{max} = 17.5 mm l_{max} = 26.0 mm	20 V/µs 10 V/µs	
RC between leads, for C > 0.33 µF at 100 V; 1 minute	>5000 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	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 = 3.5 ±0.5 mm	±10%	2222 468 04...	preferred
		±5%	2222 468 05...	preferred
	long leads; note 2	±10%	2222 468 51...	on request
		±5%	2222 468 52...	on request
Taped on reel	H = 16.0 mm; P_0 = 12.7 mm; note 3	±10%	2222 468 06...	on request
		±5%	2222 468 07...	on request
Taped on reel (bent back)	H = 16.0 mm; P_0 = 15.0 mm; note 3	±10%	2222 468 61...	preferred
		±5%	2222 468 62...	preferred

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. Length of long leads: l_t = 19.0 ±4.0 mm for lead pitch = 15.0 mm and 25.0 ±4.0 mm for lead pitch = 22.5 mm.
3. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

U_{Rdc} = 100 V; U_{Rac} = 63 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; H = 16.0 mm; P_0 = mm(2)	
			short leads		pitch 7.5 mm (bent back)	
			C-tol = ±10%	C-tol = ±5%	C-tol = ±10%	C-tol = ±5%
			catalogue number(3)	last 5 digits(3)	last 5 digits(3)	
Pitch = 15.0 ±0.4 mm (pitch = 7.5 ±0.4 mm for bent back leads); d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/–0.5 mm						
1.2	5.5 × 14.5 (16.0) × 17.5	0.7	2222 468 04125	.. 05125	.. 61125	.. 62125
1.5	6.0 × 15.0 (16.5) × 17.5	0.9	2222 468 04155	.. 05155	.. 61155	.. 62155
1.8	6.5 × 15.5 (17.0) × 17.5	1.0	2222 468 04185	.. 05185	.. 61185	.. 62185
2.2	7.0 × 16.0 (17.5) × 17.5	1.2	2222 468 04225	.. 05225	.. 61225	.. 62225
2.7	8.0 × 17.0 (18.5) × 17.5	1.4	2222 468 04275	.. 05275	.. 61275	.. 62275
3.3	8.5 × 17.5 (19.0) × 17.5	1.5	2222 468 04335	.. 05335	.. 61335	.. 62335
Pitch = 22.5 ±0.4 mm; d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/–0.5 mm						
3.9	6.5 × 18.5 × 26.0	2.8	2222 468 04395	.. 05395	not available	
4.7	7.0 × 19.5 × 26.0	3.2	2222 468 04475	.. 05475		
5.6	7.5 × 20.0 × 26.0	3.5	2222 468 04565	.. 05565		
6.8	8.5 × 21.5 × 26.0	4.1	2222 468 04685	.. 05685		
8.2	9.5 × 22.5 × 26.0	4.8	2222 468 04825	.. 05825		
10.0	10.5 × 23.5 × 26.0	5.5	2222 468 04106	.. 05106		

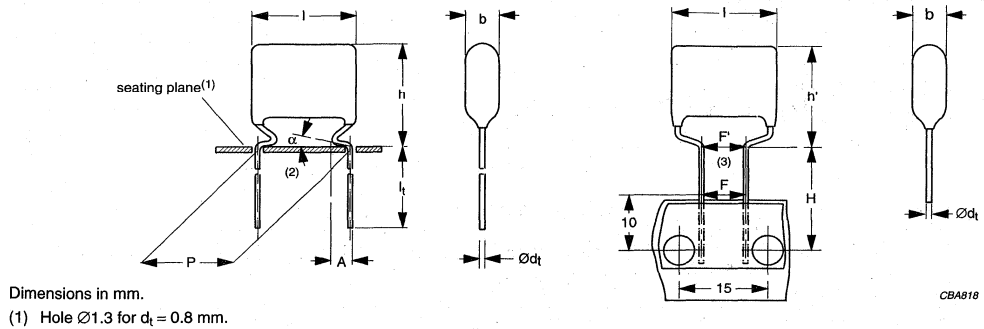
Notes

1. Dimensions in brackets for bent back leads.
2. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*.
   a) For pitch = 15.0 mm: H = 16.0 mm and P_0 = 12.7 mm.
   b) For pitch = 15/7.5 mm (bent back): H = 16.0 mm and P_0 = 15.0 mm.
   Standard reel diameter = 500 mm. Small reel diameter = 356 mm is available on request.
3. The shading indicates preferred types.

Metallized polyester film capacitors MKT 468

MKT 468 GENERAL DATA

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



Dimensions in mm.

(1) Hole Ø1.3 for d_t = 0.8 mm.

(2) $0 \leq \alpha < 50°$.

(3) $|F - F'| < 0.3$ mm.; F = 7.5 +0.6/–0.1 mm.

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:			
$C \leq 0.47$ µF	$\leq 75 \times 10^{-4}$	$\leq 120 \times 10^{-4}$	$\leq 225 \times 10^{-4}$
$C > 0.47$ µF	$\leq 75 \times 10^{-4}$	$\leq 120 \times 10^{-4}$	–
Rated voltage pulse slope $(dU/dt)_R$ at 250 V (DC):			
l_{max} = 17.5 mm	45 V/µs		
l_{max} = 26.0 mm	20 V/µs		
l_{max} = 30.0 mm	15 V/µs		
R between leads, for $C \leq 0.33$ 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(1)	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	l_t = 3.5 ±0.5 mm	±10%	2222 468 16...	preferred
		±5%	2222 468 17...	preferred
	long leads; note 2	±10%	2222 468 53...	on request
		±5%	2222 468 54...	on request
Taped on reel	H = 16.0 mm; P_0 = 12.7 mm; note 3	±10%	2222 468 18...	on request
		±5%	2222 468 19...	on request
Taped on reel (bent back)	H = 16.0 mm; P_0 = 15.0 mm; note 3	±10%	2222 468 63...	preferred
		±5%	2222 468 64...	preferred

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*; taped on reel pitch = 27.5 mm is not available.
2. Length of long leads: l_t = 19.0 ±4.0 mm for lead pitch = 15.0 mm, 25.0±4.0 mm for lead pitch = 22.5 mm and 24.0 ±4.0 mm for lead pitch = 27.5 mm.
3. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

Metallized polyester film capacitors MKT 468

U_{Rdc} = 250 V; U_{Rac} = 160 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; H = 16.0 mm; P_0 = 15.0 mm[2]	
			short leads		pitch 7.5 mm (bent back)	
			C-tol = ±10%	C-tol = ±5%	C-tol = ±10%	C-tol = ±5%
			catalogue number[3]	last 5 digits[3]	last 5 digits[3]	
Pitch = 15.0 ±0.4 mm (pitch = 7.5 ±0.4 mm for bent back leads); d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/–0.5 mm						
0.27	5.0 × 14.0 (15.5) × 17.5	0.6	2222 468 16274	.. 17274	.. 63274	.. 64274
0.33	5.5 × 14.5 (16.0) × 17.5	0.7	2222 468 16334	.. 17334	.. 63334	.. 64334
0.39	6.0 × 15.0 (16.5) × 17.5	0.9	2222 468 16394	.. 17394	.. 63394	.. 64394
0.47	6.5 × 15.5 (17.0) × 17.5	1.0	2222 468 16474	.. 17474	.. 63474	.. 64474
0.56	7.5 × 16.5 (18.0) × 17.5	1.3	2222 468 16564	.. 17564	.. 63564	.. 64564
0.68	8.0 × 17.0 (18.5) × 17.5	1.4	2222 468 16684	.. 17684	.. 63684	.. 64684
0.82	8.5 × 17.5 (19.0) × 17.5	1.5	2222 468 16824	.. 17824	.. 63824	.. 64824
1.0	8.0 × 20.0 (21.5) × 17.5	1.7	2222 468 16105	.. 17105	.. 63105	.. 64105
Pitch = 22.5 ±0.4 mm; d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/–0.5 mm						
1.2	7.0 × 19.0 × 26.0	3.2	2222 468 16125	.. 17125	.. 63125	.. 64125
1.5	8.0 × 21.0 × 26.0	3.8	2222 468 16155	.. 17155	.. 63155	.. 64155
1.8	9.0 × 22.0 × 26.0	4.1	2222 468 16185	.. 17185	.. 63185	.. 64185
2.2	9.8 × 23.0 × 26.0	4.8	2222 468 16225	.. 17225	.. 63225	.. 64225
2.7	11.0 × 24.0 × 26.0	5.9	2222 468 16275	.. 17275	.. 63275	.. 64275
3.3	12.5 × 25.5 × 26.0	6.9	2222 468 16335	.. 17335	.. 63335	.. 64335
3.9	13.5 × 26.5 × 26.0	7.5	2222 468 16395	.. 17395	.. 63395	.. 64395
4.7	14.9 × 28.0 × 26.0	8.6	2222 468 16475	.. 17475	.. 63475	.. 64475
Pitch = 27.5 ±0.4 mm; d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/–0.5 mm						
5.6	15.0 × 28.0 × 30.0	9.1	2222 468 16565	.. 17565	.. 63565	.. 64565

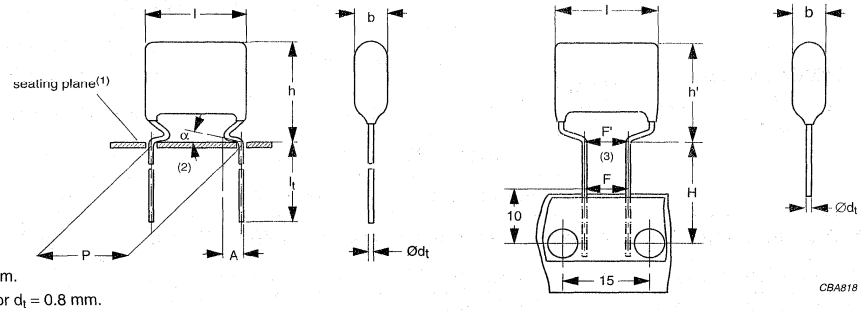
Notes

1. Dimensions in brackets for bent back leads.
2. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*.
   a) For pitch = 15.0 mm: H = 16.0 mm and P_0 = 12.7 mm.
   b) For pitch = 15/7.5 mm (bent back): H = 16.0 mm and P_0 = 15.0 mm.
   Standard reel diameter = 500 mm. Small reel diameter = 356 mm is available on request.
3. The shading indicates preferred types.

Metallized polyester film capacitors MKT 468

MKT 468 GENERAL DATA

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



Dimensions in mm.

(1) Hole ∅1.3 for d_t = 0.8 mm.

(2) $0 \leq \alpha < 50°$.

(3) $|F - F'| < 0.3$ mm.; F = 7.5 +0.6/–0.1 mm.

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: 0.12 < C ≤ 0.47 µF C > 0.47 µF	 $\leq 75 \times 10^{-4}$ $\leq 75 \times 10^{-4}$	 $\leq 120 \times 10^{-4}$ $\leq 120 \times 10^{-4}$	 $\leq 225 \times 10^{-4}$ –
Rated voltage pulse slope $(dU/dt)_R$ at 400 V (DC): l_{max} = 17.5 mm l_{max} = 26.0 mm l_{max} = 30.0 mm	 65 V/µs 30 V/µs 25 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	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 ±0.5 mm	±10%	2222 468 28...	preferred
		±5%	2222 468 29...	preferred
	long leads; note 2	±10%	2222 468 55...	on request
		±5%	2222 468 56...	on request
Taped on reel	H = 16.0 mm; P_0 = 12.7 mm; note 3	±10%	2222 468 30...	on request
		±5%	2222 468 31...	on request
Taped on reel (bent back)	H = 16.0 mm; P_0 = 15.0 mm; note 3	±10%	2222 468 65...	preferred
		±5%	2222 468 66...	preferred

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*; taped on reel pitch = 27.5 mm is not available.
2. Length of long leads: l_t = 19.0 ±4.0 mm for lead pitch = 15.0 mm, 25.0 ±4.0 mm for lead pitch = 22.5 mm and 24.0 ±4.0 mm for lead pitch = 27.5 mm.
3. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

Metallized polyester film capacitors MKT 468

U_{Rdc} = 400 V; U_{Rac} = 200 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; H = 16.0 mm; P_0 = 15.0 mm[2]	
			short leads		pitch 7.5 mm (bent back)	
			C-tol = ±10%	C-tol = ±5%	C-tol = ±10%	C-tol = ±5%
			catalogue number[3]	last 5 digits[3]	last 5 digits[3]	
Pitch = 15.0 ±0.4 mm (pitch = 7.5 ±0.4 mm for bent back leads); d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/–0.5 mm						
0.12	5.0 × 14.0 (15.5) × 17.5	0.6	2222 468 28124	.. 29124	.. 65124	.. 66124
0.15	5.8 × 15.0 (16.5) × 17.5	0.9	2222 468 28154	.. 29154	.. 65154	.. 66154
0.18	6.5 × 15.5 (17.0) × 17.5	1.0	2222 468 28184	.. 29184	.. 65184	.. 66184
0.22	7.0 × 15.5 (17.5) × 17.5	1.2	2222 468 28224	.. 29224	.. 65224	.. 66224
0.27	7.4 × 16.5 (18.0) × 17.5	1.3	2222 468 28274	.. 29274	.. 65274	.. 66274
0.33	8.5 × 17.5 (19.0) × 17.5	1.5	2222 468 28334	.. 29334	.. 65334	.. 66334
0.39	7.4 × 19.5 (21.0) × 17.5	1.3	2222 468 28394	.. 29394	.. 65394	.. 66394
0.47	8.4 × 20.5 (22.0) × 17.5	1.5	2222 468 28474	.. 29474	.. 65474	.. 66474
Pitch = 22.5 ±0.4 mm; d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/–0.5 mm						
0.56	7.5 × 19.5 × 26.0	3.2	2222 468 28564	.. 29564	.. 65564	.. 66564
0.68	8.0 × 21.0 × 26.0	3.8	2222 468 28684	.. 29684	.. 65684	.. 66684
0.82	9.0 × 22.0 × 26.0	4.5	2222 468 28824	.. 29824	.. 65824	.. 66824
1.0	9.9 × 23.0 × 26.0	5.2	2222 468 28105	.. 29105	.. 65105	.. 66105
1.2	11.0 × 24.0 × 26.0	5.9	2222 468 28125	.. 29125	.. 65125	.. 66125
Pitch = 27.5 ±0.4 mm; d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/–0.5 mm						
1.5	11.5 × 24.5 × 30.0	6.5	2222 468 28155	.. 29155	.. 65155	.. 66155
1.8	12.5 × 25.5 × 30.0	7.1	2222 468 28185	.. 29185	.. 65185	.. 66185
2.2	14.0 × 27.0 × 30.0	8.2	2222 468 28225	29225	.. 65225	.. 66225

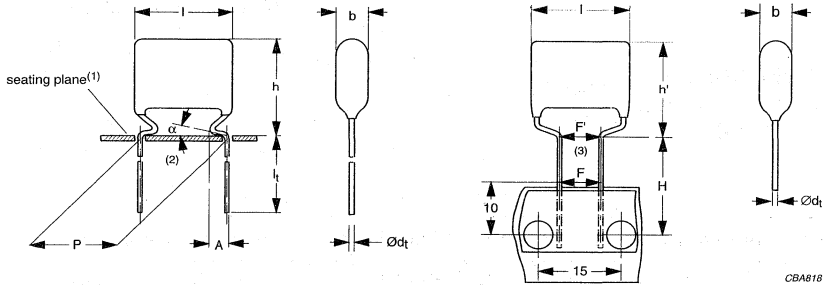
Notes

1. Dimensions in brackets for bent back leads.
2. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*.
   a) For pitch = 15.0 mm: H = 16.0 mm and P_0 = 12.7 mm.
   b) For pitch = 15/7.5 mm (bent back): H = 16.0 mm and P_0 = 15.0 mm.
   Standard reel diameter = 500 mm. Small reel diameter = 356 mm is available on request.
3. The shading indicates preferred types.

Metallized polyester film capacitors MKT 468

MKT 468 GENERAL DATA

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



Dimensions in mm.

(1) Hole Ø1.3 for d_t = 0.8 mm.

(2) $0 \leq \alpha < 50°$.

(3) $|F - F'| < 0.3$ mm.; F = 7.5 +0.6/–0.1 mm

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 ≤ 0.1 µF	≤75 × 10^{-4}	≤120 × 10^{-4}	≤200 × 10^{-4}
0.1 µF < 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):			
l_{max} = 17.5 mm	90 V/µs		
l_{max} = 26.0 mm	35 V/µs		
l_{max} = 30.0 mm	30 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	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 ±0.5 mm	±10%	2222 468 40...	preferred
		±5%	2222 468 41...	preferred
	long leads; note 2	±10%	2222 468 57...	on request
		±5%	2222 468 58...	on request
Taped on reel	H = 16.0 mm; P_0 = 12.7 mm; note 3	±10%	2222 468 42...	on request
		±5%	2222 468 43...	on request
Taped on reel (bent back)	H = 16.0 mm; P_0 = 15.0 mm; note 3	±10%	2222 468 67...	preferred
		±5%	2222 468 68...	preferred

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*; taped on reel pitch = 27.5 mm is not available.
2. Length of long leads: l_t = 19.0 ±4.0 mm for lead pitch = 15.0 mm, 25.0 ±4.0 mm for lead pitch = 22.5 mm and 24.0 ±4.0 mm for lead pitch = 27.5 mm.
3. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

U_{Rdc} = 630 V; U_{Rac} = 250 V

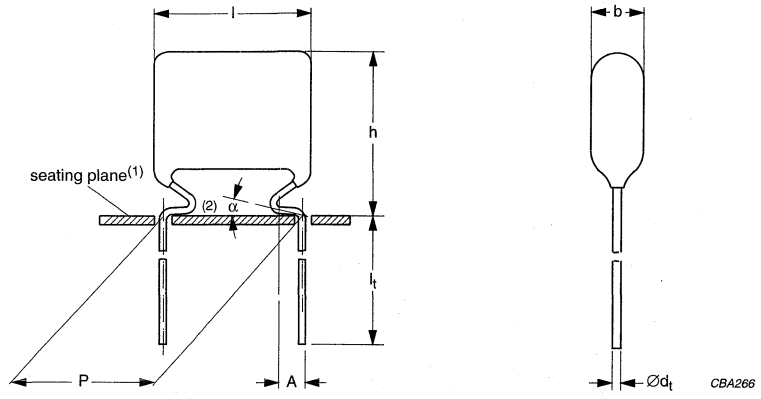
C (µF)	DIMENSIONS(1) $b_{max} \times h\ (h')_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER			
			LOOSE IN BOX		REEL DIAMETER = 500 mm; H = 16.0 mm; P_0 = 15.0 mm(2)	
			short leads		pitch 7.5 mm (bent back)	
			C-tol = ±10%	C-tol = ±5%	C-tol = ±10%	C-tol = ±5%
			catalogue number(3)	last 5 digits(3)	last 5 digits(3)	
Pitch = 15.0 ±0.4 mm (pitch = 7.5 ±0.4 mm for bent back leads); d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/–0.5 mm						
0.039	5.0 × 14.0 (15.5) × 17.5	0.6	2222 468 40393	.. 41393	.. 67393	.. 68393
0.047	5.5 × 14.5 (16.0) × 17.5	0.7	2222 468 40473	.. 41473	.. 67473	.. 68473
0.056	5.9 × 15.0 (16.5) × 17.5	0.9	2222 468 40563	.. 41563	.. 67563	.. 68563
0.068	6.5 × 16.0 (17.5) × 17.5	1.2	2222 468 40683	.. 41683	.. 67683	.. 68683
0.082	7.3 × 16.5 (18.0) × 17.5	1.3	2222 468 40823	.. 41823	.. 67823	.. 68823
0.1	7.9 × 17.0 (18.5) × 17.5	1.4	2222 468 40104	.. 41104	.. 67104	.. 68104
0.12	7.5 × 19.5 (21.0) × 17.5	1.3	2222 468 40124	.. 41124	.. 67124	.. 68124
0.15	8.5 × 20.5 (22.0) × 17.5	1.5	2222 468 40154	.. 41154	.. 67154	.. 68154
Pitch = 22.5 ±0.4 mm; d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/–0.5 mm						
0.18	7.5 × 19.5 × 26.0	3.5	2222 468 40184	.. 41184	.. 67184	.. 68184
0.22	8.0 × 21.0 × 26.0	3.8	2222 468 40224	.. 41224	.. 67224	.. 68224
0.27	9.0 × 22.0 × 26.0	4.5	2222 468 40274	.. 41274	.. 67274	.. 68274
0.33	10.0 × 23.0 × 26.0	5.2	2222 468 40334	.. 41334	.. 67334	.. 68334
0.39	11.0 × 24.0 × 26.0	5.9	2222 468 40394	.. 41394	.. 67394	.. 68394
0.47	12.5 × 25.5 × 26.0	6.9	2222 468 40474	.. 41474	.. 67474	.. 68474
0.56	13.5 × 26.6 × 26.0	7.5	2222 468 40564	.. 41564	.. 67564	.. 68564
0.68	15.0 × 28.0 × 26.0	8.6	2222 468 40684	.. 41684	.. 67684	.. 68684
Pitch = 27.5 ±0.4 mm; d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/–0.5 mm						
0.82	15.0 × 28.0 × 30.0	8.8	2222 468 40824	.. 41824	.. 67824	.. 68824

Notes

1. Dimensions in brackets for bent back leads.
2. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*:
   a) For pitch = 15.0 mm: H = 16.0 mm and P_0 = 12.7 mm.
   b) For pitch = 15/7.5 mm (bent back): H = 16.0 mm and P_0 = 15.0 mm.
   Standard reel diameter = 500 mm. Small reel diameter = 356 mm is available on request.
3. The shading indicates preferred types.

Metallized polyester film capacitors MKT/MKT 468

MKT/MKT 468 GENERAL DATA PITCH 27.5 mm



(1) Hole Ø1.3 for $d_t = 0.8$ mm.
(2) $0 \leq \alpha < 50°$.

Fig.12 Outline.

Specific reference data for the 1000 V DC capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle:			
$C \leq 0.1$ µF	$\leq 75 \times 10^{-4}$	$\leq 120 \times 10^{-4}$	$\leq 200 \times 10^{-4}$
0.1 µF < C ≤ 0.22 µF	$\leq 75 \times 10^{-4}$	$\leq 120 \times 10^{-4}$	$\leq 225 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 1000 V (DC):			
P = 15 mm	200 V/µs		
P = 22.5 mm	120 V/µs		
P = 27.5 mm	100 V/µs		
R between leads, for C ≤ 0.33 µF at 500 V; 1 minute	>30000 MΩ		
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	1600; 1 minute		
Withstanding (DC) voltage between leads and case	2000 V; 1 minute		

Available 1000 V DC versions

PACKAGING(1)	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 3.5 \pm 0.5$ mm	±10%	2222 468 60...	preferred

Note

1. For SPQ refer to this handbook, chapter *"Packaging information"*.

U_{Rdc} = 1000 V; U_{Rac} = 400 V

C (µF)	DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER(1) LOOSE IN BOX; l_t = 3.5 ±0.5 mm C-tol = 10%
Pitch = 15.0 ±0.4 mm; d_t = 0.80 ±0.08 mm; A = 2.5+1.4/–0.5 mm			
0.015	5.5 × 15.0 × 17.5	0.9	2222 468 60**153**
0.018			2222 468 60**183**
0.022	6.0 × 15.0 × 17.5	1.1	2222 468 60**223**
0.027	6.5 × 15.5 × 17.5	1.4	2222 468 60**273**
0.033	8.0 × 17.0 × 17.5	1.5	2222 468 60**333**
0.039	8.5 × 17.5 × 17.5	1.8	2222 468 60**393**
0.047	9.5 × 18.5 × 17.5	2.5	2222 468 60**473**
Pitch = 22.5 ±0.4 mm; d_t = 0.80 ±0.08 mm; A = 2.5+1.4/–0.5 mm			
0.056	7.0 × 20.0 × 26.0	3.1	2222 468 60**563**
0.068	7.5 × 20.5 × 26.0	3.6	2222 468 60**683**
0.082	8.5 × 21.5 × 26.0	3.9	2222 468 60**823**
0.1	9.0 × 22.0 × 26.0	4.2	2222 468 60**104**
0.12	10.0 × 23.0 × 26.0	4.5	2222 468 60**124**
Pitch = 27.5 ±0.4 mm; d_t = 0.80 ±0.08 mm; A = 2.5+1.4/–0.5 mm			
0.15	10.0 × 23.0 × 30.0	6.5	2222 468 60**154**
0.18	11.0 × 24.5 × 30.0	7.0	2222 468 60**184**
0.22	12.0 × 25.5 × 30.0	8.0	2222 468 60**224**

Note

1. The shading indicates preferred types.

CONSTRUCTION

Description

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

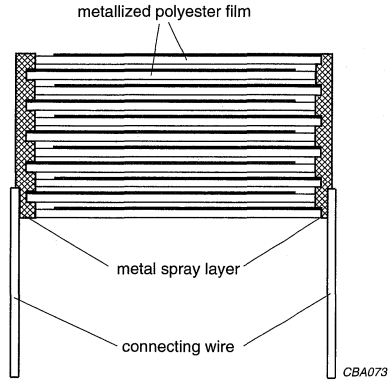


Fig.13 Construction: MKT 100, 250, 400 and 630 V.

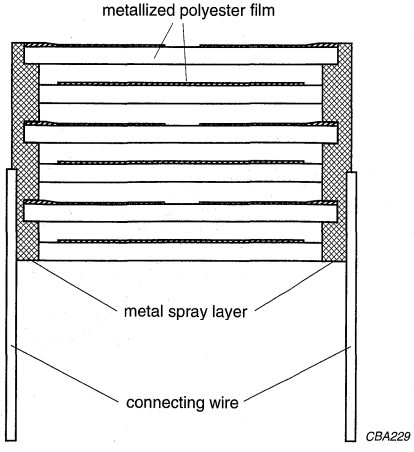


Fig.14 Construction: MKT/MKT 1000 V.

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 ±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%.

CHARACTERISTICS

Capacitance

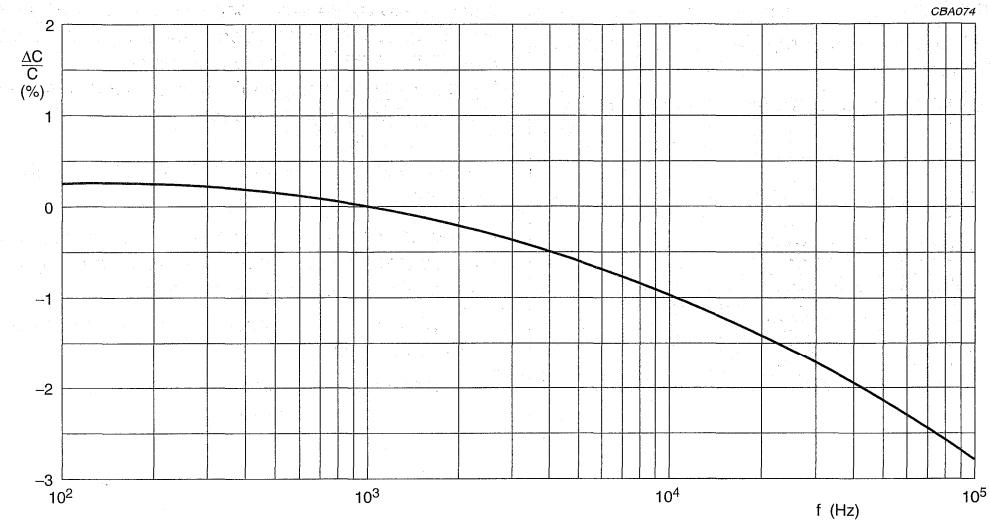


Fig.15 Capacitance change as a function of frequency: typical curve.

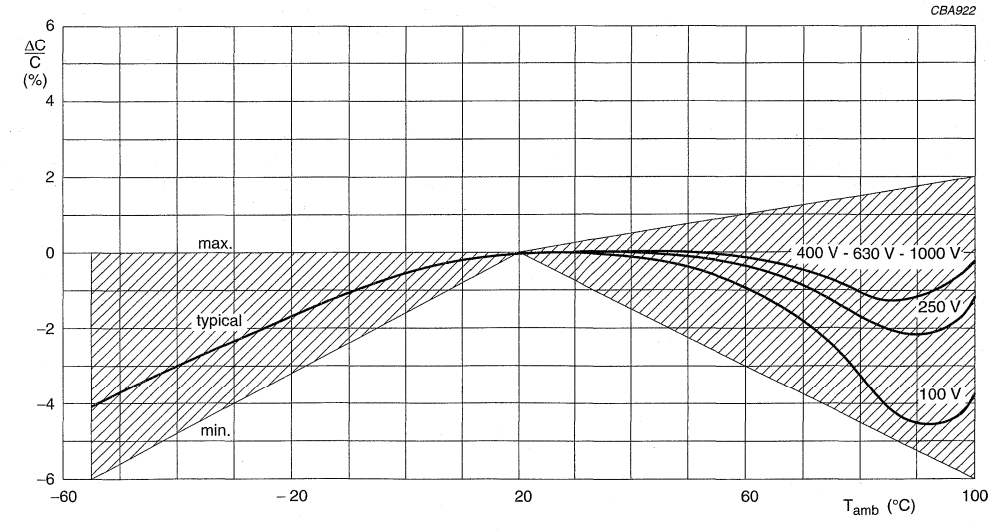


Fig.16 Capacitance as a function of ambient free air temperature, measured at 1 kHz, 1 V.

Impedance

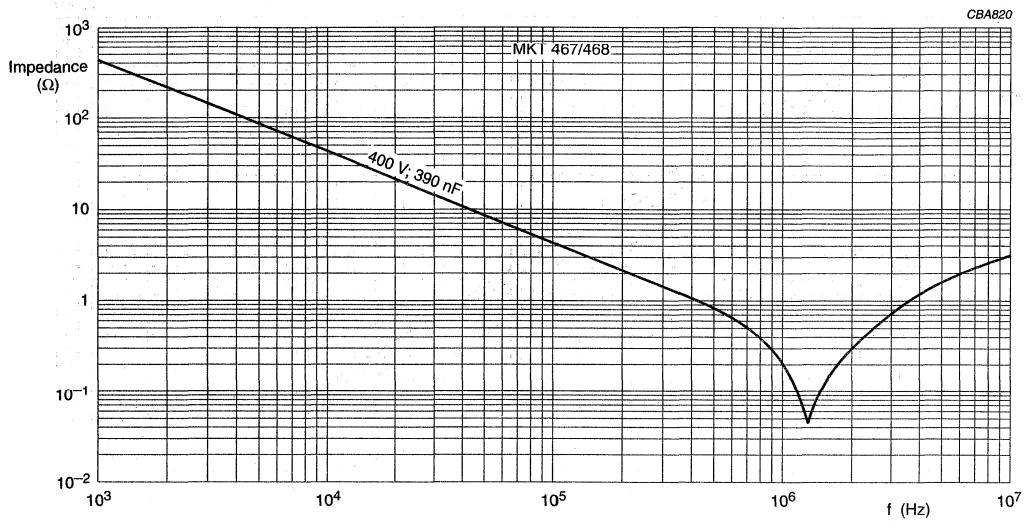


Fig.17 Impedance as a function of frequency: typical curve.

Maximum DC and AC voltage as a function of temperature

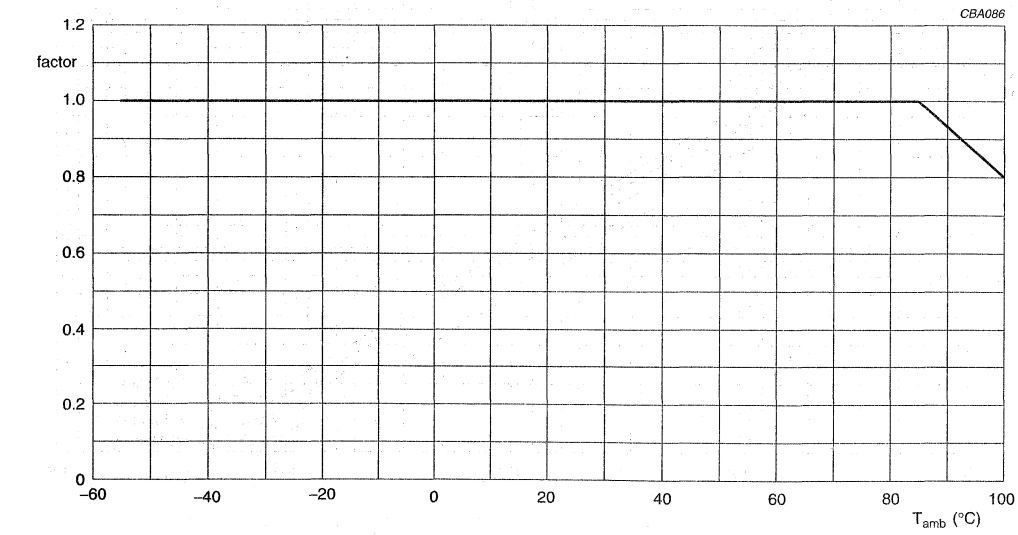


Fig.18 Multiplying factor for DC and AC voltage as a function of temperature.

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

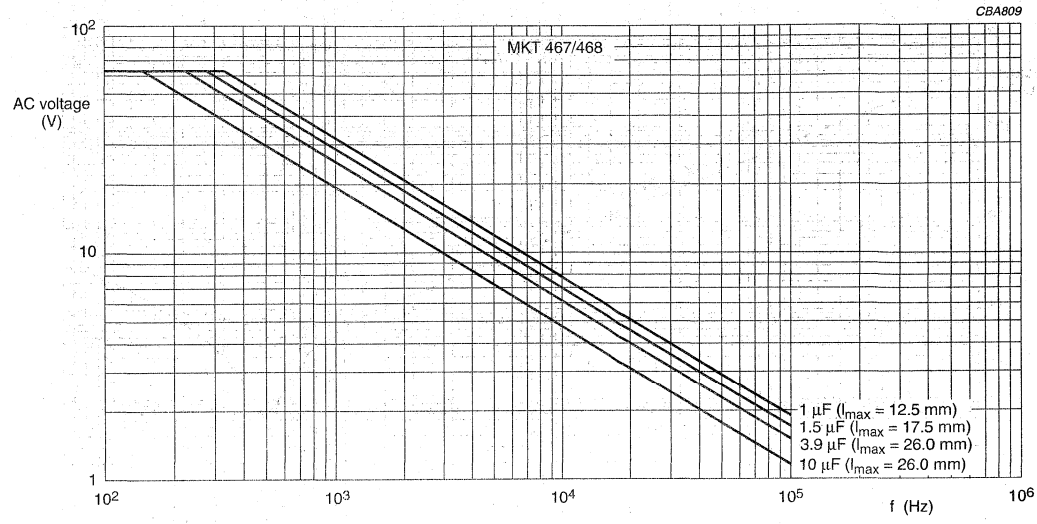


Fig.19 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C for $U_{Rdc} = 100$ V.

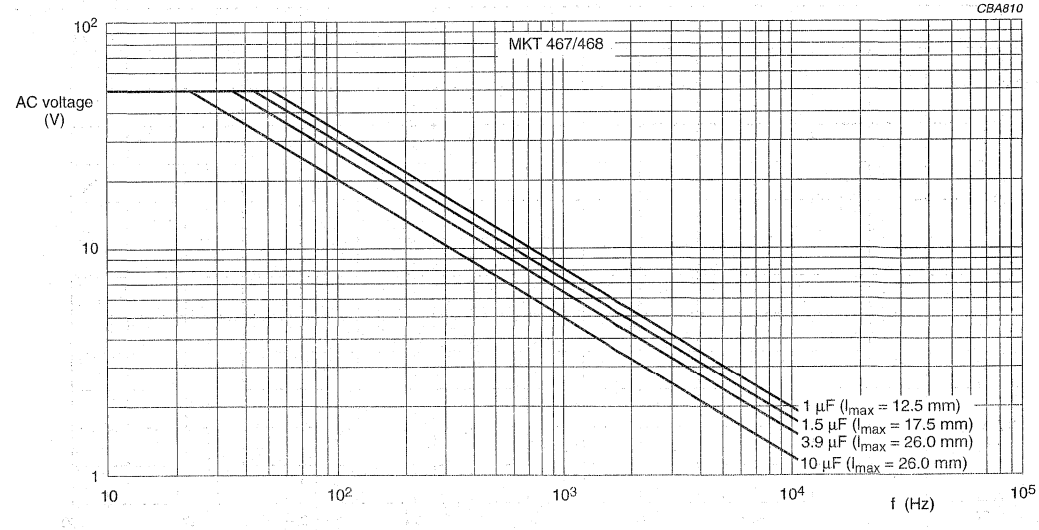


Fig.20 AC voltage (RMS value) as a function of frequency at 85 °C < $T_{amb} \leq 100$ °C for $U_{Rdc} = 100$ V.

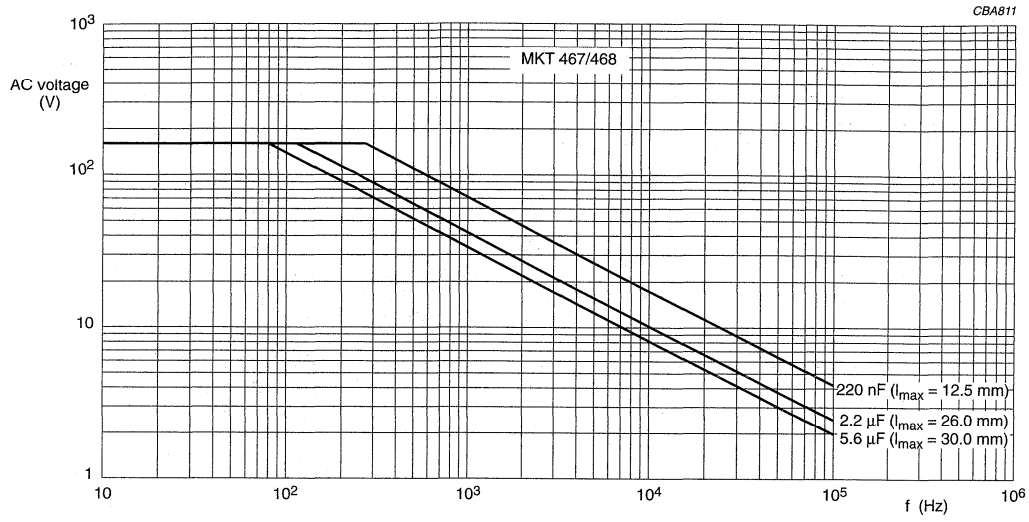


Fig.21 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C for $U_{Rdc} = 250$ V.

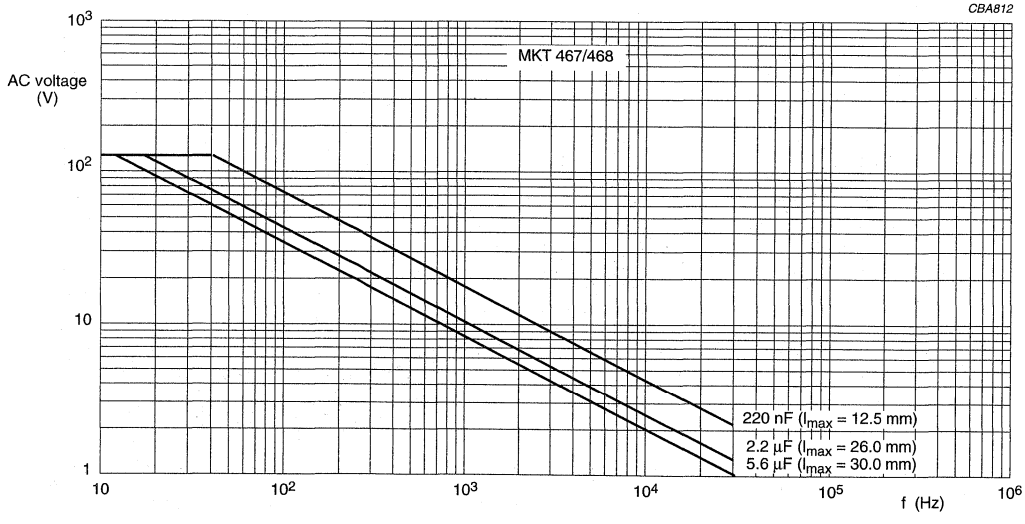


Fig.22 AC voltage (RMS value) as a function of frequency at 85 °C < $T_{amb} \leq 100$ °C for $U_{Rdc} = 250$ V.

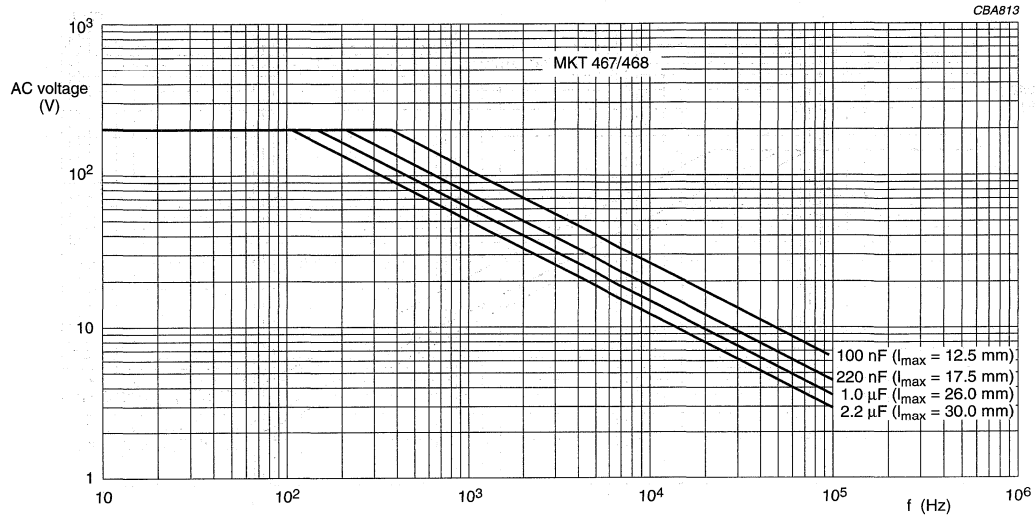


Fig.23 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C for $U_{Rdc} = 400$ V.

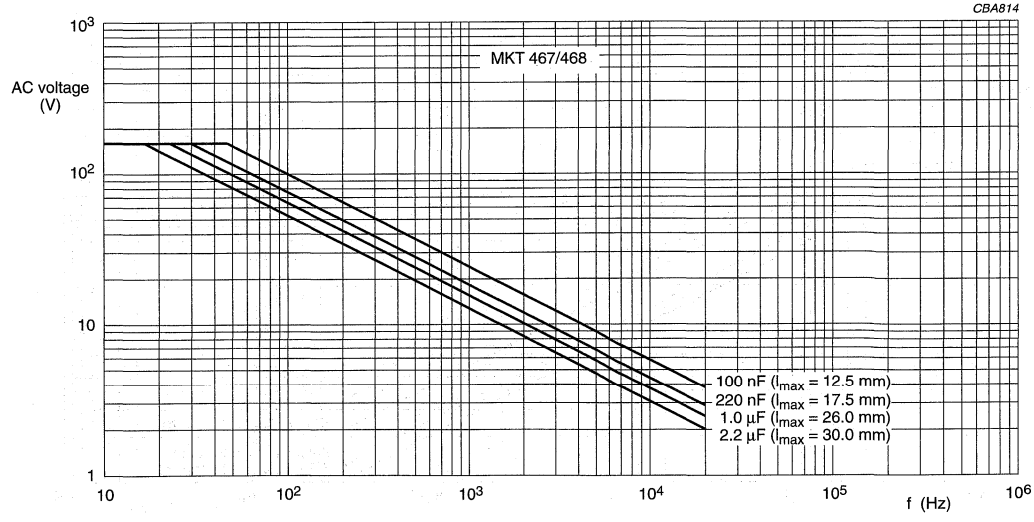


Fig.24 AC voltage (RMS value) as a function of frequency at 85 °C < $T_{amb} \leq 100$ °C for $U_{Rdc} = 400$ V.

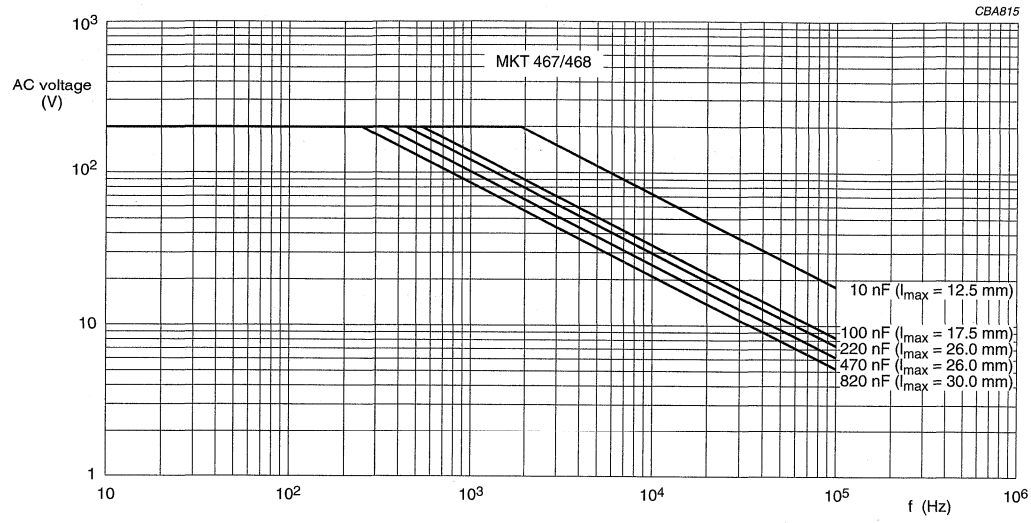


Fig.25 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C for $U_{Rdc} = 630$ V.

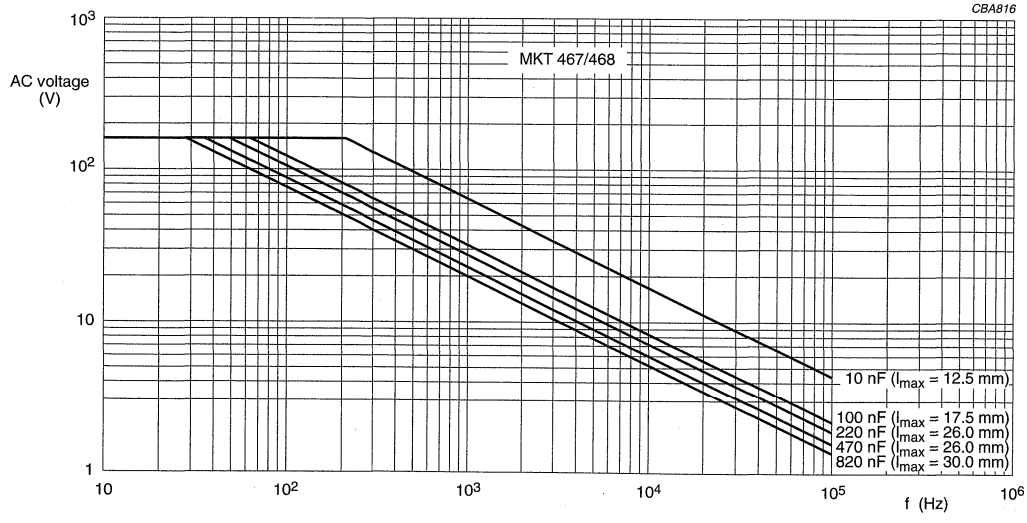


Fig.26 AC voltage (RMS value) as a function of frequency at 85 °C < $T_{amb} \leq 100$ °C for $U_{Rdc} = 630$ V.

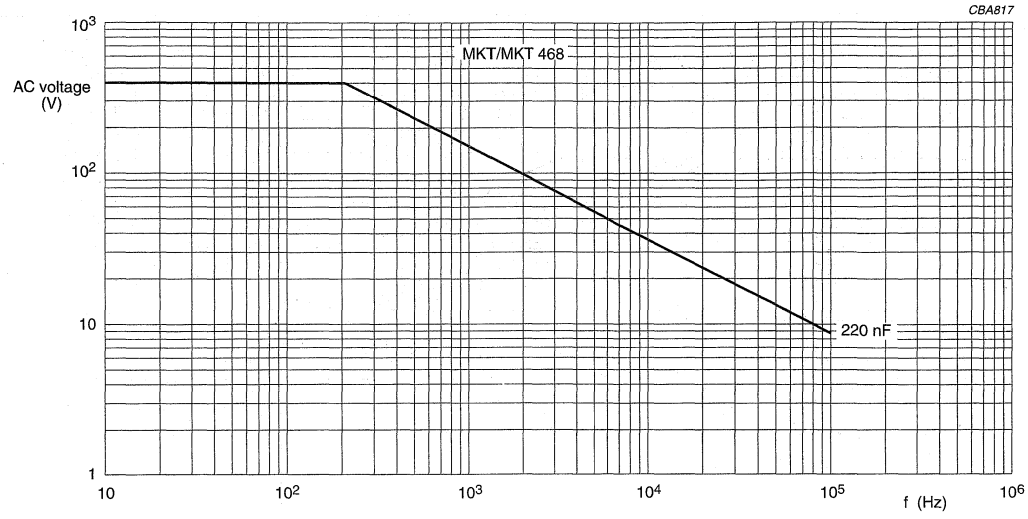


Fig.27 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C for $U_{Rdc} = 1000$ V.

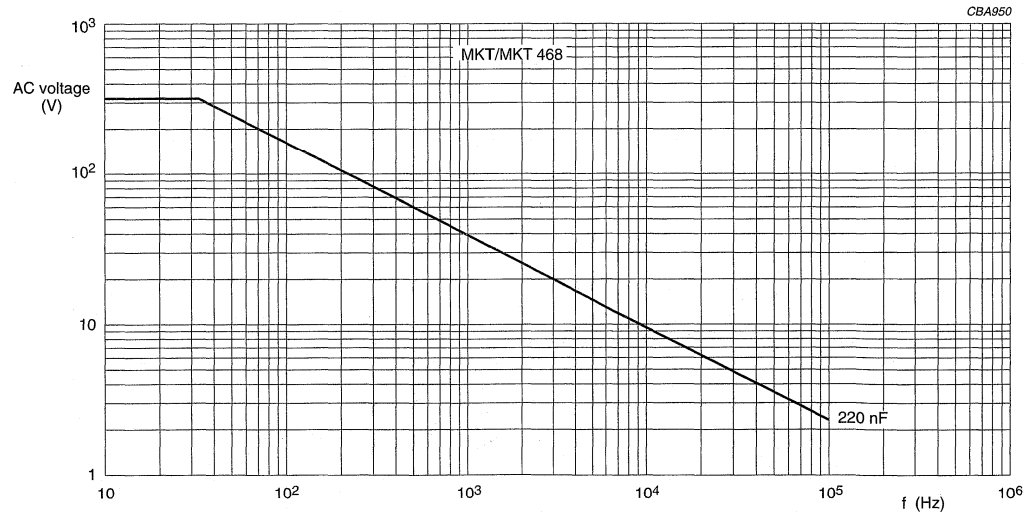


Fig.28 AC voltage (RMS value) as a function of frequency at 85 °C < $T_{amb} \leq 100$ °C for $U_{Rdc} = 1000$ V.

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 19 to 28.

Tangent of loss angle

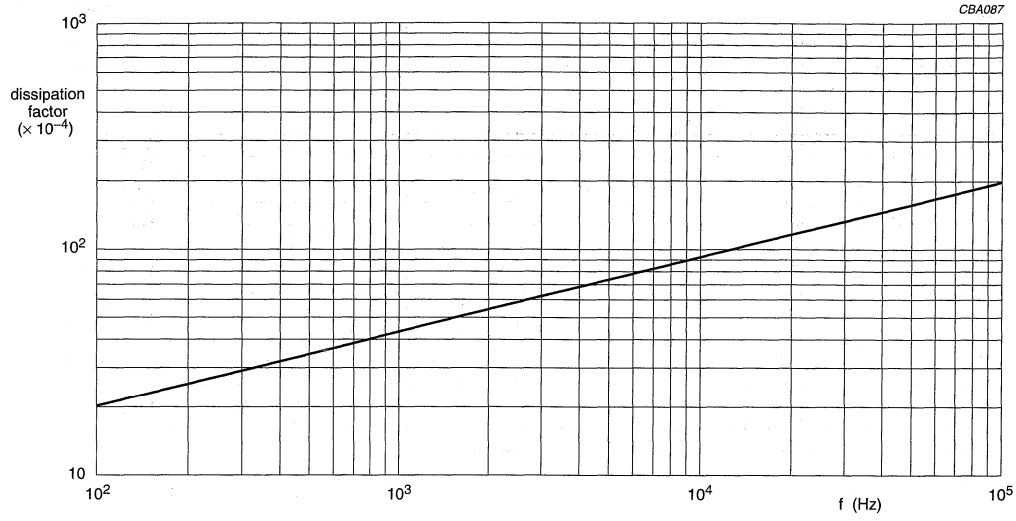


Fig.29 Tangent of loss angle as a function of frequency: typical curve.

Insulation resistance

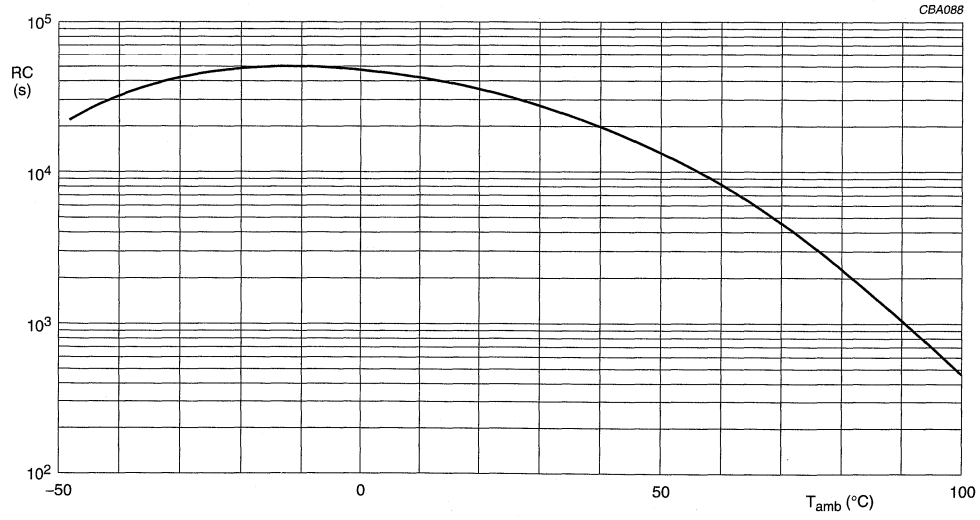


Fig.30 RC product as a function of ambient free air temperature: typical curve.

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

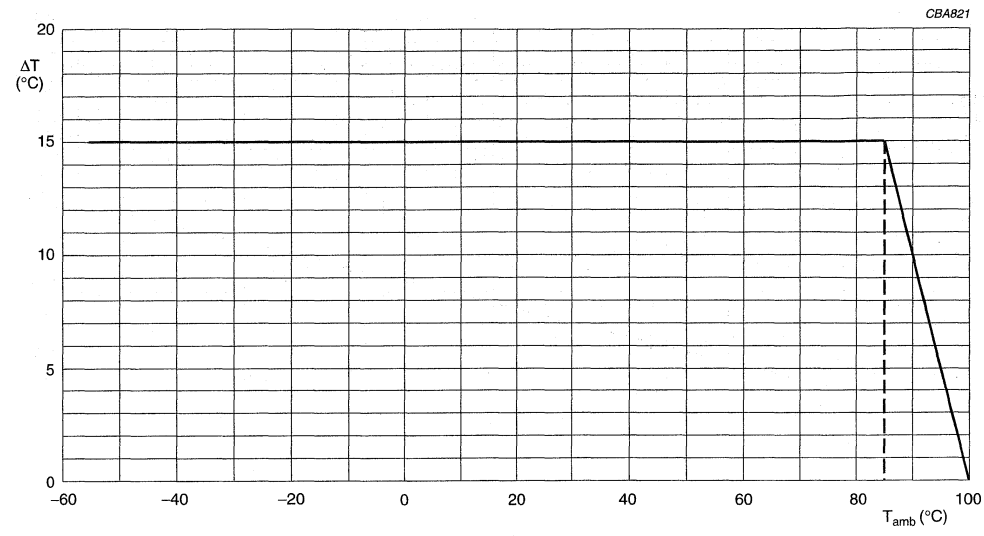


Fig.31 Maximum allowed component temperature rise as a function of the ambient temperature.

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)			
	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.

Power dissipation can be calculated in accordance with 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).

Measuring the component temperature

A thermocouple must be attached to the capacitor body as in Fig.32.

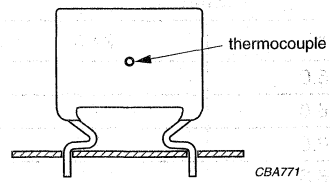


Fig.32 Mounting the thermocouple.

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

These capacitors are not suitable for mains applications as across-the-line capacitors without additional protection, as described below. These mains applications are strictly regulated for safety standards and therefore electromagnetic interference suppression capacitors conforming to 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.31.
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.
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	$T_{amb} \leq 85$ °C	85 °C < $T_{amb} \leq 100$ °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)	$1.6 \times U_{Rdc}$	$1.3 \times U_{Rdc}$

Example

C = 3300 nF - 100 V used for the voltage signal shown in Fig.33.

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

The ambient temperature is 35 °C.

Checking the conditions:

1. The peak voltage U_p = 70 V is lower than 100 V (DC).
2. The peak-to-peak voltage 80 V is lower than $2 \times \sqrt{2} \times 63$ V (AC) = 178 U_{p-p}.
3. The voltage pulse slope dU/dt = 80 V/500 µs = 0.16 V/ µs.
   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_{max} = 8.5 mm and pitch = 15 mm will be $\frac{60 \text{ mW}}{11 \text{ mW/°C}}$ = 5.5 °C.

   This is lower than 15 °C temperature rise at 35 °C; see Fig.31.
5. Not applicable.
6. Not applicable.

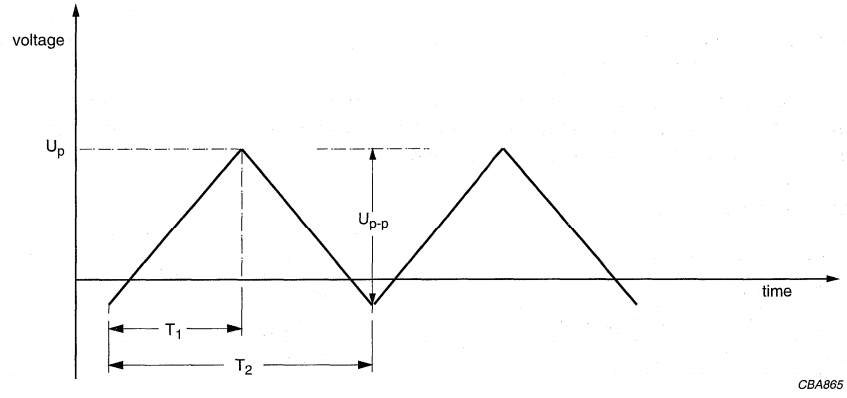


Fig.33 Voltage signal.

MARKING

Product marking

STYLE MKT 467/468

Capacitors with original pitch = 10 mm

The capacitors are marked on the top in black ink (see Fig.34) with the following information:

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

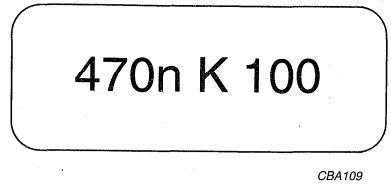


Fig.34 Example of marking for a capacitor with original pitch = 10 mm.

Capacitors with original pitch = 15, 22.5 and 27.5 mm

The capacitors are marked on the top in black ink (see Fig.35) with the following information:

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

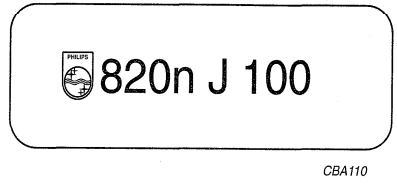


Fig.35 Example of marking for a capacitor with original pitch = 15, 22.5 and 27.5 mm.

STYLE MKT/MKT 468

The capacitors are marked on the top in black ink (see Fig.36) with the following information:

1. Capacitance code in accordance with *"IEC 60062"*
2. Tolerance on rated capacitance: K = ±10%; J = ±5%
3. Rated voltage (DC)
4. Code for dielectric material (MKT/MKT)
5. Manufacturer's symbol.

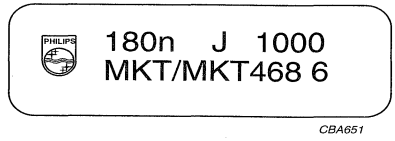
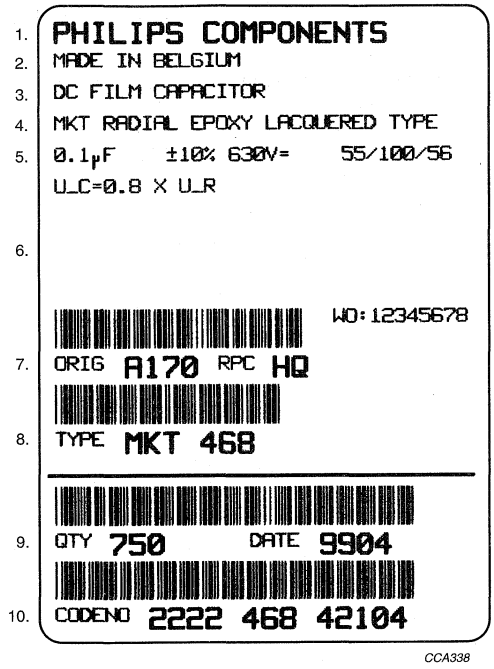


Fig.36 Example of marking.

Package marking

The package containing the capacitors is marked as shown in Fig.37.

Please note:
In due time BC COMPONENTS
will replace PHILIPS COMPONENTS



Barcode label marking

LINE	MARKING EXPLANATION
1	Manufacturer's name
2	Country of origin
3	Sub-family
4	Type description
5	Capacitance value, tolerance, voltage and climatic category *("IEC 60068-1")*
6	Batchnumber (only for capacitors from PRC)
7	• 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.37 Barcode label.

QUICK REFERENCE TEST REQUIREMENTS (see note 1)

TEST	PROCEDURE (quick reference)	REQUIREMENTS
Robustness of leads		
Tensile: *"IEC 60068-2-21"*	load 10 N; 10 s	no visible damage legible marking $\lvert\Delta C/C\rvert \leq 2\%$ $\Delta\tan\delta \leq 30 \times 10^{-4}$; note 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	
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	$\lvert\Delta C/C\rvert \leq 3\%$ $\Delta\tan\delta \leq 30 \times 10^{-4}$; note 2
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	$\lvert\Delta C/C\rvert \leq 5\%$ $\Delta\tan\delta \leq 50 \times 10^{-4}$; note 2 $R_{ins} \geq 50\%$ 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	$\lvert\Delta C/C\rvert \leq 5\%$ $\Delta\tan\delta \leq 50 \times 10^{-4}$; note 2 $R_{ins} \geq 50\%$ of specified value
Endurance (DC): *"IEC 60384-2"*	2000 hours: $1.25 \times U_{Rdc}$; 85 °C $1 \times U_{Rdc}$; 100 °C	$\lvert\Delta C/C\rvert \leq 5\%$ $\Delta\tan\delta \leq 30 \times 10^{-4}$; note 2 $R_{ins} \geq 50\%$ of specified value
Heat storage: *"IEC 60384-2"*	2000 hours; 100 °C	$\lvert\Delta C/C\rvert \leq 3\%$ $\Delta\tan\delta \leq 30 \times 10^{-4}$; note 2
Resistance to soldering heat with preheating: *"IEC 60384-2"*	body temperature: 100 °C; bath temperature: 260 °C; dwell time: 10 s	$\lvert\Delta C/C\rvert \leq 2\%$ (C ≤ 10 nF) $\lvert\Delta C/C\rvert \leq 1\%$ (C > 10 nF) $\Delta\tan\delta \leq 30 \times 10^{-4}$; note 2

Notes

1. For detailed information, see *"Type detail specification HQN-384-02/102"*.
2. Measuring frequency 10 kHz.

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

MKT RADIAL POTTED CAPACITORS PITCH 5/7.5/10/15/22.5/27.5 mm

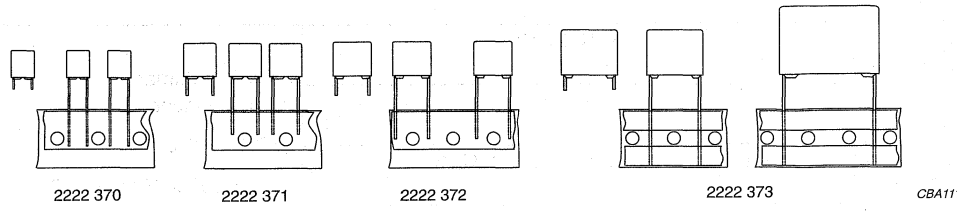


Fig.1 Simplified outlines.

FEATURES

- Low-inductive wound cell of metallized (PETP) film
- Potted with epoxy resin in a blue 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 µF
Capacitance tolerance	±10%; ±5%
Rated (DC) voltage	63 V; 100 V; 250 V; 400 V
Climatic category	55/100/56
Maximum application temperature	100 °C
Rated temperature	85 °C
Tangent of loss angle at 10 kHz	100×10^{-4}
Reference specification	IEC 60384-2
Performance grade	grade 1 (long life)

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	C-TOL	63 V	100 V	250 V	400 V
370	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	H = 18.5 mm; P_0 = 12.7 mm	±10%	18	28	48	58
			±5%	19	29	49	59
	ammopack	H = 18.5 mm; P_0 = 12.7 mm	±10%	75	85	35	65
			±5%	76	86	36	66

Metallized polyester film capacitors MKT 371/372/373

TYPE AND PITCHES	
371	7.5 mm
372	10.0 mm
373	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 × 10 = 100 nF

2222	37.	XX	XX	X

TYPE	PACKAGING	LEAD CONFIGURATION	C-TOL	63 V	100 V	250 V	400 V
371	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	H = 18.5 mm; P_0 = 12.7 mm	±10%	35	65	75	85
			±5%	36	66	76	86
	ammopack	H = 18.5 mm; P_0 = 12.7 mm	±10%	38	68	78	88
			±5%	39	69	79	89
372	loose in box	lead length 4.0 mm	±10%	–	21	41	51
			±5%	–	22	42	52
	taped on reel	H = 18.5 mm; P_0 = 12.7 mm	±10%	–	25	45	55
			±5%	–	26	46	56
	ammopack	H = 18.5 mm; P_0 = 12.7 mm	±10%	–	28	48	58
			±5%	–	29	49	59
373	loose in box	lead length 5.0 mm	±10%	–	23	43	53
			±5%	–	24	44	54
	taped on reel	H = 18.5 mm; P_0 = 12.7 mm	±10%	–	27	47	57
			±5%	–	28	48	58

Metallized polyester film capacitors MKT 370

MKT 370 GENERAL DATA PITCH 5 mm

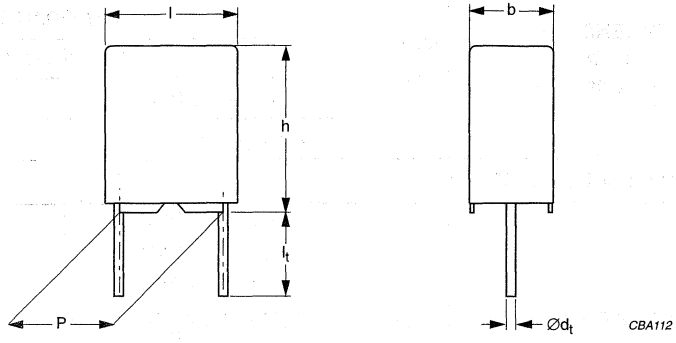


Fig.4 Outline.

Specific reference data for the 63 V DC capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle:			
$C \leq 0.1\ \mu F$	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 250 \times 10^{-4}$
$0.1\ \mu F < C \leq 0.47\ \mu F$	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 300 \times 10^{-4}$
$0.47\ \mu F < C \leq 1.5\ \mu F$	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	–
Rated voltage pulse slope $(dU/dt)_R$ at 63 V (DC)	60 V/µs		
R between leads, for $C \leq 0.33\ \mu F$ at 10 V; 1 minute	>15000 MΩ		
RC between leads, for $C > 0.33\ \mu F$ 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(1)	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Ammopack	H = 18.5 mm; note 2	±10%	2222 370 75...	preferred
		±5%	2222 370 76...	preferred
Loose in box	l_t = 4.0 +1.0/–0.5 mm	±10%	2222 370 11...	on request
		±5%	2222 370 12...	on request
	l_t = 26.0 ±2.0 mm	±10%	2222 370 15...	on request
		±5%	2222 370 16...	on request
Taped on reel	H = 18.5 mm; note 2	±10%	2222 370 18...	on request
		±5%	2222 370 19...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

U_{Rdc} = 63 V; U_{Rac} = 40 V

C (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER	
			AMMOPACK	
			H = 18.5 mm	
			C-tol = ±10%	C-tol = ±5%
			catalogue number(1)	last 5 digits(1)
Pitch = 5.08 ±0.30 mm; d_t = 0.50 ±0.05 mm				
0.056	2.5 × 6.5 × 7.2	0.25	2222 370 75**563**	.. 76**563**
0.068			2222 370 75**683**	.. 76**683**
0.082			2222 370 75**823**	.. 76**823**
0.1			2222 370 75**104**	.. 76**104**
0.12			2222 370 75**124**	.. 76**124**
0.15			2222 370 75**154**	.. 76**154**
0.18			2222 370 75**184**	.. 76**184**
0.22	3.5 × 8.0 × 7.2	0.35	2222 370 75**224**	.. 76**224**
0.27			2222 370 75**274**	.. 76**274**
0.33			2222 370 75**334**	.. 76**334**
0.39			2222 370 75**394**	.. 76**394**
0.47			2222 370 75**474**	.. 76**474**
0.56	4.5 × 9.0 × 7.2	0.45	2222 370 75**564**	.. 76**564**
0.68			2222 370 75**684**	.. 76**684**
0.82	6.0 × 11.0 × 7.2	0.60	2222 370 75**824**	.. 76**824**
1			2222 370 75**105**	.. 76**105**
1.2(2)			2222 370 75**125**	.. 76**125**
1.5(2)			2222 370 75**155**	.. 76**155**

Notes

1. The shading indicates preferred types.
2. For C = 1.2 µF and C = 1.5 µF: U_{Rdc} = 50 V and U_{Rac} = 32 V.

Metallized polyester film capacitors MKT 370

MKT 370 GENERAL DATA PITCH 5 mm

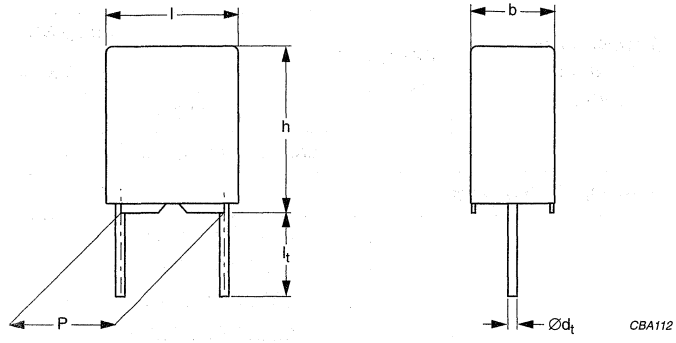


Fig.5 Outline.

Specific reference data for the 100 V DC capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle:			
$C \leq 0.1\ \mu F$	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 250 \times 10^{-4}$
$0.1\ \mu F < C \leq 0.47\ \mu F$	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 300 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 100 V (DC)	110 V/µs		
R between leads, for $C \leq 0.33\ \mu F$ at 100 V; 1 minute	>15000 MΩ		
RC between leads, for $C > 0.33\ \mu F$ 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[1]	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Ammopack	H = 18.5 mm; note 2	±10%	2222 370 85...	preferred
		±5%	2222 370 86...	preferred
Loose in box	l_t = 4.0 +1.0/–0.5 mm	±10%	2222 370 21...	on request
		±5%	2222 370 22...	on request
	l_t = 26.0 ±2.0 mm	±10%	2222 370 25...	on request
		±5%	2222 370 26...	on request
Taped on reel	H = 18.5 mm; note 2	±10%	2222 370 28...	on request
		±5%	2222 370 29...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

U_{Rdc} = 100 V; U_{Rac} = 63 V

C (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER	
			AMMOPACK	
			H = 18.5 mm	
			C-tol = ±10%	C-tol = ±5%
			catalogue number(1)	last 5 digits(1)
Pitch = 5.08 ±0.30 mm; d_t = 0.50 ±0.05 mm				
0.012	2.5 × 6.5 × 7.2	0.25	2222 370 85**123**	.. 86**123**
0.015			2222 370 85**153**	.. 86**153**
0.018			2222 370 85**183**	.. 86**183**
0.022			2222 370 85**223**	.. 86**223**
0.027			2222 370 85**273**	.. 86**273**
0.033			2222 370 85**333**	.. 86**333**
0.039			2222 370 85**393**	.. 86**393**
0.047			2222 370 85**473**	.. 86**473**
0.056			2222 370 85**563**	.. 86**563**
0.068			2222 370 85**683**	.. 86**683**
0.082			2222 370 85**823**	.. 86**823**
0.10	3.5 × 8.0 × 7.2	0.35	2222 370 85**104**	.. 86**104**
0.12			2222 370 85**124**	.. 86**124**
0.15			2222 370 85**154**	.. 86**154**
0.18			2222 370 85**184**	.. 86**184**
0.22	4.5 × 9.0 × 7.2	0.45	2222 370 85**224**	.. 86**224**
0.27			2222 370 85**274**	.. 86**274**
0.33			2222 370 85**334**	.. 86**334**
0.39	6.0 × 11.0 × 7.2	0.65	2222 370 85**394**	.. 86**394**
0.47			2222 370 85**474**	.. 86**474**

Note

1. The shading indicates preferred types.

MKT 370 GENERAL DATA

PITCH 5 mm

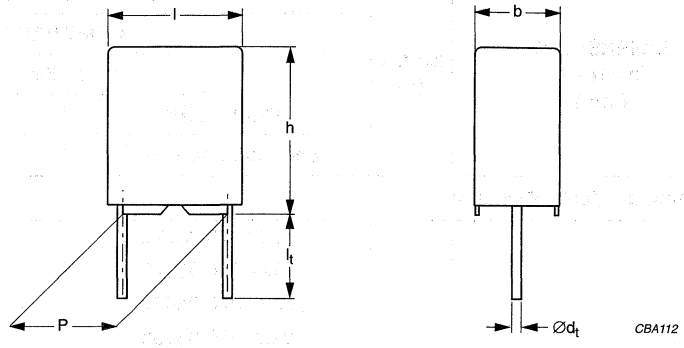


Fig.6 Outline.

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/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	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
Ammopack	H = 18.5 mm; note 2	±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; note 2	±10%	2222 370 48...	on request
		±5%	2222 370 49...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

U_{Rdc} = 250 V; U_{Rac} = 160 V

C (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER	
			AMMOPACK	
			H = 18.5 mm	
			C-tol = ±10%	C-tol = ±5%
			catalogue number(1)	last 5 digits(1)
Pitch = 5.08 ±0.30 mm; d_t = 0.50 ±0.05 mm				
0.0039	2.5 × 6.5 × 7.2	0.25	2222 370 35**392**	.. 36**392**
0.0047			2222 370 35**472**	.. 36**472**
0.0056			2222 370 35**562**	.. 36**562**
0.0068			2222 370 35**682**	.. 36**682**
0.0082			2222 370 35**822**	.. 36**822**
0.01			2222 370 35**103**	.. 36**103**
0.012			2222 370 35**123**	.. 36**123**
0.015			2222 370 35**153**	.. 36**153**
0.018			2222 370 35**183**	.. 36**183**
0.022	3.5 × 8.0 × 7.2	0.35	2222 370 35**223**	.. 36**223**
0.027			2222 370 35**273**	.. 36**273**
0.033			2222 370 35**333**	.. 36**333**
0.039	4.5 × 9.0 × 7.2	0.45	2222 370 35**393**	.. 36**393**
0.047			2222 370 35**473**	.. 36**473**
0.056			2222 370 35**563**	.. 36**563**
0.068	6.0 × 11.0 × 7.2	0.60	2222 370 35**683**	.. 36**683**
0.082			2222 370 35**823**	.. 36**823**
0.1			2222 370 35**104**	.. 36**104**

Note

1. The shading indicates preferred types.

MKT 370 GENERAL DATA

PITCH 5 mm

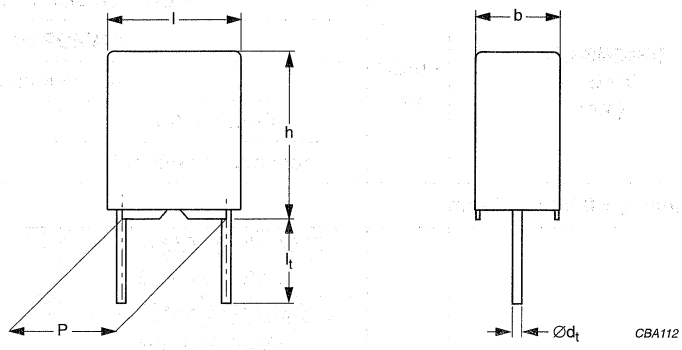


Fig.7 Outline.

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/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(1)	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Ammopack	H = 18.5 mm; note 2	±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; note 2	±10%	2222 370 58...	on request
		±5%	2222 370 59...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

U_{Rdc} = 400 V; U_{Rac} = 220 V

C (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER	
			AMMOPACK	
			H = 18.5 mm	
			C-tol = ±10%	C-tol = ±5%
			catalogue number(1)	last 5 digits(1)
Pitch = 5.08 ±0.30 mm; d_t = 0.50 ±0.05 mm				
0.001	2.5 × 6.5 × 7.2	0.25	2222 370 65**102**	.. 66**102**
0.0012			2222 370 65**122**	.. 66**122**
0.0015			2222 370 65**152**	.. 66**152**
0.0018			2222 370 65**182**	.. 66**182**
0.0022			2222 370 65**222**	.. 66**222**
0.0027			2222 370 65**272**	.. 66**272**
0.0033			2222 370 65**332**	.. 66**332**
0.0039			2222 370 65**392**	.. 66**392**
0.0047			2222 370 65**472**	.. 66**472**
0.0056			2222 370 65**562**	.. 66**562**
0.0068			2222 370 65**682**	.. 66**682**
0.0082			2222 370 65**822**	.. 66**822**
0.01	3.5 × 8.0 × 7.2	0.35	2222 370 65**103**	.. 66**103**
0.012			2222 370 65**123**	.. 66**123**
0.015			2222 370 65**153**	.. 66**153**
0.018	4.5 × 9.0 × 7.2	0.45	2222 370 65**183**	.. 66**183**
0.022			2222 370 65**223**	.. 66**223**
0.027			2222 370 65**273**	.. 66**273**
0.033	6.0 × 11.0 × 7.2	0.60	2222 370 65**333**	.. 66**333**
0.039			2222 370 65**393**	.. 66**393**
0.047			2222 370 65**473**	.. 66**473**

Note

1. The shading indicates preferred types.

Metallized polyester film capacitors MKT 371

MKT 371 GENERAL DATA PITCH 7.5mm

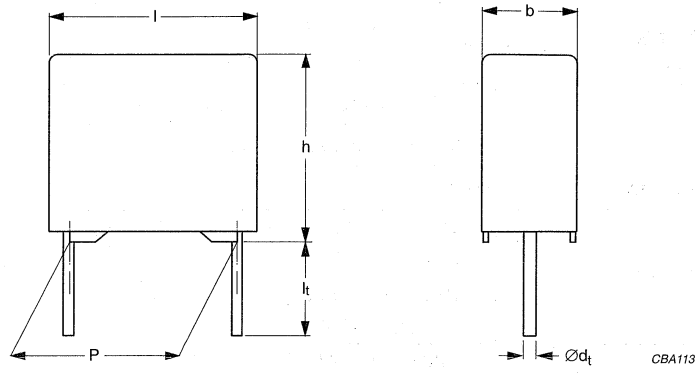


Fig.8 Outline.

Specific reference data for the 63 V DC capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle:			
$C \leq 0.1\ \mu F$	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 250 \times 10^{-4}$
$0.1\ \mu F < C \leq 0.47\ \mu F$	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 300 \times 10^{-4}$
$0.47\ \mu F < C \leq 1.0\ \mu F$	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	–
Rated voltage pulse slope $(dU/dt)_R$ at 63 V (DC)	18 V/µs		
R between leads, for $C \leq 0.33\ \mu F$ at 10 V; 1 minute	>15000 MΩ		
RC between leads, for $C > 0.33\ \mu F$ 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(1)	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; note 2	±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; note 2	±10%	2222 371 35...	on request
		±5%	2222 371 36...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

U_{Rdc} = 63 V; U_{Rac} = 40 V

C (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER			
			LOOSE IN BOX		AMMOPACK	
			l_t = 4.0 +1.0/–0.5 mm		H = 18.5 mm	
			C-tol = ±10%	C-tol = ±5%	C-tol = ±10%	C-tol = ±5%
			catalogue number[1]	last 5 digits[1]	last 5 digits[1]	
Pitch = 7.62 +0.30/–0.40 mm; d_t = 0.50 ±0.05 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

Note

1. The shading indicates preferred types.

Metallized polyester film capacitors MKT 371

MKT 371 GENERAL DATA PITCH 7.5 mm

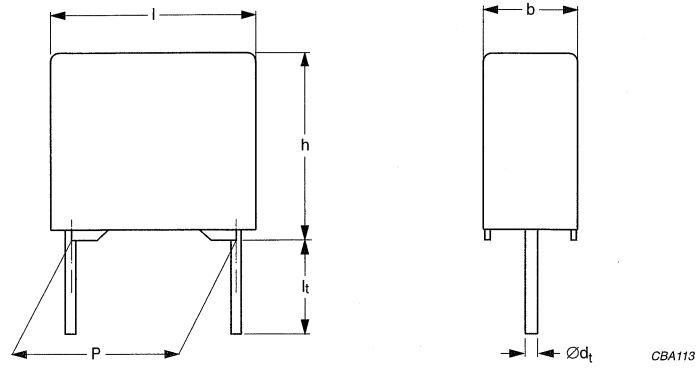


Fig.9 Outline.

Specific reference data for the 100 V DC capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle:			
$C \leq 0.1\ \mu F$	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 250 \times 10^{-4}$
$0.1\ \mu F < C \leq 0.47\ \mu F$	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 300 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 100 V (DC)	36 V/μs		
R between leads, for $C \leq 0.33\ \mu F$ at 100 V; 1 minute	>15000 MΩ		
RC between leads, for $C > 0.33\ \mu F$ 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(1)	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; note 2	±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; note 2	±10%	2222 371 65...	on request
		±5%	2222 371 66...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

U_{Rdc} = 100 V; U_{Rac} = 63 V

C (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER			
			LOOSE IN BOX		AMMOPACK	
			l_t = 4.0 +1.0/–0.5 mm		H = 18.5 mm	
			C-tol = ±10%	C-tol = ±5%	C-tol = ±10%	C-tol = ±5%
			catalogue number(1)	last 5 digits(1)	last 5 digits(1)	
Pitch = 7.62 +0.30/–0.40 mm; d_t = 0.50 ±0.05 mm						
0.018	2.5 × 6.5 × 10.0	0.3	2222 371 21**183**	.. 22**183**	.. 68**183**	.. 69**183**
0.022			2222 371 21**223**	.. 22**223**	.. 68**223**	.. 69**223**
0.027			2222 371 21**273**	.. 22**273**	.. 68**273**	.. 69**273**
0.033			2222 371 21**333**	.. 22**333**	.. 68**333**	.. 69**333**
0.039			2222 371 21**393**	.. 22**393**	.. 68**393**	.. 69**393**
0.047			2222 371 21**473**	.. 22**473**	.. 68**473**	.. 69**473**
0.056	3.0 × 8.0 × 10.0	0.4	2222 371 21**563**	.. 22**563**	.. 68**563**	.. 69**563**
0.068			2222 371 21**683**	.. 22**683**	.. 68**683**	.. 69**683**
0.082			2222 371 21**823**	.. 22**823**	.. 68**823**	.. 69**823**
0.1			2222 371 21**104**	.. 22**104**	.. 68**104**	.. 69**104**
0.12	4.0 × 9.0 × 10.0	0.5	2222 371 21**124**	.. 22**124**	.. 68**124**	.. 69**124**
0.15			2222 371 21**154**	.. 22**154**	.. 68**154**	.. 69**154**
0.18			2222 371 21**184**	.. 22**184**	.. 68**184**	.. 69**184**
0.22			2222 371 21**224**	.. 22**224**	.. 68**224**	.. 69**224**
0.27	5.0 × 10.5 × 10.0	0.7	2222 371 21**274**	.. 22**274**	.. 68**274**	.. 69**274**
0.33			2222 371 21**334**	.. 22**334**	.. 68**334**	.. 69**334**
0.39			2222 371 21**394**	.. 22**394**	.. 68**394**	.. 69**394**
0.47			2222 371 21**474**	.. 22**474**	.. 68**474**	.. 69**474**

Note

1. The shading indicates preferred types.

Metallized polyester film capacitors MKT 371

MKT 371 GENERAL DATA PITCH 7.5 mm

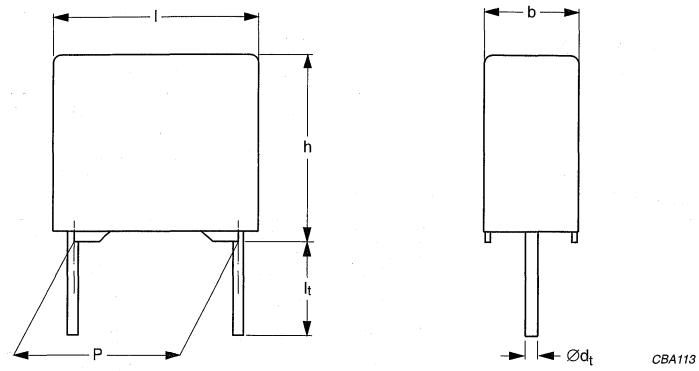


Fig.10 Outline.

Specific reference data for the 250 V DC capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 250 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 250 V (DC)	70 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	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 = 4.0 +1.0/−0.5 mm	±10%	2222 371 41...	preferred
		±5%	2222 371 42...	preferred
Ammopack	H = 18.5 mm; note 2	±10%	2222 371 78...	preferred
		±5%	2222 371 79...	preferred
Loose in box	l_t = 26.0 ±2.0 mm	±10%	2222 371 45...	on request
		±5%	2222 371 46...	on request
Taped on reel	H = 18.5 mm; note 2	±10%	2222 371 75...	on request
		±5%	2222 371 76...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

U_{Rdc} = 250 V; U_{Rac} = 160 V

C (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER			
			LOOSE IN BOX		AMMOPACK	
			l_t = 4.0 +1.0/–0.5 mm		H = 18.5 mm	
			C-tol = ±10%	C-tol = ±5%	C-tol = ±10%	C-tol = ±5%
			catalogue number(1)	last 5 digits(1)	last 5 digits(1)	
Pitch = 7.62 +0.30/–0.40 mm; d_t = 0.50 ±0.05 mm						
0.0082	2.5 × 6.5 × 10.0	0.3	2222 371 41**822**	.. 42**822**	.. 78**822**	.. 79**822**
0.01			2222 371 41**103**	.. 42**103**	.. 78**103**	.. 79**103**
0.012			2222 371 41**123**	.. 42**123**	.. 78**123**	.. 79**123**
0.015			2222 371 41**153**	.. 42**153**	.. 78**153**	.. 79**153**
0.018	3.0 × 8.0 × 10.0	0.4	2222 371 41**183**	.. 42**183**	.. 78**183**	.. 79**183**
0.022			2222 371 41**223**	.. 42**223**	.. 78**223**	.. 79**223**
0.027			2222 371 41**273**	.. 42**273**	.. 78**273**	.. 79**273**
0.033			2222 371 41**333**	.. 42**333**	.. 78**333**	.. 79**333**
0.039			2222 371 41**393**	.. 42**393**	.. 78**393**	.. 79**393**
0.047			2222 371 41**473**	.. 42**473**	.. 78**473**	.. 79**473**
0.056	4.0 × 9.0 × 10.0	0.5	2222 371 41**563**	.. 42**563**	.. 78**563**	.. 79**563**
0.068			2222 371 41**683**	.. 42**683**	.. 78**683**	.. 79**683**
0.082			2222 371 41**823**	.. 42**823**	.. 78**823**	.. 79**823**
0.1			2222 371 41**104**	.. 42**104**	.. 78**104**	.. 79**104**

Note

1. The shading indicates preferred types.

Metallized polyester film capacitors MKT 371

MKT 371 GENERAL DATA PITCH 7.5 mm

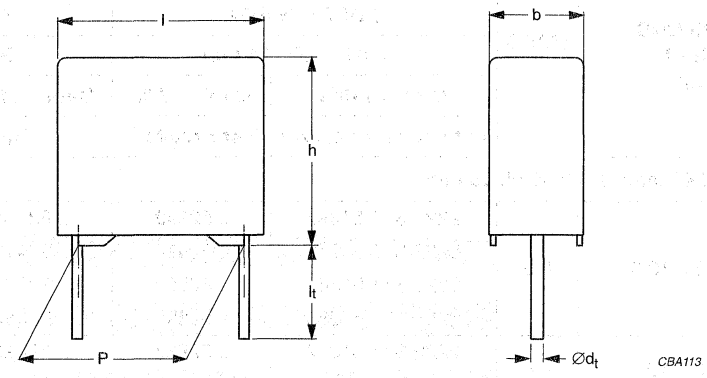


Fig.11 Outline.

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(1)	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; note 2	±10%	2222 371 88...	preferred
		±5%	2222 371 89...	preferred
Loose in box	l_t = 26.0 ±2.0 mm	±10%	2222 371 55...	on request
		±5%	2222 371 56...	on request
Taped on reel	H = 18.5 mm; note 2	±10%	2222 371 85...	on request
		±5%	2222 371 86...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

U_{Rdc} = 400 V; U_{Rac} = 220 V

C (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER			
			LOOSE IN BOX		AMMOPACK	
			l_t = 4.0 +1.0/–0.5 mm		H = 18.5 mm	
			C-tol = ±10%	C-tol = ±5%	C-tol = ±10%	C-tol = ±5%
			catalogue number(1)	last 5 digits(1)	last 5 digits(1)	
Pitch = 7.62 +0.30/–0.40 mm; d_t = 0.50 ±0.05 mm						
0.0039	2.5 × 6.5 × 10.0	0.3	2222 371 51**392**	.. 52**392**	.. 88**392**	.. 89**392**
0.0047			2222 371 51**472**	.. 52**472**	.. 88**472**	.. 89**472**
0.0056			2222 371 51**562**	.. 52**562**	.. 88**562**	.. 89**562**
0.0068			2222 371 51**682**	.. 52**682**	.. 88**682**	.. 89**682**
0.0082	3.0 × 8.0 × 10.0	0.4	2222 371 51**822**	.. 52**822**	.. 88**822**	.. 89**822**
0.01			2222 371 51**103**	.. 52**103**	.. 88**103**	.. 89**103**
0.012	4.0 × 9.0 × 10.0	0.5	2222 371 51**123**	.. 52**123**	.. 88**123**	.. 89**123**
0.015			2222 371 51**153**	.. 52**153**	.. 88**153**	.. 89**153**

Note

1. The shading indicates preferred types.

Metallized polyester film capacitors MKT 372

MKT 372 GENERAL DATA PITCH 10 mm

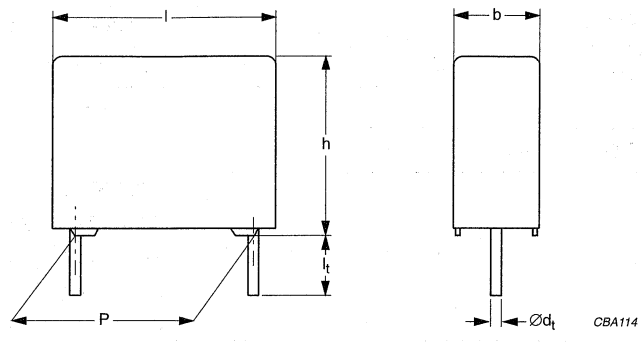


Fig.12 Outline.

Specific reference data for the 100 V DC capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle:			
$C \leq 0.1\ \mu F$	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 250 \times 10^{-4}$
$0.1\ \mu F < C \leq 0.47\ \mu F$	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 300 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 100 V (DC)	34 V/µs		
R between leads, for $C \leq 0.33\ \mu F$ at 100 V; 1 minute	>15000 MΩ		
RC between leads, for $C > 0.33\ \mu F$ 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(1)	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	l_t = 4.0 +1.0/–0.5 mm	±10%	2222 372 21...	preferred
		±5%	2222 372 22...	on request
Taped on reel	H = 18.5 mm; note 2	±10%	2222 372 25...	on request
		±5%	2222 372 26...	on request
Ammopack	H = 18.5 mm; note 2	±10%	2222 372 28...	on request
		±5%	2222 372 29...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

U_{Rdc} = 100V; U_{Rac} = 63 V

C (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER(1) LOOSE IN BOX l_t = 4.0 +1.0/–0.5 mm C-tol = ±10%
Pitch = 10.0 ±0.4 mm; d_t = 0.60 ±0.06 mm			
0.1	4.0 × 9.0 × 12.5	0.6	2222 372 21**104**
0.12			2222 372 21**124**
0.15			2222 372 21**154**
0.18			2222 372 21**184**
0.22			2222 372 21**224**
0.27	4.0 × 10.0 × 12.5	0.7	2222 372 21**274**
0.33			2222 372 21**334**
0.39	5.0 × 11.0 × 12.5	0.9	2222 372 21**394**
0.47			2222 372 21**474**

Note

1. The shading indicates preferred types.

Metallized polyester film capacitors MKT 372

MKT 372 GENERAL DATA PITCH 10 mm

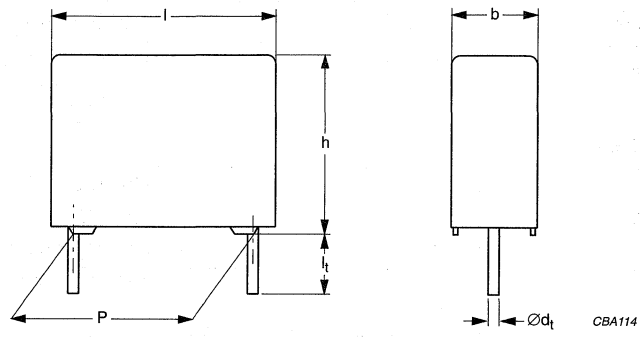


Fig.13 Outline.

Specific reference data for the 250 V DC capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle:			
$C \leq 0.1\ \mu F$	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 250 \times 10^{-4}$
$0.1\ \mu F < C \leq 0.47\ \mu F$	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 300 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 250 V (DC)	50 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	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 = 4.0 +1.0/–0.5 mm	±10%	2222 372 41...	preferred
		±5%	2222 372 42...	on request
Taped on reel	H = 18.5 mm; note 2	±10%	2222 372 45...	on request
		±5%	2222 372 46...	on request
Ammopack	H = 18.5 mm; note 2	±10%	2222 372 48...	on request
		±5%	2222 372 49...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

U_{Rdc} = 250 V; U_{Rac} = 160 V

C (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER(1) LOOSE IN BOX l_t = 4.0 +1.0/–0.5 mm C-tol = ±10%
Pitch = 10.0 ±0.4 mm; d_t = 0.60 ±0.06 mm			
0.047	4.0 × 9.0 × 12.5	0.6	2222 372 41**473**
0.056			2222 372 41**563**
0.068			2222 372 41**683**
0.082	4.0 × 10.0 × 12.5	0.7	2222 372 41**823**
0.1			2222 372 41**104**
0.12	5.0 × 11.0 × 12.5	0.9	2222 372 41**124**
0.15			2222 372 41**154**

Note

1. The shading indicates preferred types.

MKT 372 GENERAL DATA **PITCH 10 mm**

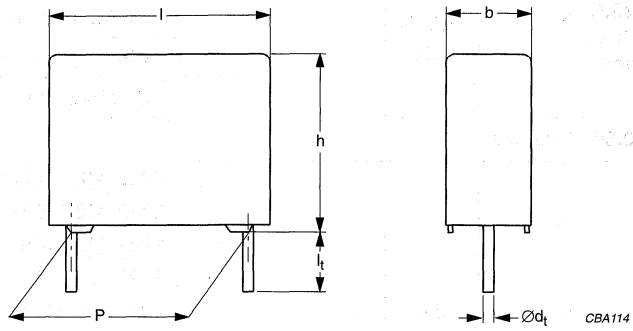


Fig.14 Outline.

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/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(1)	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	l_t = 4.0 +1.0/–0.5 mm	±10%	2222 372 51...	preferred
		±5%	2222 372 52...	on request
Taped on reel	H = 18.5 mm; note 2	±10%	2222 372 55...	on request
		±5%	2222 372 56...	on request
Ammopack	H = 18.5 mm; note 2	±10%	2222 372 58...	on request
		±5%	2222 372 59...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

U_{Rdc} = 400 V; U_{Rac} = 220 V

C (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER(1) LOOSE IN BOX l_t = 4.0 +1.0/–0.5 mm C-tol = ±10%
Pitch = 10.0 ±0.4 mm; d_t = 0.60 ±0.06 mm			
0.0047	4.0 × 9.0 × 12.5	0.6	2222 372 51**472**
0.0056			2222 372 51**562**
0.0068			2222 372 51**682**
0.0082			2222 372 51**822**
0.01			2222 372 51**103**
0.012			2222 372 51**123**
0.015			2222 372 51**153**
0.018			2222 372 51**183**
0.022			2222 372 51**223**
0.027	4.0 × 10.0 × 12.5	0.7	2222 372 51**273**
0.033			2222 372 51**333**
0.039	5.0 × 11.0 × 12.5	0.9	2222 372 51**393**
0.047			2222 372 51**473**

Note

1. The shading indicates preferred types.

Metallized polyester film capacitors MKT 373

MKT 373 GENERAL DATA

PITCH 15/22.5/27.5 mm (NEW)

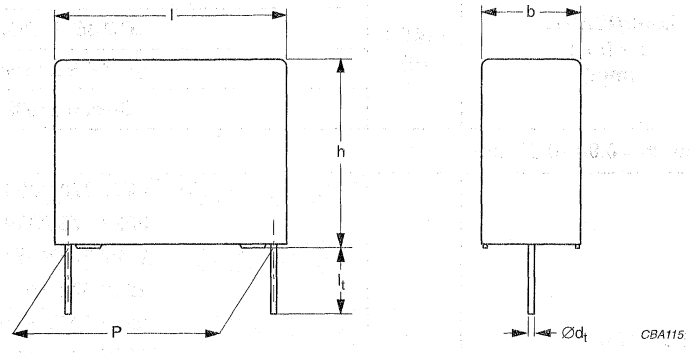


Fig.15 Outline.

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 ≤ 0.47 µF	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 300 \times 10^{-4}$
0.47 µF < C ≤ 1.0 µF	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	–
1.0 µF < C ≤ 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 ≤ 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[1]	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	l_t – 5.0 ±1.0 mm	±10%	2222 373 23...	preferred
		±5%	2222 373 24...	on request
Taped on reel	H = 18.5 mm; note 2	±10%	2222 373 27...	on request
		±5%	2222 373 28...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*; taped on reel pitch = 27.5 mm is not available.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

U_{Rdc} = 100 V; U_{Rac} = 63 V **(NEW)**

C (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER(1) LOOSE IN BOX l_t = 5.0 ±1.0 mm C-tol = ±10%
Pitch = 15.0 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.33	5.0 × 11.0 × 17.5	1.1	2222 373 23**334**
0.39			2222 373 23**394**
0.47			2222 373 23**474**
0.56			2222 373 23**564**
0.68			2222 373 23**684**
0.82			2222 373 23**824**
1			2222 373 23**105**
1.2			2222 373 23**125**
1.5			2222 373 23**155**
1.8			2222 373 23**185**
2.2	6.0 × 12.0 × 17.5	1.4	2222 373 23**225**
2.7	7.0 × 13.5 × 17.5	1.9	2222 373 23**275**
3.3			2222 373 23**335**
3.9	8.5 × 15.0 × 17.5	2.6	2222 373 23**395**
4.7			2222 373 23**475**
5.6	10.0 × 16.5 × 17.5	3.1	2222 373 23**565**
6.8			2222 373 23**685**
Pitch = 22.5 ±0.4 mm; d_t = 0.80 ±0.08 mm			
8.2	8.5 × 18.0 × 26.0	4.4	2222 373 23**825**
10			2222 373 23**106**
12	10.0 × 19.5 × 26.0	5.5	2222 373 23**126**
Pitch = 27.5 ±0.4 mm; d_t = 0.80 ±0.08 mm			
15	11.0 × 21.0 × 31.0	7.8	2222 373 23**156**

Note

1. The shading indicates preferred types.

Metallized polyester film capacitors MKT 373

MKT 373 GENERAL DATA **PITCH 15/22.5/27.5 mm (NEW)**

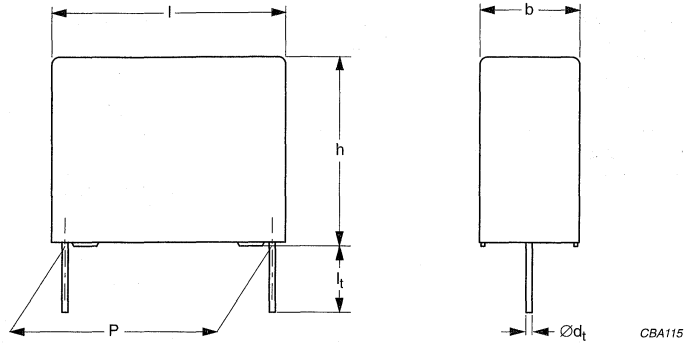


Fig.16 Outline.

Specific reference data for the 250 V DC capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle:			
0.15 µF < C ≤ 0.47 µF	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 300 \times 10^{-4}$
0.47 µF < C ≤ 1.0 µF	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	–
1.0 µF < C ≤ 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 ≤ 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 interconnected leads and case (foil method)	>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(1)	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	l_t = 5.0 ± 1.0 mm	±10%	2222 373 43...	preferred
		±5%	2222 373 44...	on request
Taped on reel	H = 18.5 mm; note 2	±10%	2222 373 47...	on request
		±5%	2222 373 48...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*; taped on reel pitch = 27.5 mm is not available.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

U_{Rdc} = 250 V; U_{Rac} = 160 V **(NEW)**

C (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER[1] LOOSE IN BOX l_t = 5.0 ±1.0 mm C-tol = ±10%
Pitch = 15.0 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.15	5.0 × 11.0 × 17.5	1.1	2222 373 43**154**
0.18			2222 373 43**184**
0.22			2222 373 43**224**
0.27			2222 373 43**274**
0.33			2222 373 43**334**
0.39	6.0 × 12.0 × 17.5	1.4	2222 373 43**394**
0.47			2222 373 43**474**
0.56	7.0 × 13.5 × 17.5	1.9	2222 373 43**564**
0.68			2222 373 43**684**
0.82	8.5 × 15.0 × 17.5	2.6	2222 373 43**824**
1.0			2222 373 43**105**
1.2	10.0 × 16.5 × 17.5	3.1	2222 373 43**125**
Pitch = 22.5 ±0.4 mm; d_t = 0.80 ±0.08 mm			
1.5	8.5 × 18.0 × 26.0	4.4	2222 373 43**155**
1.8			2222 373 43**185**
2.2	10.0 × 19.5 × 26.0	5.5	2222 373 43**225**
2.7			2222 373 43**275**
Pitch = 27.5 ±0.4 mm; d_t = 0.80 ±0.08 mm			
3.3	11.0 × 21.0 × 31.0	7.8	2222 373 43**335**
3.9	13.0 × 23.0 × 31.0	10.4	2222 373 43**395**
4.7			2222 373 43**475**

Note

1. The shading indicates preferred types.

Metallized polyester film capacitors MKT 373

MKT 373 GENERAL DATA **PITCH 15/22.5/27.5 mm (NEW)**

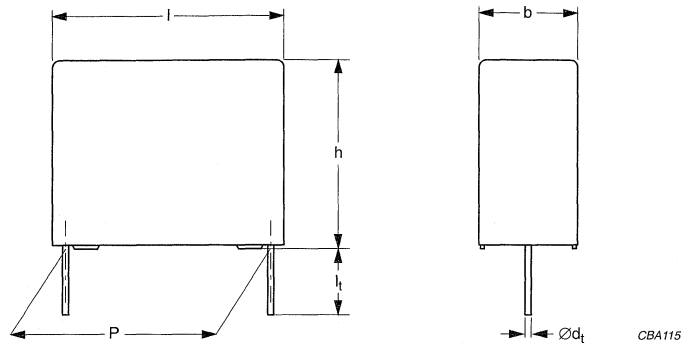


Fig.17 Outline.

Specific reference data for the 400 V DC capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle:			
$C \leq 0.1\ \mu F$	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 250 \times 10^{-4}$
$0.1\ \mu F < C \leq 0.47\ \mu F$	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 300 \times 10^{-4}$
$0.47\ \mu F < C \leq 1.0\ \mu F$	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	–
$1.0\ \mu F < C \leq 1.5\ \mu F$	$\leq 75 \times 10^{-4}$	$\leq 150 \times 10^{-4}$	–
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 $C \leq 0.33\ \mu F$ at 100 V; 1 minute	>30000 MΩ		
RC between leads, for $C > 0.33\ \mu F$ 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	$l_t = 5.0 \pm 1.0$ mm	±10%	2222 373 53...	preferred
		±5%	2222 373 54...	on request
Taped on reel	H = 18.5 mm; note 2	±10%	2222 373 57...	on request
		±5%	2222 373 58...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*; taped on reel pitch = 27.5 mm is not available.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

U_{Rdc} = 400 V; U_{Rac} = 220 V **(NEW)**

C (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER[1] LOOSE IN BOX l_t = 5.0 ±1.0 mm C-tol = ±10%
Pitch = 15.0 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.047	5.0 × 11.0 × 17.5	1.1	2222 373 53**473**
0.056			2222 373 53**563**
0.068			2222 373 53**683**
0.082			2222 373 53**823**
0.1			2222 373 53**104**
0.12			2222 373 53**124**
0.15			2222 373 53**154**
0.18	6.0 × 12.0 × 17.5	1.4	2222 373 53**184**
0.22			2222 373 53**224**
0.27	7.0 × 13.5 × 17.5	1.9	2222 373 53**274**
0.33			2222 373 53**334**
0.39	8.5 × 15.0 × 17.5	2.6	2222 373 53**394**
0.47			2222 373 53**474**
0.56	10.0 × 16.5 × 17.5	3.2	2222 373 53**564**
Pitch = 22.5 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.68	8.5 × 18.0 × 26.0	4.4	2222 373 53**684**
0.82			2222 373 53**824**
1	10.0 × 19.5 × 26.0	5.5	2222 373 53**105**
1.2			2222 373 53**125**
Pitch = 27.5 ±0.4 mm; d_t = 0.80 ±0.08 mm			
1.5	11.0 × 21.0 × 31.0	7.8	2222 373 53**155**

Note

1. The shading indicates preferred types.

MKT 373 GENERAL DATA **PITCH 15/22.5/27.5 mm (MAINTENANCE)**

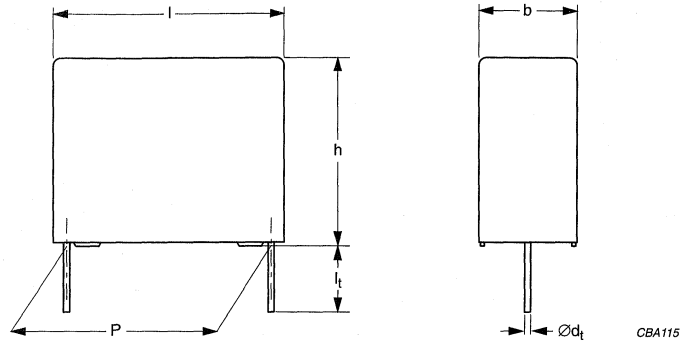


Fig.18 Outline.

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 ≤ 0.47 µF	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 300 \times 10^{-4}$
0.47 µF < C ≤ 1.0 µF	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	–
1.0 µF < C ≤ 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 ≤ 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(1)	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	l_t = 5.0 ± 1.0 mm	±10%	2222 373 21...	on request
		±5%	2222 373 22...	on request
Taped on reel	H = 18.5 mm; note 2	±10%	2222 373 25...	on request
		±5%	2222 373 26...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*; taped on reel pitch = 27.5 mm is not available.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

Metallized polyester film capacitors MKT 373

U_{Rdc} = 100 V; U_{Rac} = 63 V **(MAINTENANCE)**

C (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER LOOSE IN BOX l_t = 5.0 ±1.0 mm C-tol = ±10%
Pitch = 15.0 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.33	5.0 × 11.0 × 17.5	1.1	2222 373 21**334**
0.39			2222 373 21**394**
0.47			2222 373 21**474**
0.56			2222 373 21**564**
0.68			2222 373 21**684**
0.82	6.0 × 12.0 × 17.5	1.4	2222 373 21**824**
1			2222 373 21**105**
1.2	7.0 × 13.5 × 17.5	1.9	2222 373 21**125**
1.5			2222 373 21**155**
1.8	8.5 × 15.0 × 17.5	2.6	2222 373 21**185**
2.2			2222 373 21**225**
Pitch = 22.5 ±0.4 mm; d_t = 0.80 ±0.08 mm			
2.7	8.5 × 18.0 × 26.0	4.4	2222 373 21**275**
3.3			2222 373 21**335**
3.9	10.0 × 19.5 × 26.0	5.5	2222 373 21**395**
4.7			2222 373 21**475**
Pitch = 27.5 ±0.4 mm; d_t = 0.80 ±0.08 mm			
5.6	11.0 × 21.0 × 31.0	8.0	2222 373 21**565**
6.8			2222 373 21**685**
8.2	13.0 × 23.0 × 31.0	10.5	2222 373 21**825**
10			2222 373 21**106**
12	18.0 × 28.0 × 31.0	17.5	2222 373 21**126**
15			2222 373 21**156**

Available on request

C (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER			
			loose in box; l_t = 5.0 ± 1.0 mm[1]		taped on reel; H = 18.5 mm[1][2]	
			C-tol = ±10%	C-tol = ±5%	C-tol = ±10%	C-tol = ±5%
			catalogue number	last 5 digits	last 5 digits	
Pitch = 22.5 ±0.4 mm; d_t = 0.80 ±0.08 mm						
1.5	6.0 × 15.5 × 26.0	2.5	2222 373 90**012**	.. 90**013**	.. 90**018**	.. 90**019**
1.8	7.0 × 16.5 × 26.0	3.2	2222 373 90**022**	.. 90**023**	.. 90**028**	.. 90**029**
2.2			2222 373 90**002**	.. 90**003**	.. 90**008**	.. 90**009**
Pitch = 27.5 ±0.4 mm; d_t = 0.80 ±0.08 mm						
4.7	9.0 × 19.0 × 31.0	5.8	2222 373 90**032**	.. 90**033**	not available	

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*; taped on reel pitch = 27.5 mm is not available.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

Metallized polyester film capacitors MKT 373

MKT 373 GENERAL DATA **PITCH 15/22.5/27.5 mm (MAINTENANCE)**

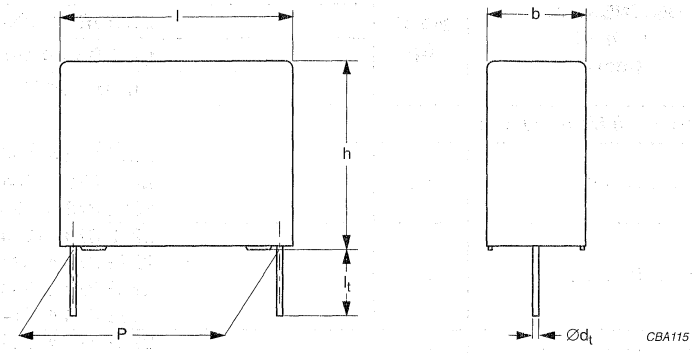


Fig.19 Outline.

Specific reference data for the 250 V DC capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle:			
0.15 µF < C ≤ 0.47 µF	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 300 \times 10^{-4}$
0.47 µF < C ≤ 1.0 µF	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	–
1.0 µF < C ≤ 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 ≤ 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 interconnected leads and case (foil method)	>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(1)	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	l_t = 5.0 ± 1.0 mm	±10%	2222 373 41...	on request
		±5%	2222 373 42...	on request
Taped on reel	H = 18.5 mm; note 2	±10%	2222 373 45...	on request
		±5%	2222 373 46...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*; taped on reel pitch = 27.5 mm is not available.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

U_{Rdc} = 250 V; U_{Rac} = 160 V (MAINTENANCE)

C (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER LOOSE IN BOX l_t = 5.0 ±1.0 mm C-tol = ±10%
Pitch = 15.0 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.15 0.18 0.22	5.0 × 11.0 × 17.5	1.1	2222 373 41**154** 2222 373 41**184** 2222 373 41**224**
0.27 0.33 0.39 0.47	6.0 × 12.0 × 17.5	1.4	2222 373 41**274** 2222 373 41**334** 2222 373 41**394** 2222 373 41**474**
0.56 0.68	7.0 × 13.5 × 17.5	1.9	2222 373 41**564** 2222 373 41**684**
0.82 1.0	8.5 × 15.0 × 17.5	2.6	2222 373 41**824** 2222 373 41**105**
Pitch = 22.5 ±0.4 mm; d_t = 0.80 ±0.08 mm			
1.2 1.5	8.5 × 18.0 × 26.0	4.4	2222 373 41**125** 2222 373 41**155**
1.8 2.2	10.0 × 19.5 × 26.0	5.5	2222 373 41**185** 2222 373 41**225**
Pitch = 27.5 ±0.4 mm; d_t = 0.80 ±0.08 mm			
2.7 3.3	13.0 × 23.0 × 31.0	10.4	2222 373 41**275** 2222 373 41**335**
3.9 4.7	15.0 × 25.0 × 31.0	12.5	2222 373 41**395** 2222 373 41**475**

Available on request

C (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER			
			loose in box; l_t = 5.0 ±1.0 mm(1)		taped on reel; H = 18.5 mm(1)(2)	
			C-tol = ±10%	C-tol = ±5%	C-tol = ±10%	C-tol = ±5%
			catalogue number	last 5 digits	last 5 digits	
Pitch = 22.5 ±0.4 mm; d_t = 0.80 ±0.08 mm						
0.47 0.56 0.68	6.0 × 15.5 × 26.0	2.5	2222 373 90**042** 2222 373 90**052** 2222 373 90**062**	.. 90**043** .. 90**053** .. 90**063**	.. 90**048** .. 90**058** .. 90**068**	.. 90**049** .. 90**059** .. 90**069**
0.82 1	7.0 × 16.5 × 26.0	3.2	2222 373 90**072** 2222 373 90**082**	.. 90**073** .. 90**083**	.. 90**078** .. 90**088**	.. 90**079** .. 90**089**
Pitch = 27.5 ±0.4 mm; d_t = 0.80 ±0.08 mm						
1.2 1.5	9.0 × 19.0 × 31.0	5.8	2222 373 90**172** 2222 373 90**092**	.. 90**173** .. 90**093**	not available	
1.8 2.2	11.0 × 21.0 × 31.0	7.8	2222 373 90**102** 2222 373 90**112**	.. 90**103** .. 90**113**		

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*; taped on reel pitch = 27.5 mm is not available.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

Metallized polyester film capacitors MKT 373

MKT 373 GENERAL DATA **PITCH 15/22.5/27.5 mm (MAINTENANCE)**

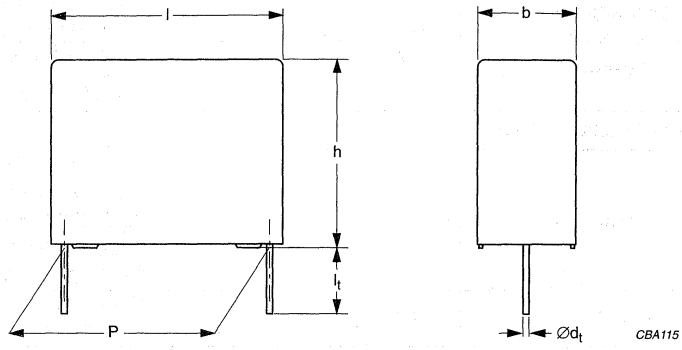


Fig.20 Outline.

Specific reference data for the 400 V DC capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle:			
$C \leq 0.1\ \mu F$	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 250 \times 10^{-4}$
$0.1\ \mu F < C \leq 0.47\ \mu F$	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 300 \times 10^{-4}$
$0.47\ \mu F < C \leq 1.0\ \mu F$	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	–
$1.0\ \mu F < C \leq 1.5\ \mu F$	$\leq 75 \times 10^{-4}$	$\leq 150 \times 10^{-4}$	–
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 $C \leq 0.33\ \mu F$ at 100 V; 1 minute	>30000 MΩ		
RC between leads, for $C > 0.33\ \mu F$ 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	$l_t = 5.0 \pm 1.0$ mm	±10%	2222 373 51...	on request
		±5%	2222 373 52...	on request
Taped on reel	H = 18.5 mm; note 2	±10%	2222 373 55...	on request
		±5%	2222 373 56...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*; taped on reel pitch = 27.5 mm is not available.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

Metallized polyester film capacitors MKT 373

U_{Rdc} = 400 V; U_{Rac} = 220 V **(MAINTENANCE)**

C (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER LOOSE IN BOX l_t = 5.0 ±1.0 mm C-tol = ±10%
Pitch = 15.0 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.047	5.0 × 11.0 × 17.5	1.1	2222 373 51**473**
0.056			2222 373 51**563**
0.068			2222 373 51**683**
0.082			2222 373 51**823**
0.1			2222 373 51**104**
0.12	6.0 × 12.0 × 17.5	1.4	2222 373 51**124**
0.15			2222 373 51**154**
0.18	7.0 × 13.5 × 17.5	1.9	2222 373 51**184**
0.22			2222 373 51**224**
0.27	8.5 × 15.0 × 17.5	2.6	2222 373 51**274**
0.33			2222 373 51**334**
Pitch = 22.5 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.39	8.5 × 18.0 × 26.0	4.4	2222 373 51**394**
0.47			2222 373 51**474**
0.56	10.0 × 19.5 × 26.0	4.4	2222 373 51**564**
0.68		5.5	2222 373 51**684**
Pitch = 27.5 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.82	11.0 × 21.0 × 31.0	7.8	2222 373 51**824**
1			2222 373 51**105**
1.2	15.0 × 25.0 × 31.0	12.8	2222 373 51**125**
1.5			2222 373 51**155**

Available on request

C (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER			
			loose in box; l_t = 5.0 ±1.0 mm(1)		taped on reel; = 18.5 mm(1)(2)	
			C-tol = ±10%	C-tol = ±5%	C-tol = ±10%	C-tol = ±5%
			catalogue number	last 5 digits	last 5 digits	
Pitch = 22.5 ±0.4 mm; d_t = 0.80 ±0.08 mm						
0.22	6.0 × 15.5 × 26.0	2.5	2222 373 90**122**	.. 90**123**	.. 90**128**	.. 90**129**
0.27	7.0 × 16.5 × 26.0	3.2	2222 373 90**132**	.. 90**133**	.. 90**138**	.. 90**139**
0.33			2222 373 90**142**	.. 90**143**	.. 90**148**	.. 90**149**
Pitch = 27.5 ±0.4 mm; d_t = 0.80 ±0.08 mm						
0.68	9.0 × 19.0 × 31.0	5.8	2222 373 90**152**	.. 90**153**	not available	

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*; taped on reel pitch = 27.5 mm is not available.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

CONSTRUCTION

Description

- Low-inductive wound cell of metallized polyethylene terephthalate (PETP) film, potted with epoxy resin in a blue flame-retardant case
- Radial leads, solder-coated:
  - Copper clad steel wire (d_t = 0.5 or 0.6 mm)
  - Copper wire (d_t = 0.8 mm)
- Small stand-off pips allow removal of solder flux etc. during cleaning of the printed-circuit board.

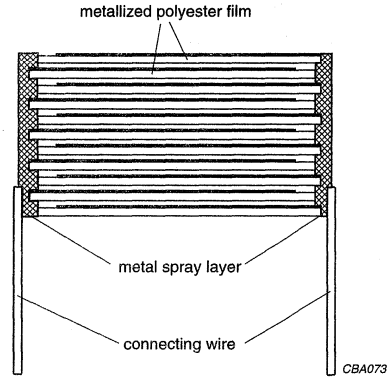


Fig.21 Construction.

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.22:

- Eccentricity see Fig.22. 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.

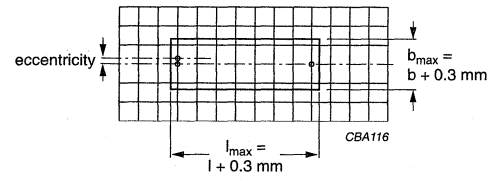


Fig.22 Lay-out..

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 ±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%.

CHARACTERISTICS

Capacitance

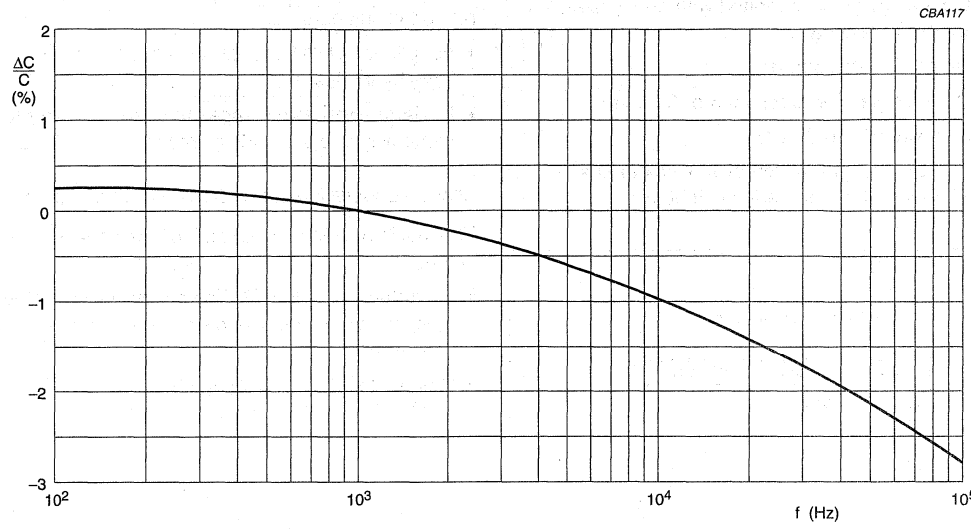


Fig.23 Capacitance change as a function of frequency; typical curve.

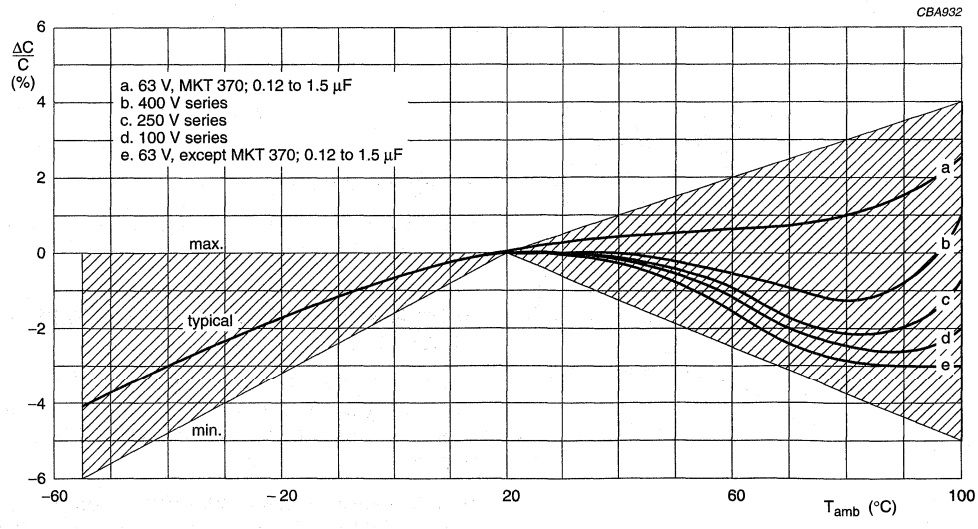


Fig.24 Capacitance change at 1 Kz as a function of ambient free air temperature.

Impedance

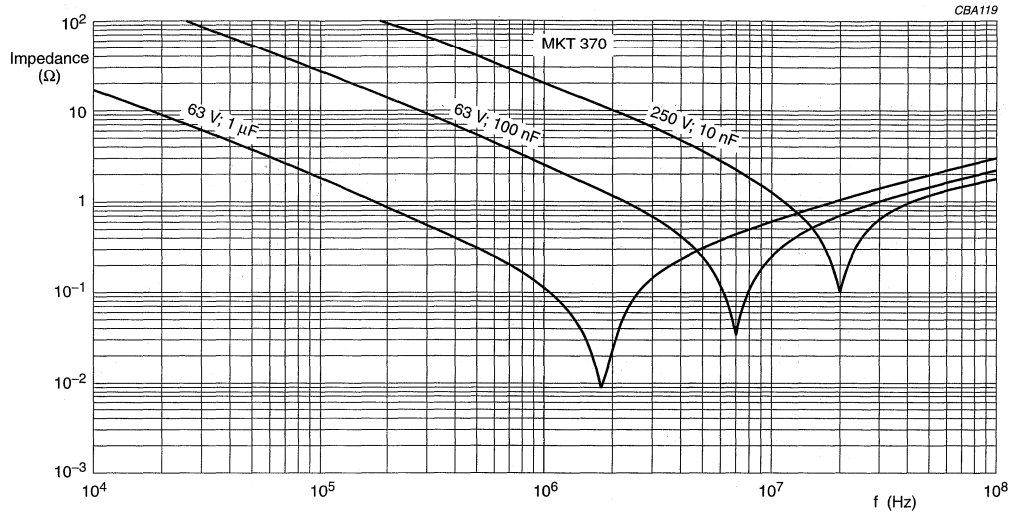


Fig.25 Impedance as a function of frequency; typical curves.

Maximum DC and AC voltage as a function of temperature

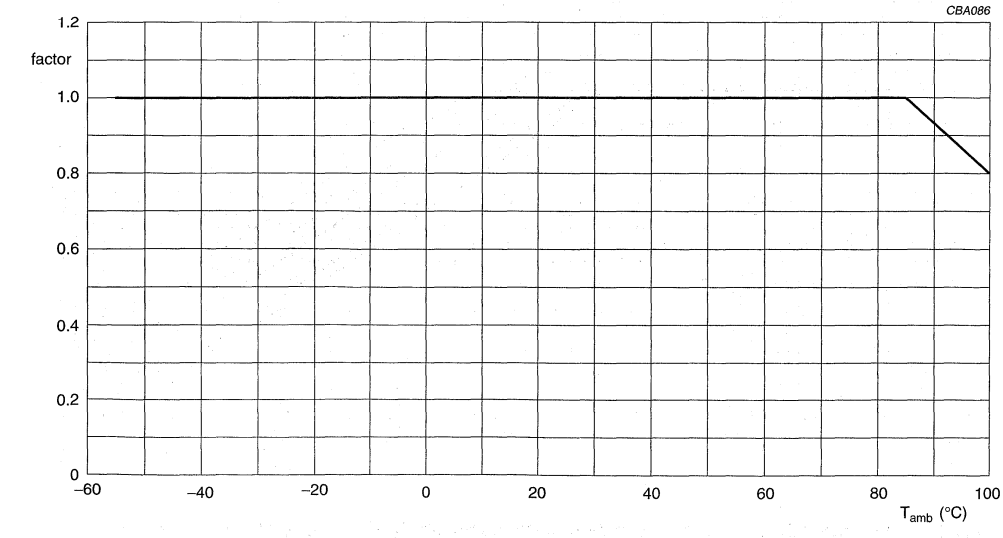


Fig.26 Multiplying factor for DC and AC voltage as a function of temperature.

Maximum RMS voltage (sinewave) as a function of frequency

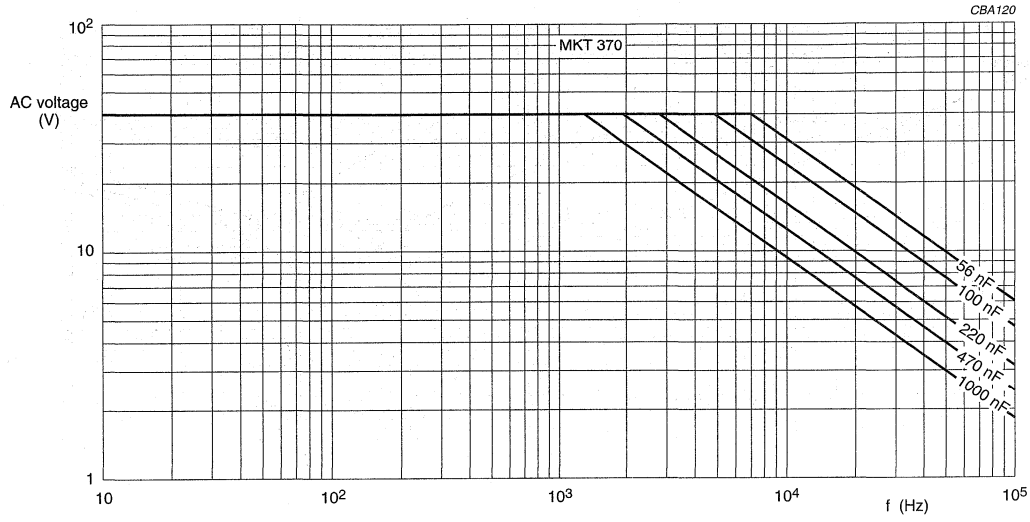


Fig.27 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C for $U_{Rdc} = 63$ V.

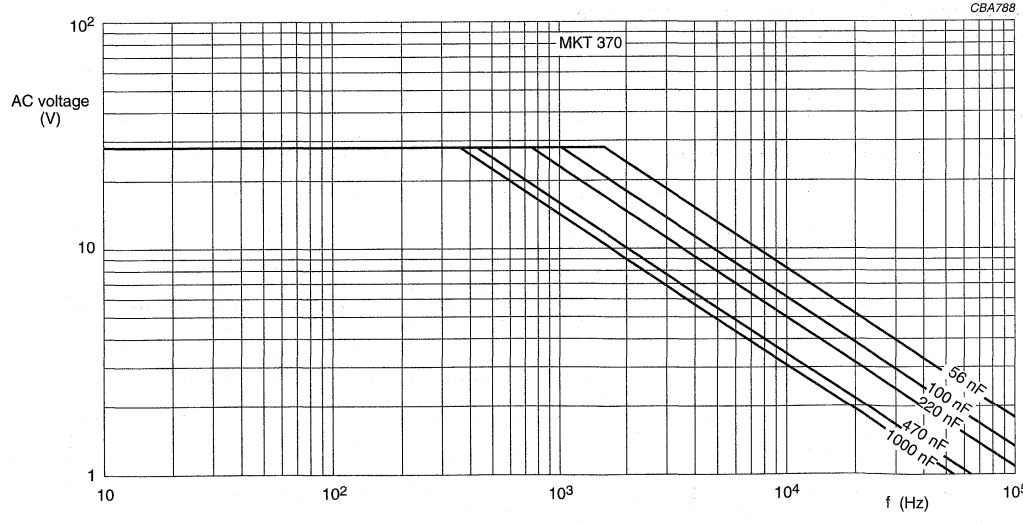


Fig.28 AC voltage (RMS value) as a function of frequency at 85 °C < $T_{amb} \leq 100$ °C for $U_{Rdc} = 63$ V.

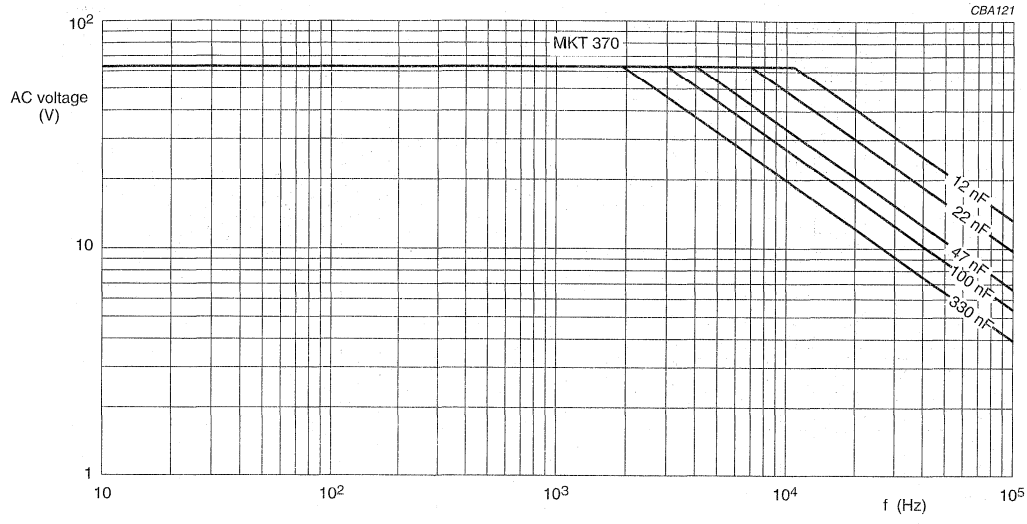


Fig.29 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C for $U_{Rdc} = 100$ V.

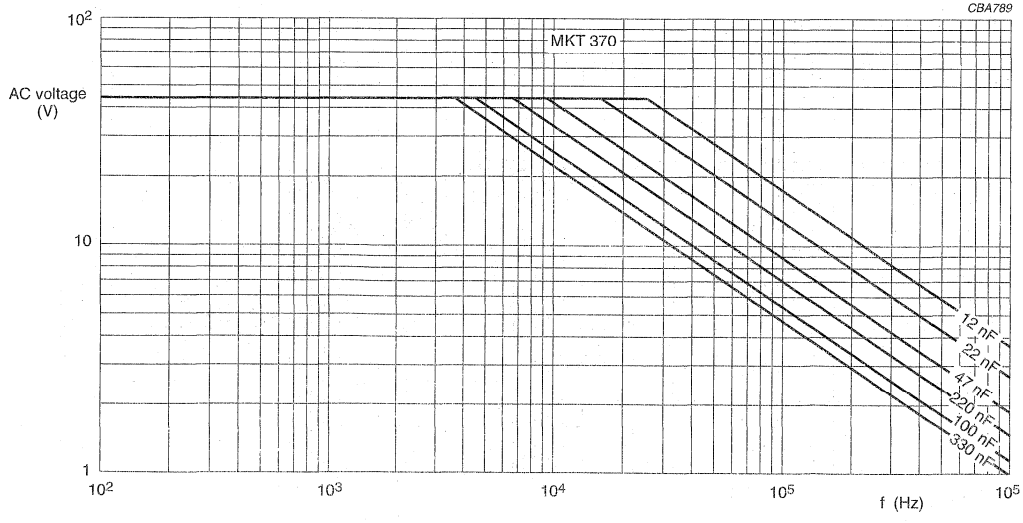


Fig.30 AC voltage (RMS value) as a function of frequency at 85 °C < $T_{amb} \leq 100$ °C for $U_{Rdc} = 100$ V.

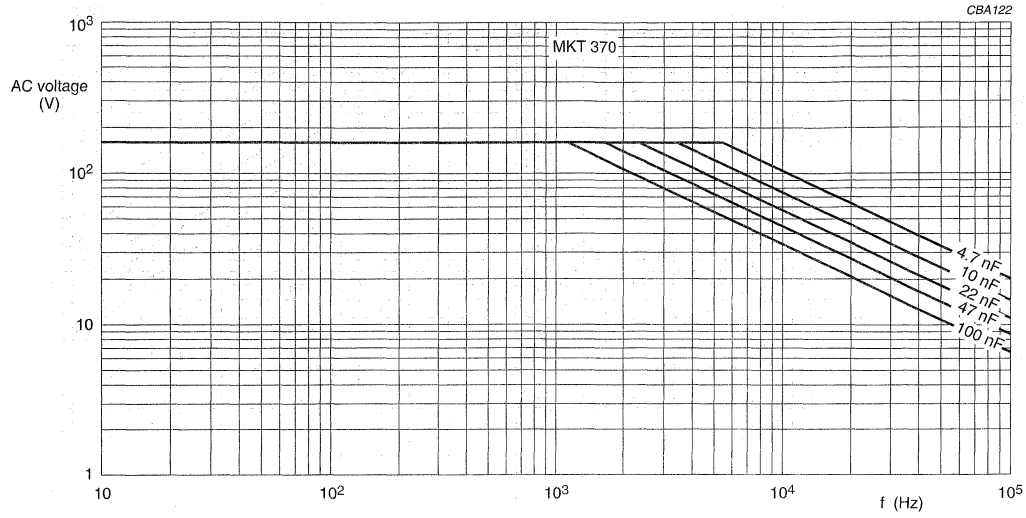


Fig.31 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C for $U_{Rdc} = 250$ V.

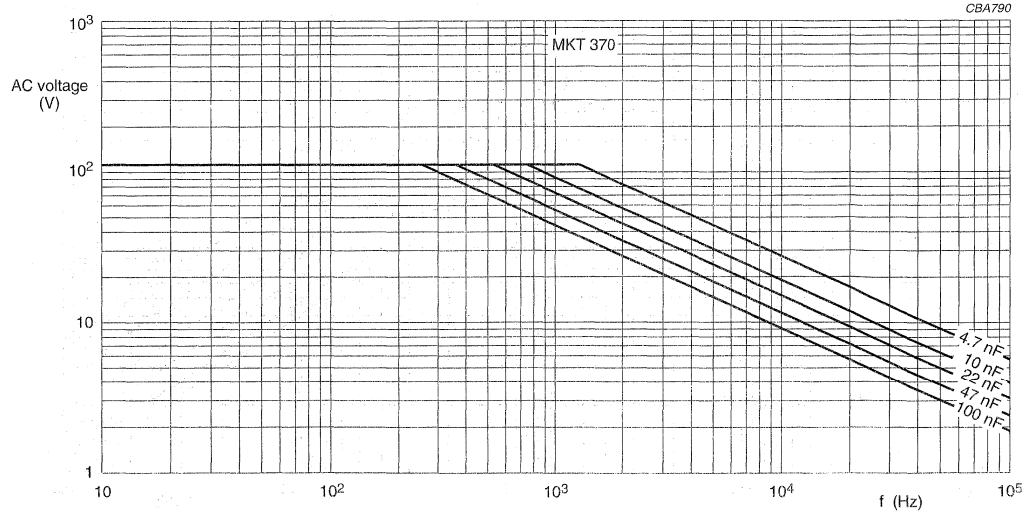


Fig.32 AC voltage (RMS value) as a function of frequency at 85 °C < $T_{amb} \leq 100$ °C for $U_{Rdc} = 250$ V.

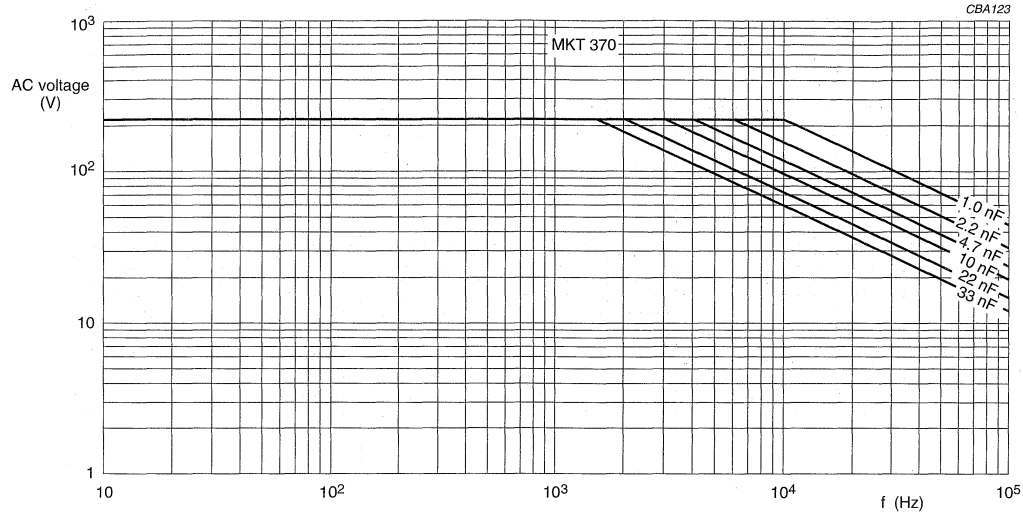


Fig.33 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C for $U_{Rdc} = 400$ V.

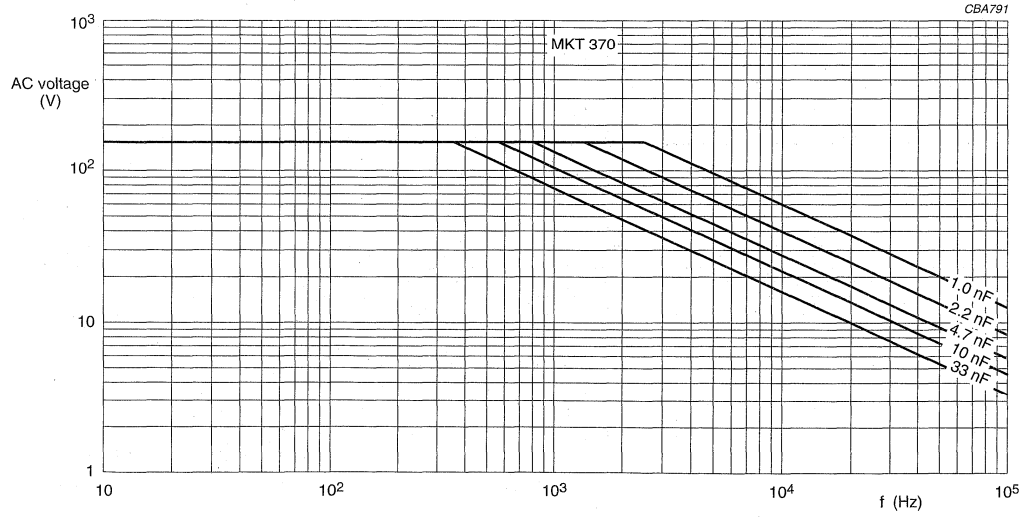


Fig.34 AC voltage (RMS value) as a function of frequency at 85 °C < $T_{amb} \leq 100$ °C for $U_{Rdc} = 400$ V.

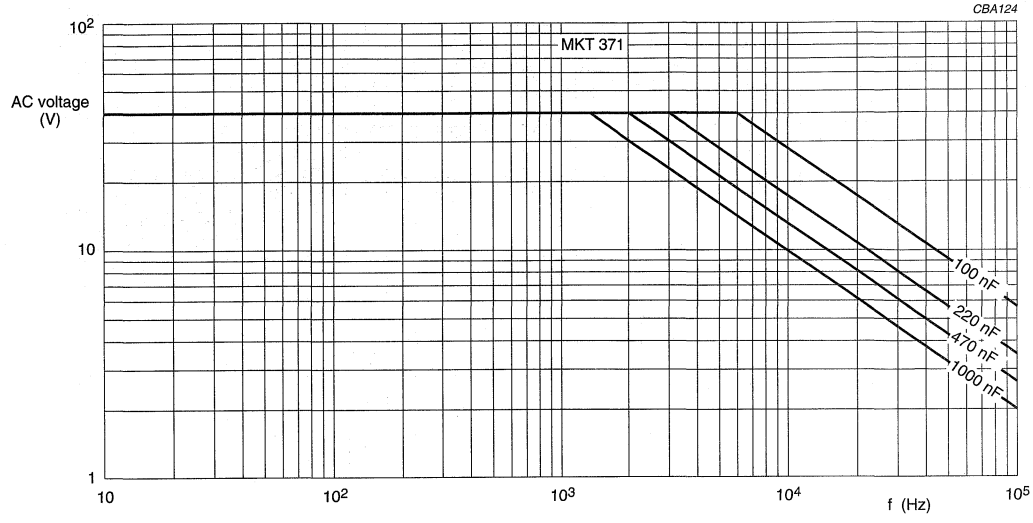


Fig.35 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C for $U_{Rdc} = 63$ V.

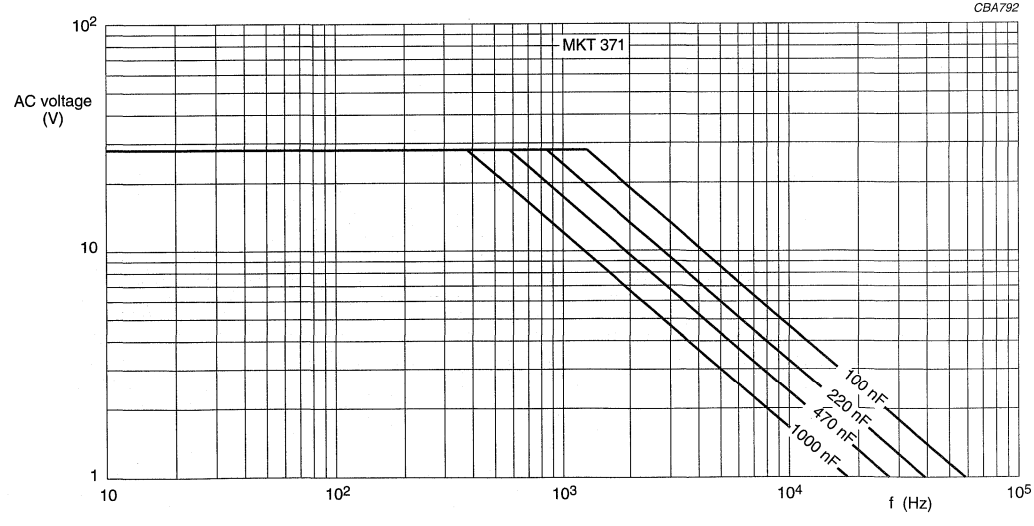


Fig.36 AC voltage (RMS value) as a function of frequency at 85 °C < $T_{amb} \leq 100$ °C for $U_{Rdc} = 63$ V.

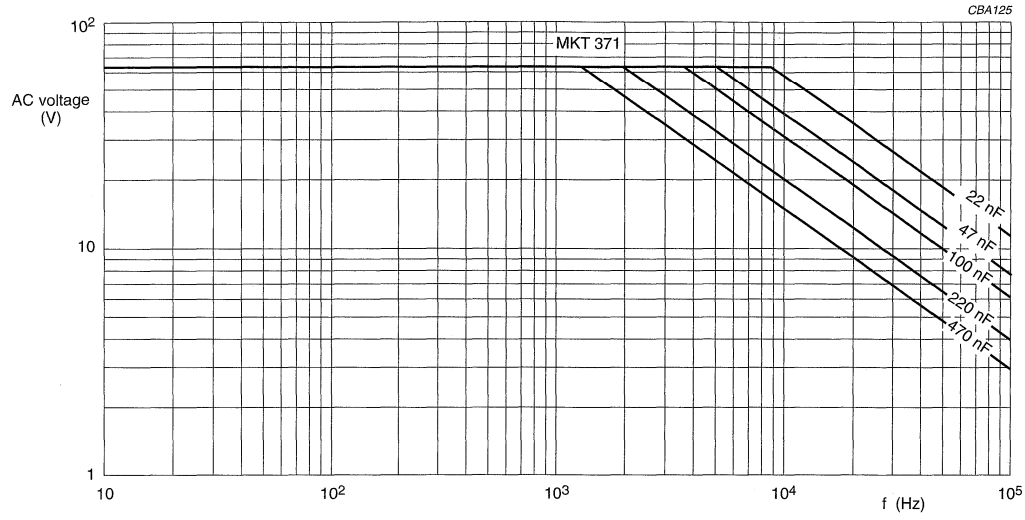


Fig.37 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C for $U_{Rdc} = 100$ V.

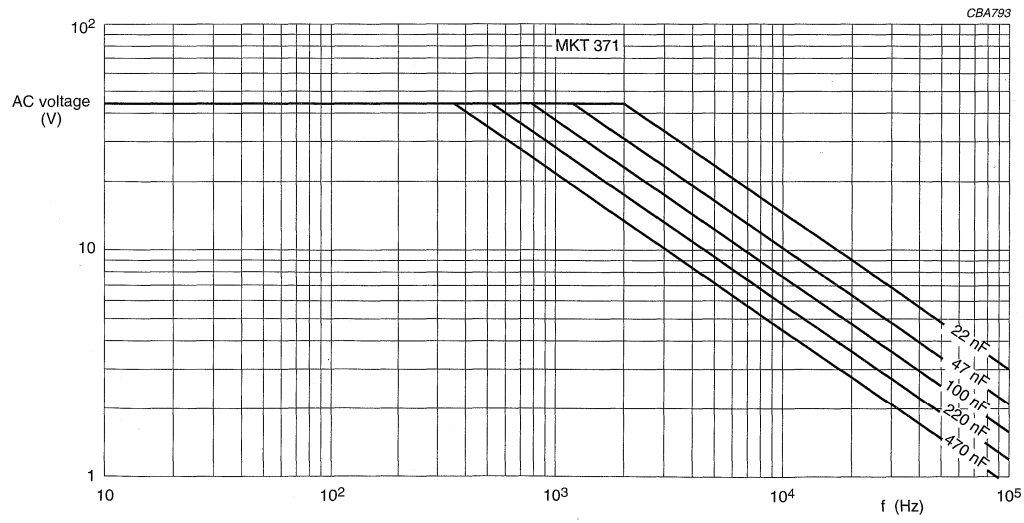


Fig.38 AC voltage (RMS value) as a function of frequency at 85 °C < $T_{amb} \leq 100$ °C for $U_{Rdc} = 100$ V.

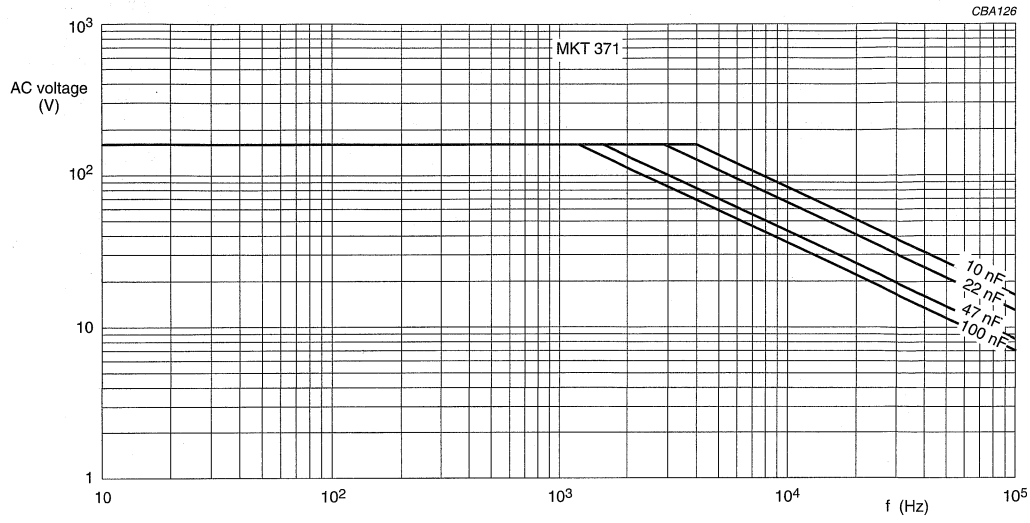


Fig.39 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C for $U_{Rdc} = 250$ V.

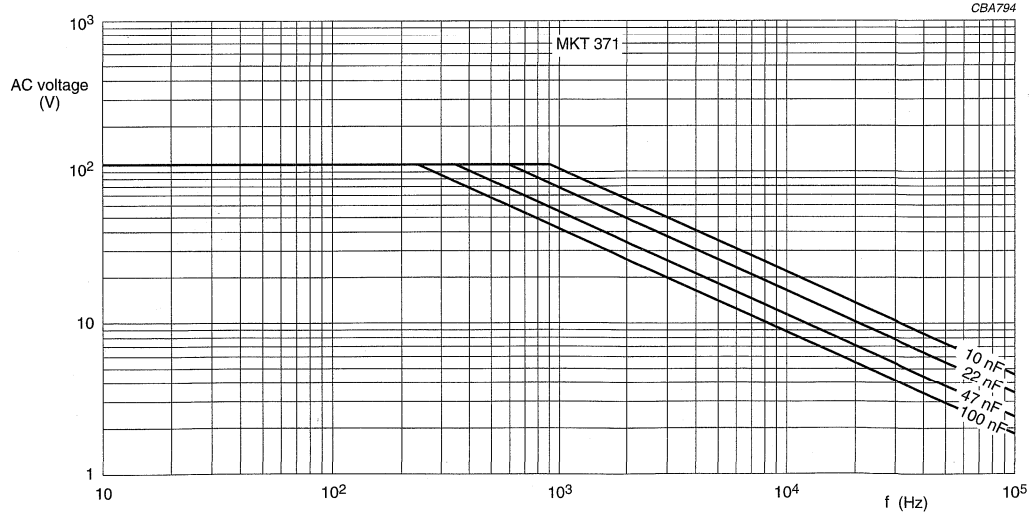


Fig.40 AC voltage (RMS value) as a function of frequency at 85 °C < $T_{amb} \leq 100$ °C for $U_{Rdc} = 250$ V.

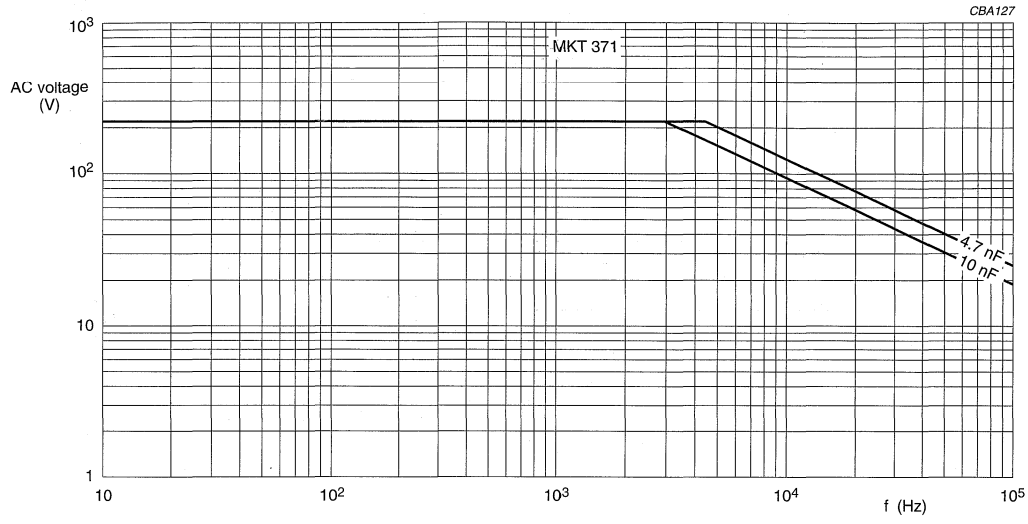


Fig.41 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C for $U_{Rdc} = 400$ V.

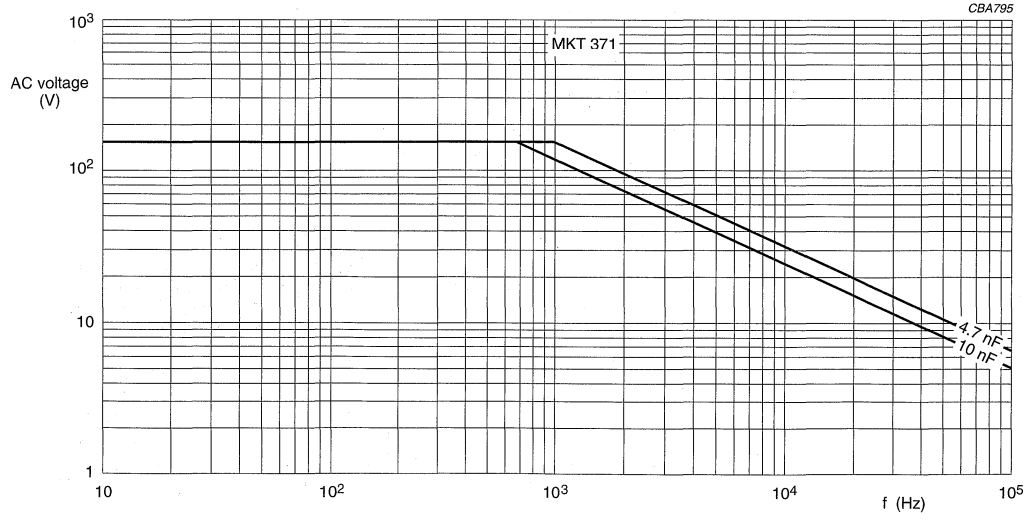


Fig.42 AC voltage (RMS value) as a function of frequency at 85 °C < $T_{amb} \leq 100$ °C for $U_{Rdc} = 400$ V.

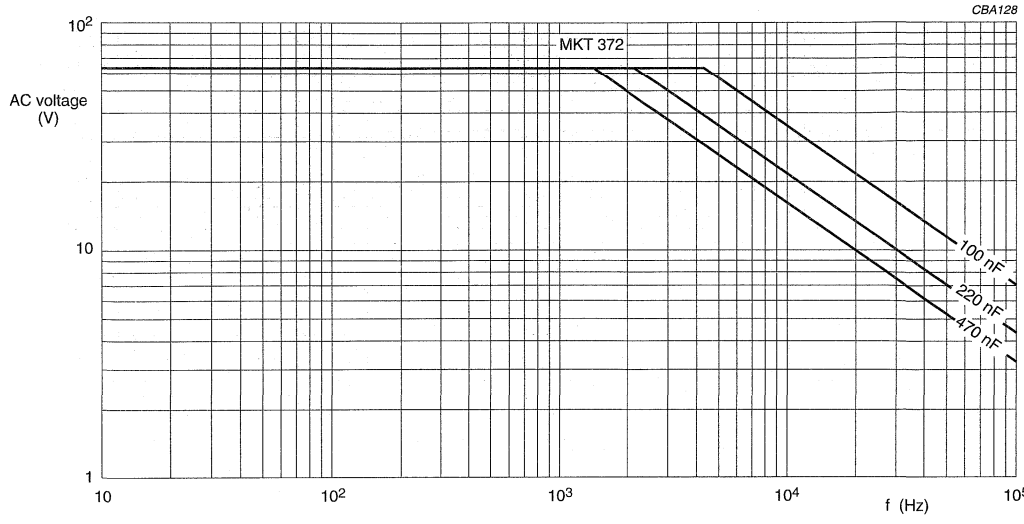


Fig.43 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C for $U_{Rdc} = 100$ V.

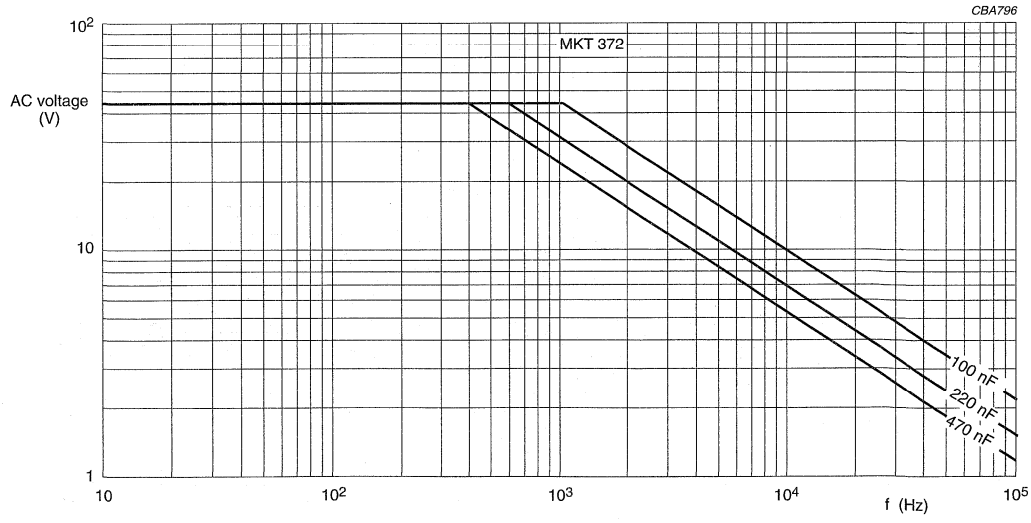


Fig.44 AC voltage (RMS value) as a function of frequency at 85 °C < $T_{amb} \leq 100$ °C for $U_{Rdc} = 100$ V.

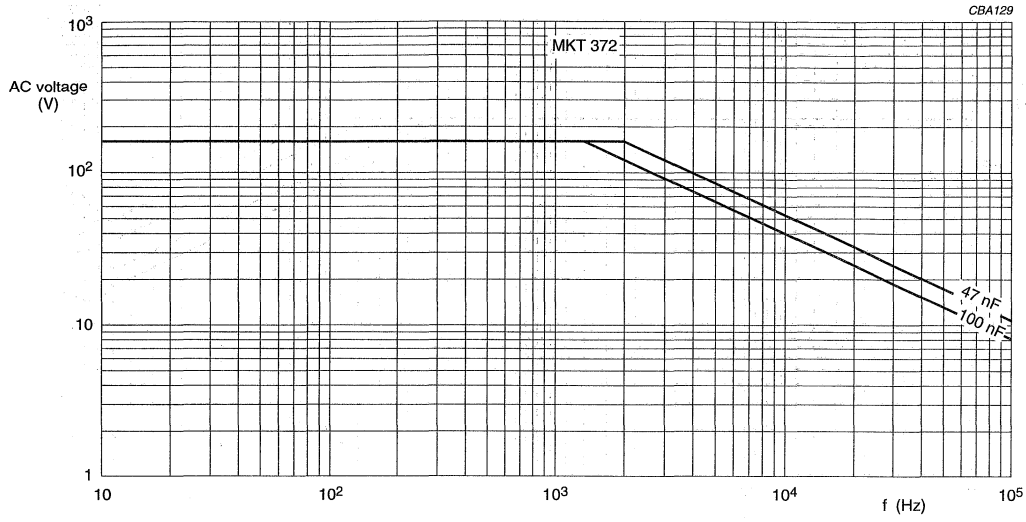


Fig.45 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C for $U_{Rdc} = 250$ V.

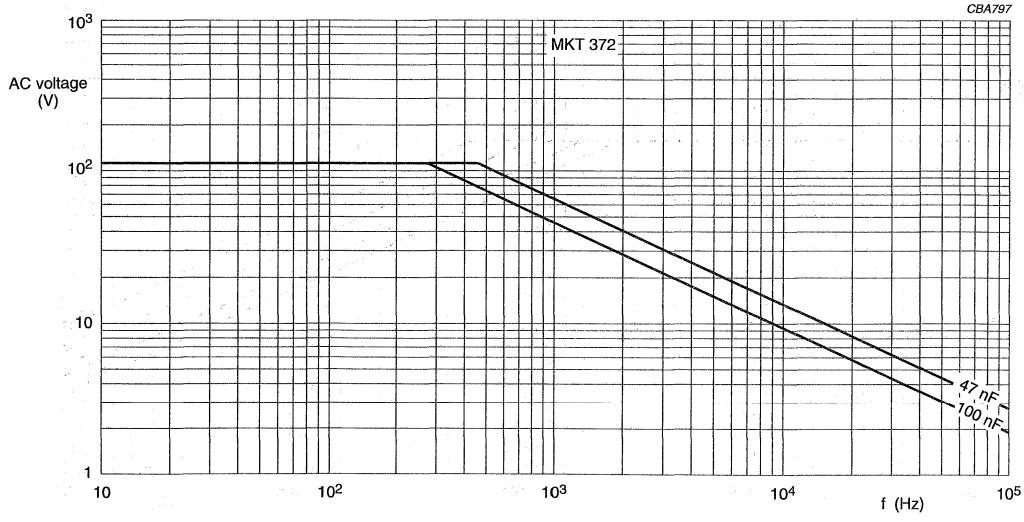


Fig.46 AC voltage (RMS value) as a function of frequency at 85 °C < $T_{amb} \leq 100$ °C for $U_{Rdc} = 250$ V.

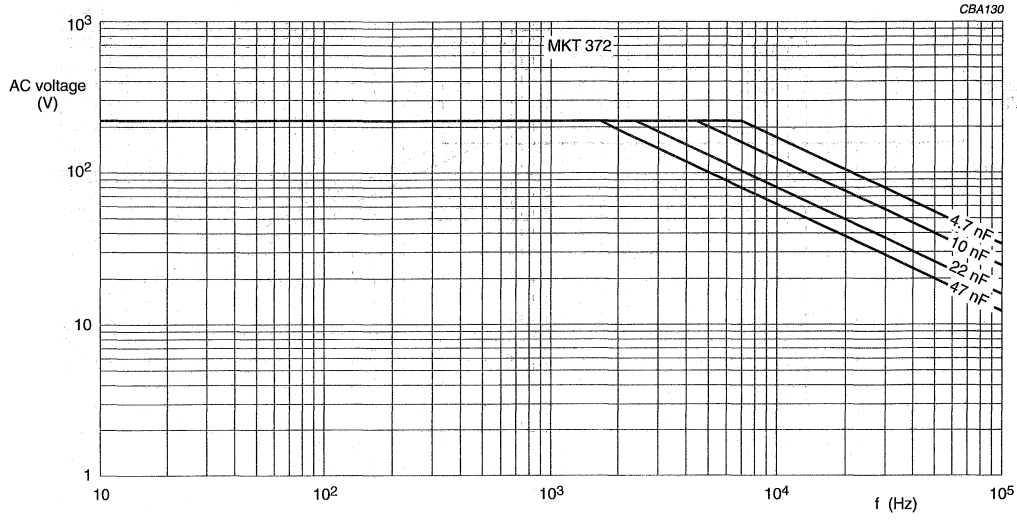


Fig.47 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C for $U_{Rdc} = 400$ V.

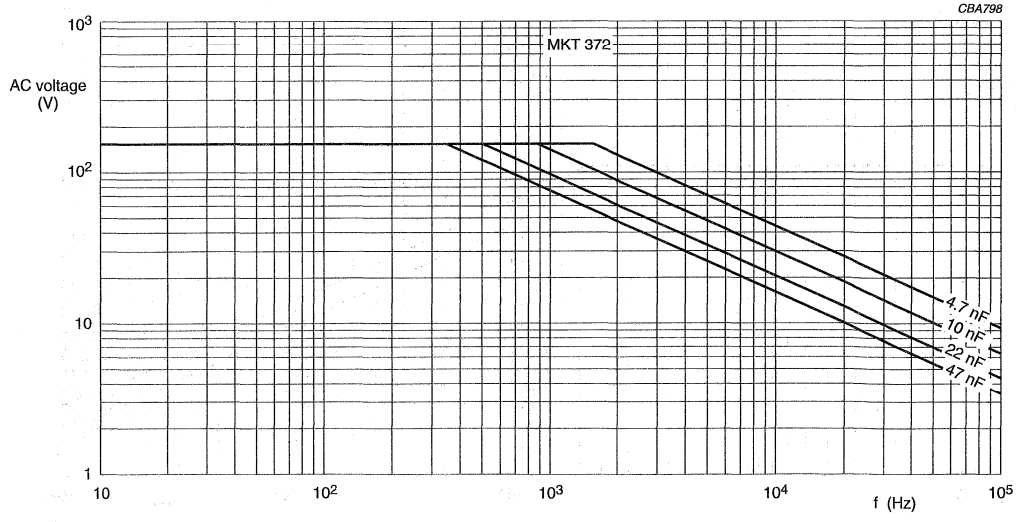


Fig.48 AC voltage (RMS value) as a function of frequency at 85 °C < $T_{amb} \leq 100$ °C for $U_{Rdc} = 400$ V.

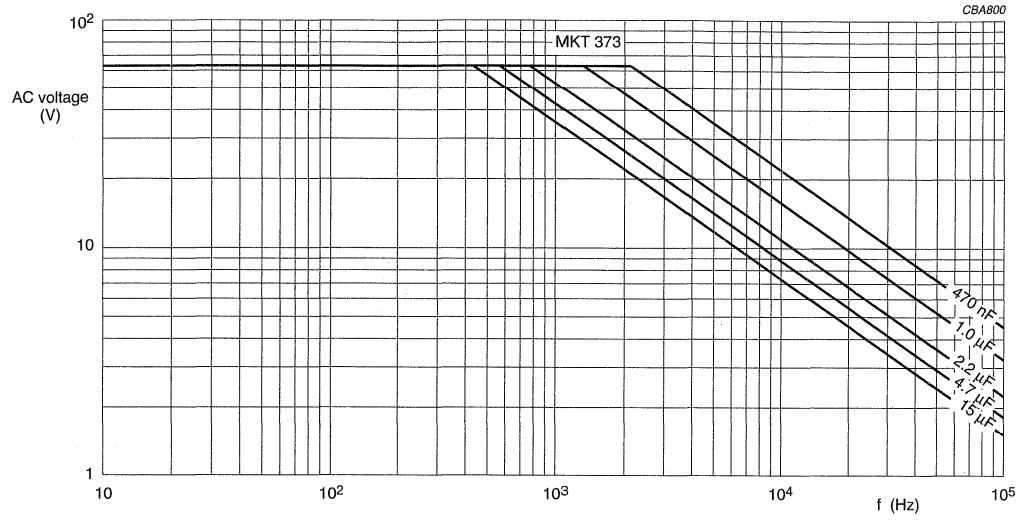


Fig.49 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C for $U_{Rdc} = 100$ V (2222 373 23...; 24...; 27...; 28... types).

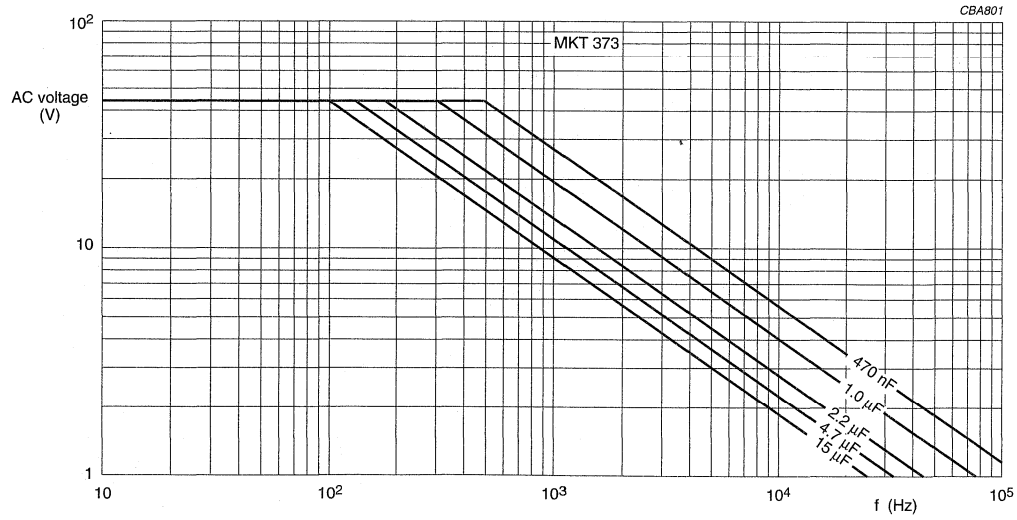


Fig.50 AC voltage (RMS value) as a function of frequency at 85 °C < $T_{amb} \leq 100$ °C for $U_{Rdc} = 100$ V (2222 373 23...; 24...; 27...; 28... types).

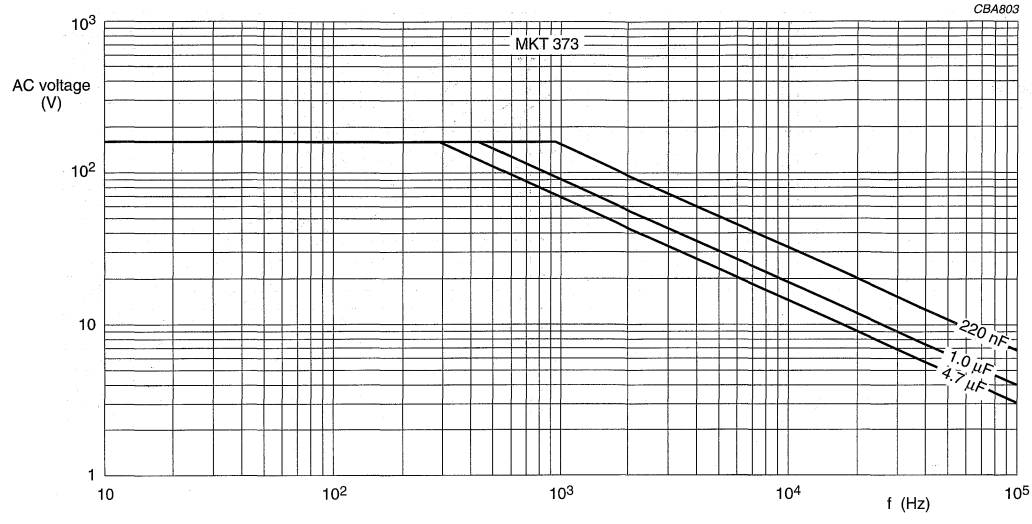


Fig.51 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C for $U_{Rdc} = 250$ V (2222 373 43...; 44...; 47...; 48... types).

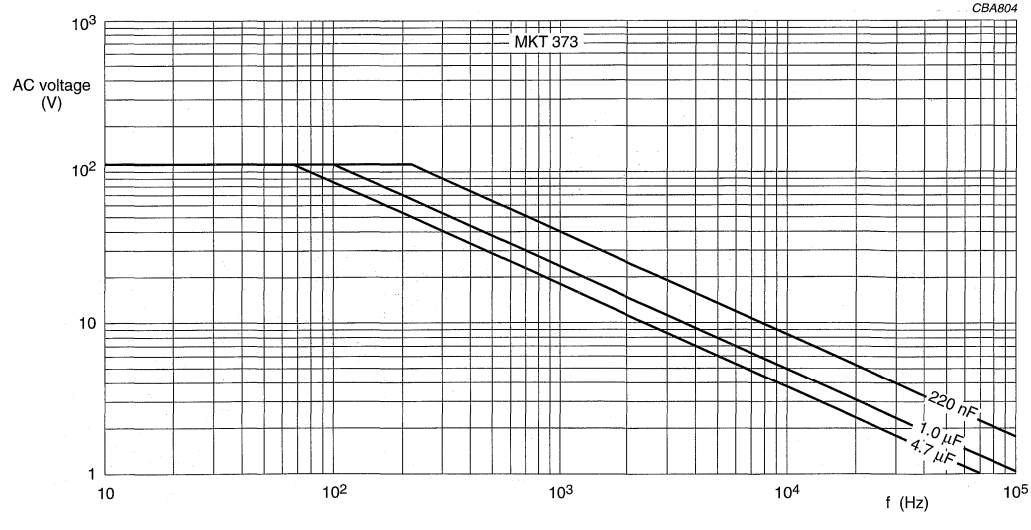


Fig.52 AC voltage (RMS value) as a function of frequency at 85 °C < $T_{amb} \leq 100$ °C for $U_{Rdc} = 250$ V (2222 373 43...; 44...; 47...; 48... types).

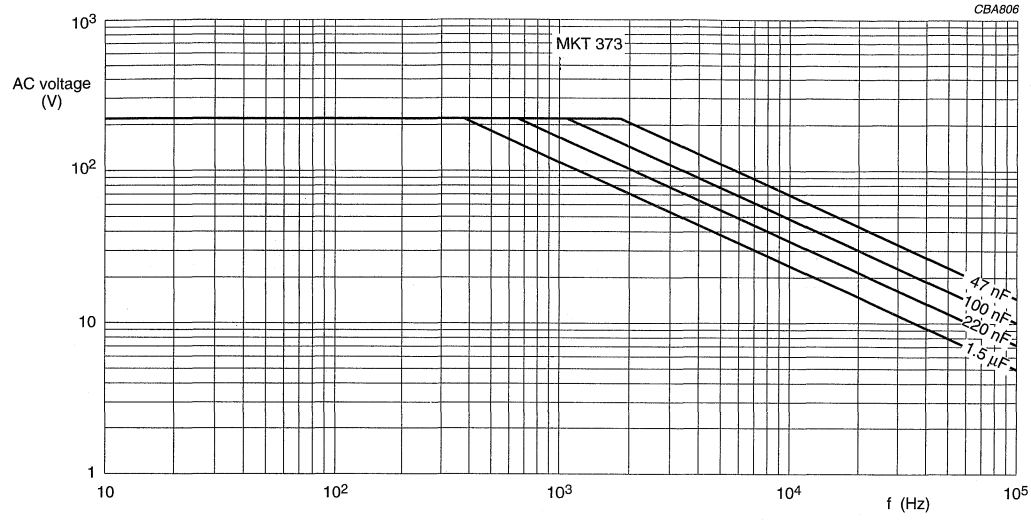


Fig.53 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C for $U_{Rdc} = 400$ V (2222 373 53...; 54...; 57...; 58... types).

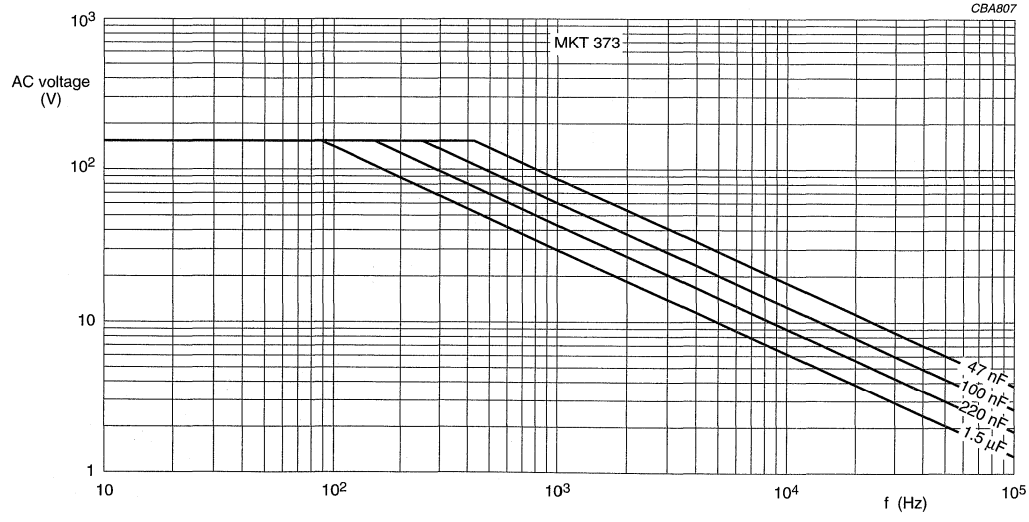


Fig.54 AC voltage (RMS value) as a function of frequency at 85 °C < $T_{amb} \leq 100$ °C for $U_{Rdc} = 400$ V (2222 373 53...; 54...; 57...; 58... types).

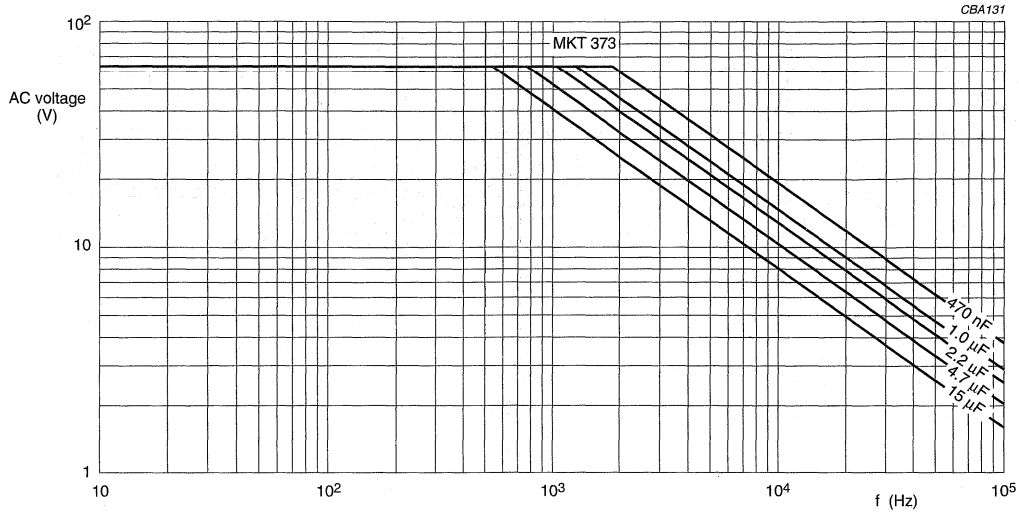


Fig.55 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C for $U_{Rdc} = 100$ V (2222 373 21...; 22...; 25...; 26... types).

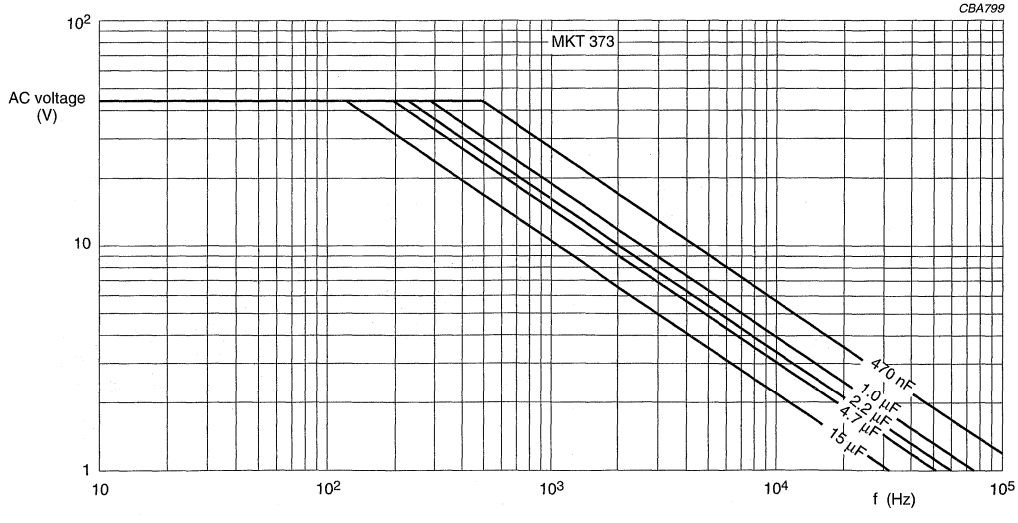


Fig.56 AC voltage (RMS value) as a function of frequency at 85 °C < $T_{amb} \leq 100$ °C for $U_{Rdc} = 100$ V (2222 373 21...; 22...; 25...; 26... types).

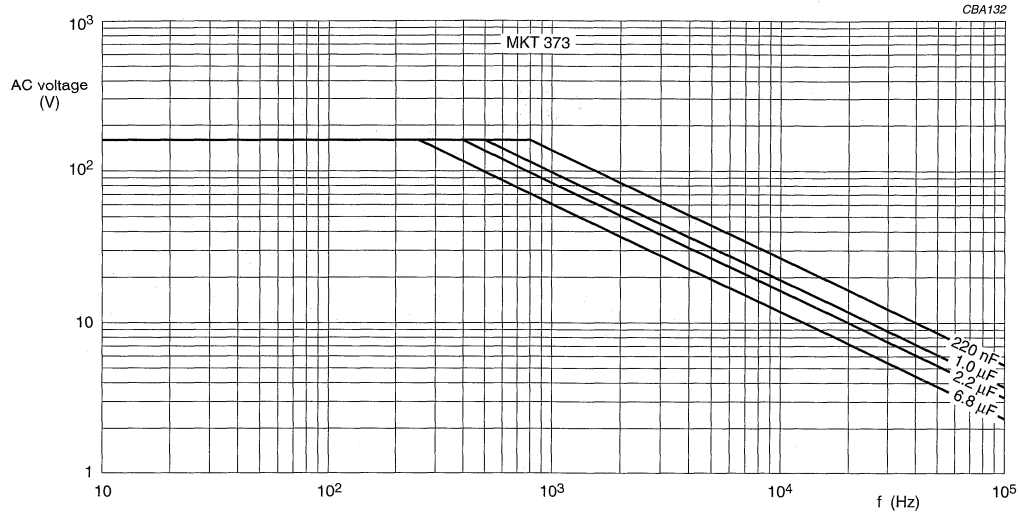


Fig.57 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C for $U_{Rdc} = 250$ V (2222 373 41...; 42...; 45...; 46... types).

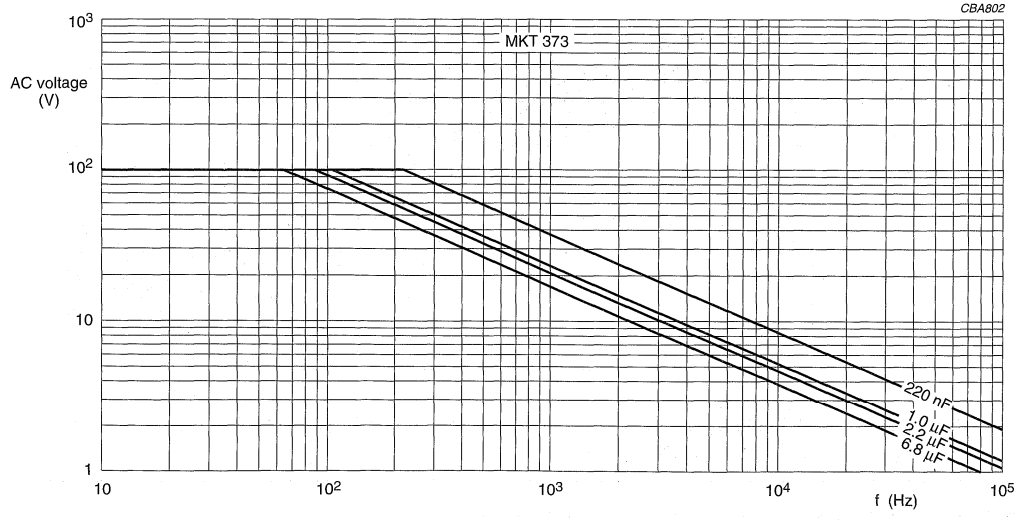


Fig.58 AC voltage (RMS value) as a function of frequency at 85 °C < $T_{amb} \leq 100$ °C for $U_{Rdc} = 250$ V (2222 373 41...; 42...; 45...; 46... types).

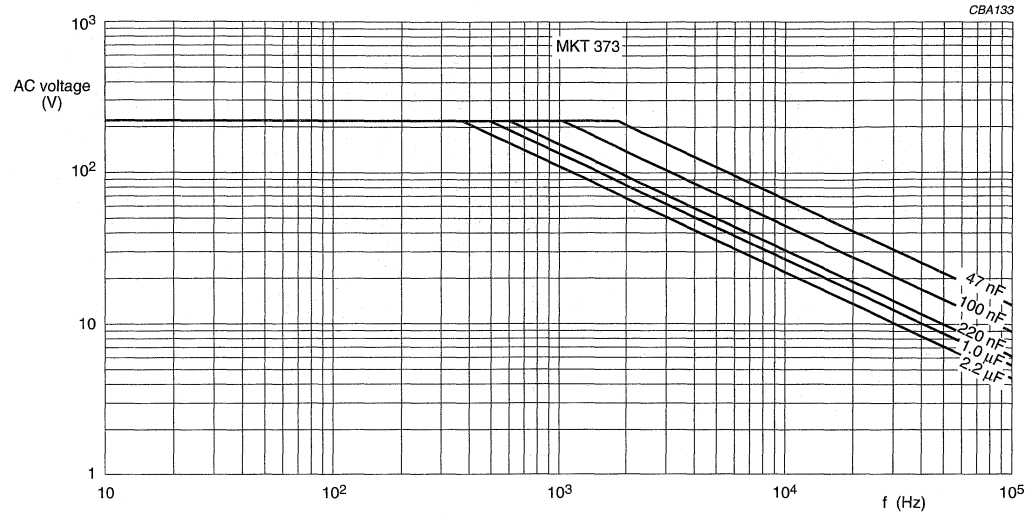


Fig.59 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C for $U_{Rdc} = 400$ V (2222 373 51...; 52...; 55...; 56... types).

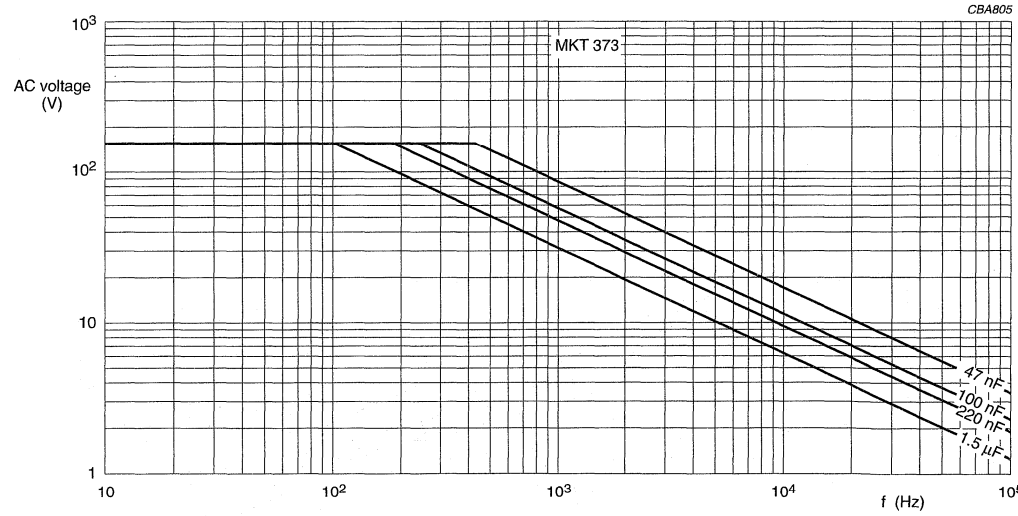


Fig.60 AC voltage (RMS value) as a function of frequency at 85 °C < $T_{amb} \leq 100$ °C for $U_{Rdc} = 400$ V (2222 373 51...; 52...; 55...; 56... types).

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 27 to 60.

Tangent of loss angle

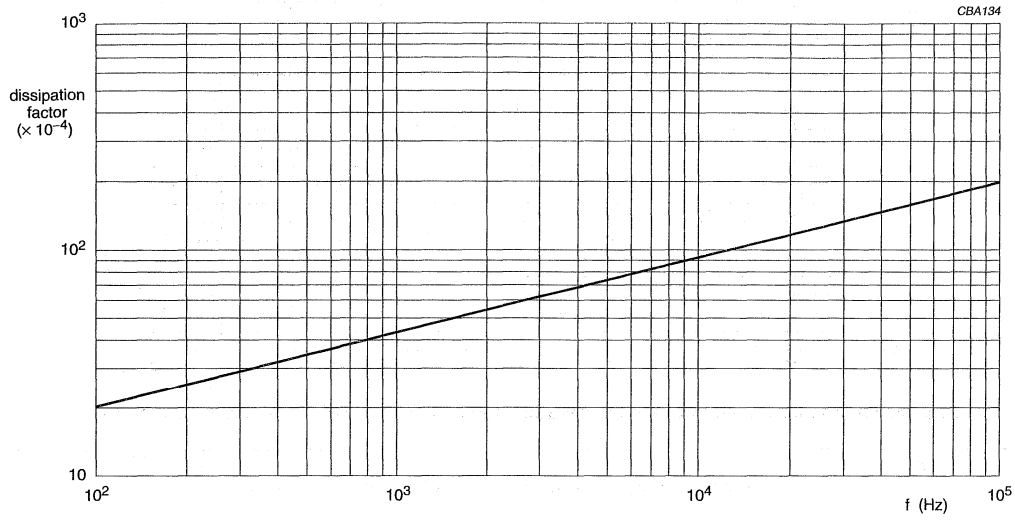


Fig.61 Tangent of loss angle as a function of frequency; typical curve.

Insulation resistance

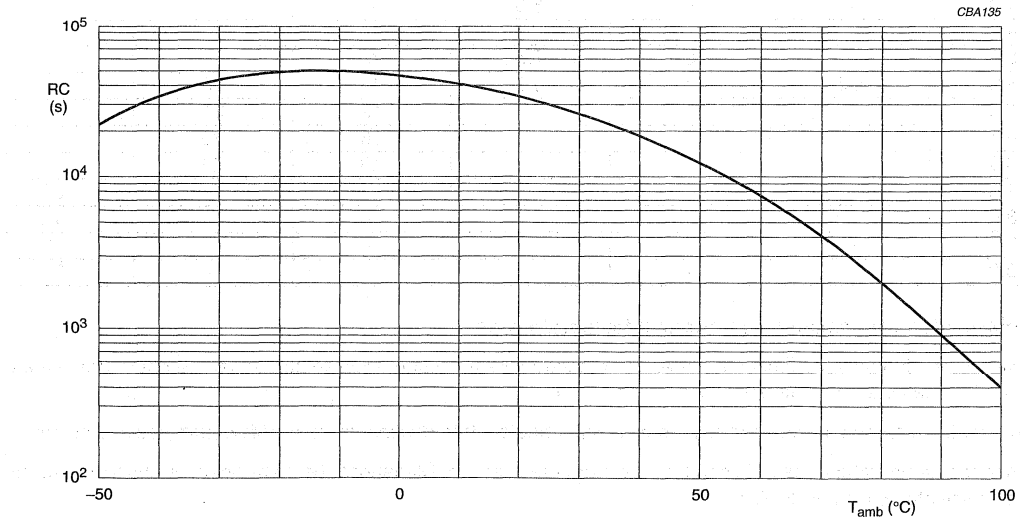


Fig.62 RC product as a function of ambient free air temperature; typical curve.

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

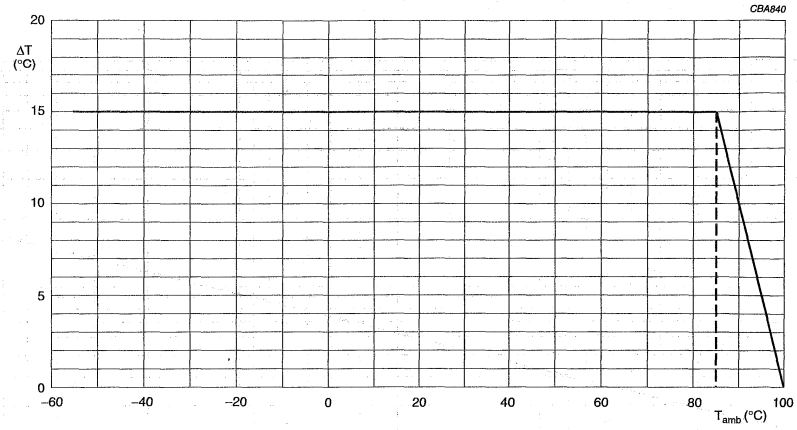


Fig.63 Maximum allowed component temperature rise as a function of the ambient temperature.

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.

Power dissipation can be calculated in accordance with 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).

Measuring the component temperature

A thermocouple must be attached to the capacitor body as in Fig.64.

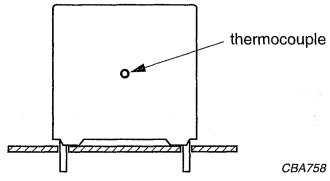


Fig.64 Mounting the thermocouple.

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

These capacitors are not suitable for mains applications as across-the-line capacitors without additional protection; see below. These mains applications are strictly regulated by safety standards and electromagnetic interference suppression capacitors conforming to 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.63.
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	$T_{amb} \leq 85$ °C	85 °C < $T_{amb} \leq 100$ °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)	$1.6 \times U_{Rdc}$	$1.3 \times U_{Rdc}$

Example

C = 3300 nF - 100 V used for the voltage signal shown in Fig.65.

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

The ambient temperature is 35 °C.

Checking the conditions:

1. The peak voltage U_p = 70 V is lower than 100 V (DC).
2. The peak-to-peak voltage 80 V is lower than $2 \times \sqrt{2} \times 63$ V (AC) = 178 U_{p-p}.
3. The voltage pulse slope dU/dt = 80 V/500 µs = 0.16 V/µs.
   This is lower than 8 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_{max} = 7.0 mm and pitch = 15 mm will be $\frac{60 \text{ mW}}{12 \text{ mW/°C}}$ = 5 °C.

   This is lower than 15 °C temperature rise at 35 °C; see Fig.63.
5. Not applicable.
6. Not applicable.

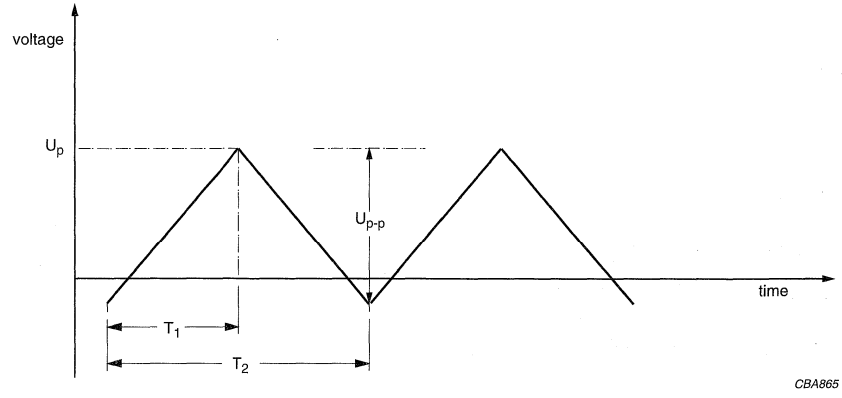


Fig.65 Voltage signal.

MARKING

Product marking

CAPACITORS WITH PITCH = 5.08 mm: STYLE 2222 370

CO_2 laser marking:

Only for case sizes:

2.5 × 6.5 × 7.2 mm

3.5 × 8.0 × 7.2 mm.

The capacitors are marked by laser print on the top (see Fig.66) with the following information:

1. Capacitance code in accordance with "*IEC 60062*"
2. Tolerance on rated capacitance: M = ±20%; K = ±10%; J = ±5%;

and on the side with the following information:

1. Year and week of manufacture (e.g. 9720)
2. Rated voltage (DC) (e.g. 100 V)
3. Code for dielectric material (MKT)
4. Code for factory of origin (HQ)
5. Manufacturer's type designation (e.g. 370)
6. Code for manufacturer.

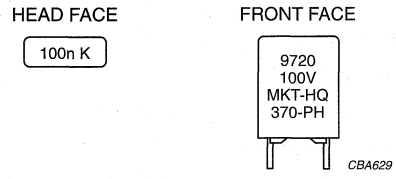


Fig.66 Example of marking for a capacitor with pitch = 5.08 mm (CO_2 laser marked).

YAG laser marking:

Only for case size:

4.5 × 9.0 × 7.2 mm

6.0 × 10.0 × 7.2 mm.

The capacitors are marked by YAG laser on the side (see Fig.67) with the following information:

1. Capacitance code in accordance with "*IEC 60062*"
2. Tolerance on rated capacitance: M = ±20%; K = ±10%; J = ±5%
3. Rated voltage (DC) (e.g. 63 V)
4. Code for manufacturer
5. Year and week of manufacture (e.g. 9710)
6. Manufacturer's type designation (e.g. 370).

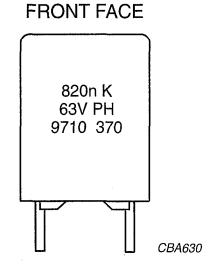


Fig.67 Example of marking for a capacitor with pitch = 5.08 mm (YAG laser marked).

CAPACITORS WITH PITCH = 7.62 mm: STYLE 2222 371

The capacitors are marked by YAG laser on the side (see Fig.68) with the following information:

1. Capacitance code in accordance with *"IEC 60062"*
2. Tolerance on rated capacitance: M = ±20%
   K = ±10%; J = ±5%
3. Rated voltage (DC) (e.g. 100 V)
4. Code for manufacturer
5. Year and week of manufacture (e.g. 9710)
6. Manufacturer's type designation (e.g. 371).

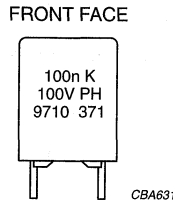


Fig.68 Example of marking for a capacitor with pitch = 7.62 mm.

CAPACITORS WITH PITCH = 10 mm: STYLE 2222 372

The capacitors are marked by laser print on the side (see Fig.69) with the following information:

1. Year and week of manufacture (e.g. 9904)
2. Capacitance code in accordance with *"IEC 60062"*
   Tolerance on rated capacitance: K = ±10%; J = ±5%
   Rated voltage (DC) (e.g. 100 V)
3. Code for dielectric material (MKT)
   Manufacturer's type designation (e.g. 372)
4. Code for factory of origin (HQ)
   Code for manufacturer.

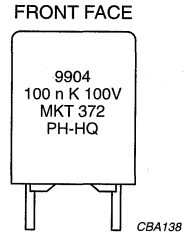


Fig.69 Example of marking for a capacitor with pitch = 10 mm.

CAPACITORS WITH PITCH = 15 mm: STYLES 2222 373

The capacitors are marked by laser print on the top (see Fig.70) with the following information:

1. Rated capacitance code in accordance with *"IEC 60062"*
2. Tolerance on rated capacitance: K = ±10%; J = ±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. 9210).

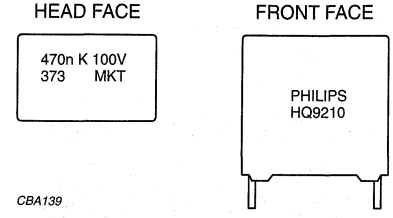


Fig.70 Example of marking for a capacitor with pitch = 15.0 mm.

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

The capacitors are marked on the top (see Fig.71) with the following information:

1. Rated capacitance code in accordance with *"IEC 60062"*
2. Tolerance on rated capacitance: K = ±10%; J = ±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. 9210).

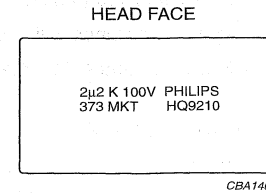
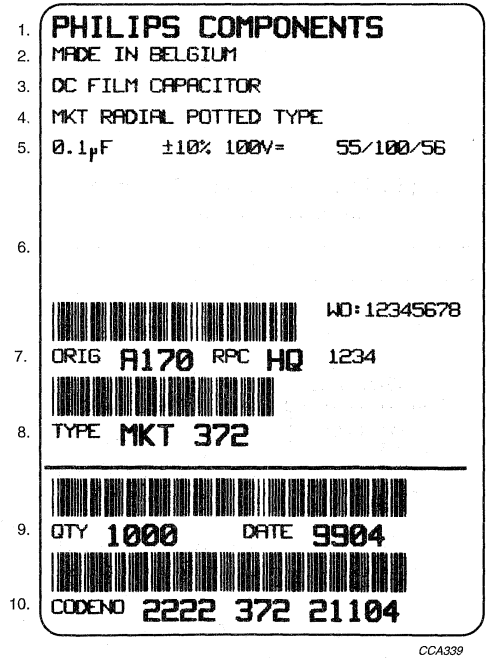


Fig.71 Example of marking for a capacitor with pitch = 22.5 and 27.5 mm.

Package marking

The package containing the capacitors is marked as shown in Fig.72.

Please note:
In due time BC COMPONENTS will replace PHILIPS COMPONENTS



Barcode label marking

LINE	MARKING EXPLANATION
1	Manufacturer's name
2	Country of origin
3	Sub-family
4	Type description
5	Capacitance value, tolerance, voltage and climatic category *("IEC 60068-1")*
6	–
7	Preference origin code: A Country of origin in code: 170 (Belgium) Responsible production centre: HQ Work order: WO Wage number of final inspection (only for capacitors with pitch = 5, 7.5 and 10 mm)
8	Product type description
9	Quantity and production period, year and week code
10	Product code (12NC)

Fig.72 Barcode label.

QUICK REFERENCE TEST REQUIREMENTS (see note 1)

TEST	PROCEDURE (quick reference)	REQUIREMENTS
Robustness of leads		
Tensile strength: *"IEC 60068-2-21"*	load 10 N; 10 s	no visible damage legible marking $\lvert\Delta C/C\rvert \leq 2\%$ $\Delta\tan\delta \leq 30 \times 10^{-4}$; note 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	
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	$\lvert\Delta C/C\rvert \leq 3\%$ $\Delta\tan\delta \leq 30 \times 10^{-4}$; note 2
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	$\lvert\Delta C/C\rvert \leq 3\%$ $\Delta\tan\delta \leq 50 \times 10^{-4}$; note 2 $R_{ins} \geq 50\%$ 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, 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	$\lvert\Delta C/C\rvert \leq 5\%$ $\Delta\tan\delta \leq 50 \times 10^{-4}$; note 2 $R_{ins} \geq 50\%$ of specified value
Endurance (DC): *"IEC 60384-2"*	2000 hours; $1.25 \times U_{Rdc}$; 85 °C $1 \times U_{Rdc}$; 100 °C	$\lvert\Delta C/C\rvert \leq 5\%$ $\Delta\tan\delta \leq 30 \times 10^{-4}$; note 2 $R_{ins} \geq 50\%$ of specified value
Heat storage: *"IEC 60384-2"*	2000 hours; 100 °C	$\lvert\Delta C/C\rvert \leq 3\%$ $\Delta\tan\delta \leq 30 \times 10^{-4}$; note 2
Endurance (AC): *"IEC 60384-2"*	1000 hours: $1.1 \times U_{Rac}$; 85 °C	$\lvert\Delta C/C\rvert \leq 8\%$ (style 370) $\lvert\Delta C/C\rvert \leq 5\%$ (style 371) $\lvert\Delta C/C\rvert \leq 3\%$ (style 372 and 373) $\Delta\tan\delta \leq 30 \times 10^{-4}$; note 2

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 2 $R_{ins} \geq 50\%$ of specified value
Resistance to soldering heat with preheating: *"IEC 60384-2"*	body temperature: 100 °C; bath temperature: 260 °C; dwell time: 5 s	$\|\Delta C/C\| \leq 2\%$ ($C \leq 10$ nF) $\|\Delta C/C\| \leq 1\%$ ($C > 10$ nF) $\Delta \tan \delta \leq 30 \times 10^{-4}$; note 2
Passive flammability (styles 372 and 373): *"IEC 60384-1"*	class C	no burning

Notes

1. For detailed information, see *"Type detail specification HQN-384-02/103".*
2. Measuring frequency 10 kHz.

Metallized polyester film capacitors MKT 470

MKT RADIAL POTTED TYPE **PITCH 5 mm**

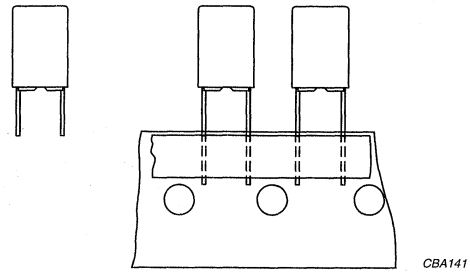


Fig.1 Simplified outlines.

FEATURES

- Low-inductive wound cell of metallized (PETP) film
- Potted with epoxy resin in a flame-retardant case
- Radial leads of solder-coated fecuma 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

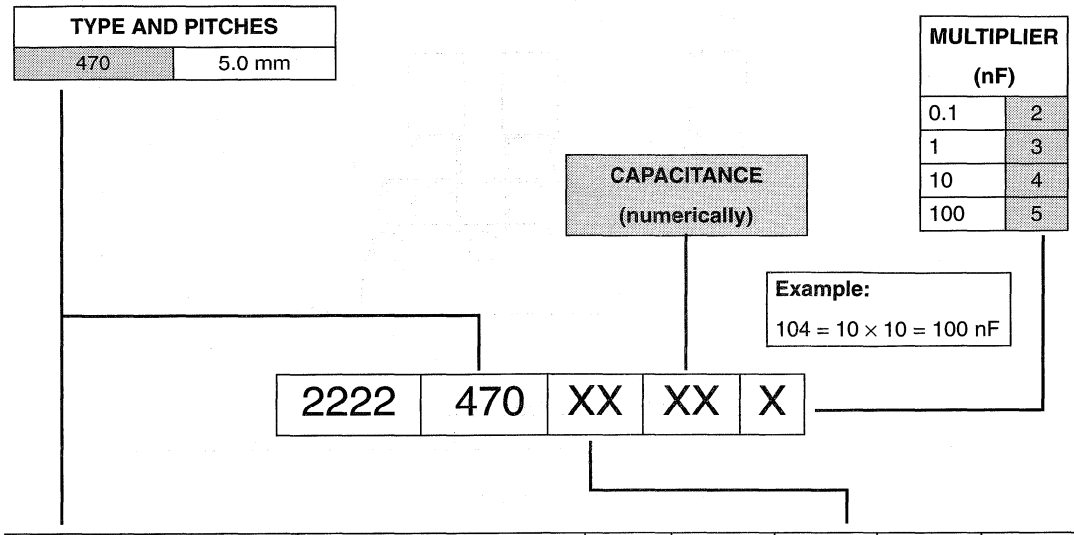
For more detailed data and test requirements see *"Type detail specification HQN-384-02/104"*.

QUICK REFERENCE DATA

DESCRIPTION	VALUE
Capacitance range (E12 series)	0.001 to 1.2 µF
Capacitance tolerance	±10%; ±5%
Rated (DC) voltage	63 V; 100 V; 250 V; 400 V
Climatic category	55/125/56
Maximum application temperature	125 °C
Rated temperature	85 °C
Tangent of loss angle at 100 kHz	150×10^{-4}
Reference specification	IEC 60384-2
Performance grade	grade 1 (long life)

Metallized polyester film capacitors MKT 470

COMPOSITION OF CATALOGUE NUMBER



TYPE	PACKAGING	LEAD CONFIGURATION	C-TOL	63 V	100 V	250 V	400 V
470	ammopack	H = 18.5 mm; P_0 = 12.7 mm	±10%	75	85	35	65
			±5%	76	86	36	66
	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	H = 18.5 mm; P_0 = 12.7 mm	±10%	18	28	48	58
			±5%	19	29	49	59

MKT 470 GENERAL DATA **PITCH 5 mm**

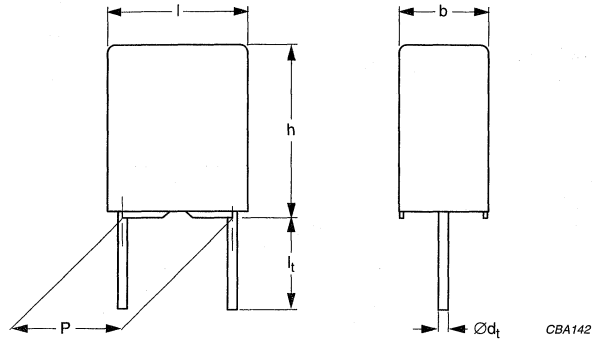


Fig.3 Outline.

Specific reference data for the 63 V DC capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle:			
$C \leq 0.1\ \mu F$	$\leq 60 \times 10^{-4}$	$\leq 120 \times 10^{-4}$	$\leq 200 \times 10^{-4}$
$0.1\ \mu F < C \leq 0.47\ \mu F$	$\leq 60 \times 10^{-4}$	$\leq 120 \times 10^{-4}$	$\leq 225 \times 10^{-4}$
$0.47\ \mu F < C \leq 1.2\ \mu F$	$\leq 60 \times 10^{-4}$	$\leq 120 \times 10^{-4}$	–
Rated voltage pulse slope $(dU/dt)_R$ at 63 V (DC)	100 V/µs		
R between leads, for $C \leq 0.33\ \mu F$ at 10 V; 1 minute	>15000 MΩ		
RC between leads, for $C > 0.33\ \mu F$ 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[1]	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Ammopack	H = 18.5 mm; note 2	±10%	2222 470 75...	preferred
		±5%	2222 470 76...	preferred
Loose in box	l_t = 4.0 +1.0/–0.5 mm	±10%	2222 470 11...	on request
		±5%	2222 470 12...	on request
	l_t = 26.0 ±2.0 mm	±10%	2222 470 15...	on request
		±5%	2222 470 16...	on request
Taped on reel	H = 18.5 mm; note 2	±10%	2222 470 18...	on request
		±5%	2222 470 19...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

U_{Rdc} = 63 V; U_{Rac} = 40 V

C (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER	
			AMMOPACK	
			H = 18.5 mm	
			C-tol = ±10%	C-tol = ±5%
			catalogue number(1)	last 5 digits(1)
Pitch = 5.0 ±0.3 mm; d_t = 0.50 ±0.05 mm				
0.068	2.5 × 6.5 × 7.2	0.25	2222 470 75**683**	.. 76**683**
0.082			2222 470 75**823**	.. 76**823**
0.1			2222 470 75**104**	.. 76**104**
0.12	3.5 × 8.0 × 7.2	0.35	2222 470 75**124**	.. 76**124**
0.15			2222 470 75**154**	.. 76**154**
0.18			2222 470 75**184**	.. 76**184**
0.22			2222 470 75**224**	.. 76**224**
0.27			2222 470 75**274**	.. 76**274**
0.33			2222 470 75**334**	.. 76**334**
0.39			2222 470 75**394**	.. 76**394**
0.47	4.5 × 9.0 × 7.2	0.45	2222 470 75**474**	.. 76**474**
0.56			2222 470 75**564**	.. 76**564**
0.68			2222 470 75**684**	.. 76**684**
0.82	6.0 × 11.0 × 7.2	0.60	2222 470 75**824**	.. 76**824**
1			2222 470 75**105**	.. 76**105**
1.2			2222 470 75**125**	.. 76**125**

Note

1. The shading indicates preferred types.

Metallized polyester film capacitors MKT 470

MKT 470 GENERAL DATA PITCH 5 mm

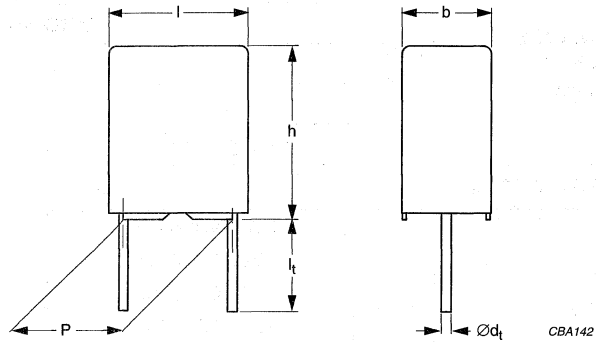


Fig.4 Outline.

Specific reference data for the 100 V DC capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle:			
$C \leq 0.1\ \mu F$	$\leq 60 \times 10^{-4}$	$\leq 120 \times 10^{-4}$	$\leq 200 \times 10^{-4}$
$0.1\ \mu F < C \leq 0.47\ \mu F$	$\leq 60 \times 10^{-4}$	$\leq 120 \times 10^{-4}$	$\leq 225 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 100 V (DC)	160 V/µs		
R between leads, for $C \leq 0.33\ \mu F$ at 100 V; 1 minute	>15000 MΩ		
RC between leads, for $C > 0.33\ \mu F$ 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[1]	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Ammopack	H = 18.5 mm; note 2	±10%	2222 470 85...	preferred
		±5%	2222 470 86...	preferred
Loose in box	l_t = 4.0 +1.0/–0.5 mm	±10%	2222 470 21...	on request
		±5%	2222 470 22...	on request
	l_t = 26.0 ±2.0 mm	±10%	2222 470 25...	on request
		±5%	2222 470 26...	on request
Taped on reel	H = 18.5 mm; note 2	±10%	2222 470 28...	on request
		±5%	2222 470 29...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

U_{Rdc} = 100 V; U_{Rac} = 63 V

C (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER	
			AMMOPACK	
			H = 18.5 mm	
			C-tol = ±10%	C-tol = ±5%
			catalogue number(1)	last 5 digits(1)
Pitch = 5.0 ±0.3 mm; d_t = 0.50 ±0.05 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

Note

1. The shading indicates preferred types.

Metallized polyester film capacitors MKT 470

MKT 470 GENERAL DATA PITCH 5 mm

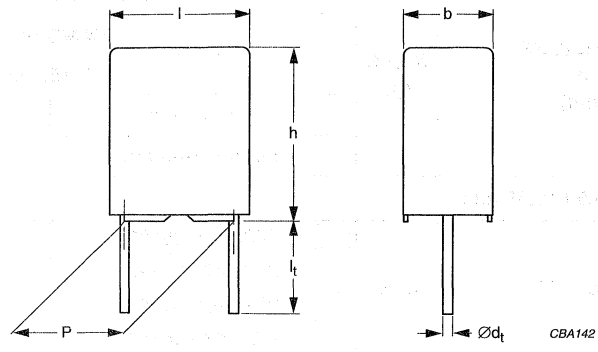


Fig.5 Outline.

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:				
$C \leq 0.01\ \mu F$	$\leq 60 \times 10^{-4}$	$\leq 120 \times 10^{-4}$	$\leq 200 \times 10^{-4}$	$\leq 250 \times 10^{-4}$
$0.01\ \mu F < C \leq 0.1\ \mu F$	$\leq 60 \times 10^{-4}$	$\leq 120 \times 10^{-4}$	$\leq 200 \times 10^{-4}$	–
$0.1\ \mu F < C \leq 0.12\ \mu F$	$\leq 60 \times 10^{-4}$	$\leq 120 \times 10^{-4}$	$\leq 225 \times 10^{-4}$	–
Rated voltage pulse slope $(dU/dt)_R$ at 250 V (DC)	400 V/µs			
R between leads at 100 V; 1 minute	>15000 MΩ			
R between interconnected leads and case (foil method)	>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[1]	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Ammopack	H = 18.5 mm; note 2	±10%	2222 470 35...	preferred
		±5%	2222 470 36...	preferred
Loose in box	l_t = 4.0 +1.0/−0.5 mm	±10%	2222 470 41...	on request
		±5%	2222 470 42...	on request
	l_t = 26.0 ±2.0 mm	±10%	2222 470 45...	on request
		±5%	2222 470 46...	on request
Taped on reel	H = 18.5 mm; note 2	±10%	2222 470 48...	on request
		±5%	2222 470 49...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

Metallized polyester film capacitors MKT 470

U_{Rdc} = 250 V; U_{Rac} = 160 V

C (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER	
			AMMOPACK	
			H = 18.5 mm	
			C-tol = ±10%	C-tol = ±5%
			catalogue number(1)	last 5 digits(1)
Pitch = 5.0 ±0.3 mm; d_t = 0.50 ±0.05 mm				
0.01	2.5 × 6.5 × 7.2	0.25	2222 470 35**103**	.. 36**103**
0.012			2222 470 35**123**	.. 36**123**
0.015			2222 470 35**153**	.. 36**153**
0.018			2222 470 35**183**	.. 36**183**
0.022	3.5 × 8.0 × 7.2	0.35	2222 470 35**223**	.. 36**223**
0.027			2222 470 35**273**	.. 36**273**
0.033			2222 470 35**333**	.. 36**333**
0.039			2222 470 35**393**	.. 36**393**
0.047	4.5 × 9.0 × 7.2	0.45	2222 470 35**473**	.. 36**473**
0.056			2222 470 35**563**	.. 36**563**
0.068			2222 470 35**683**	.. 36**683**
0.082	6.0 × 11.0 × 7.2	0.60	2222 470 35**823**	.. 36**823**
0.1			2222 470 35**104**	.. 36**104**
0.12			2222 470 35**124**	.. 36**124**

Note

1. The shading indicates preferred types.

Metallized polyester film capacitors MKT 470

MKT 470 GENERAL DATA PITCH 5 mm

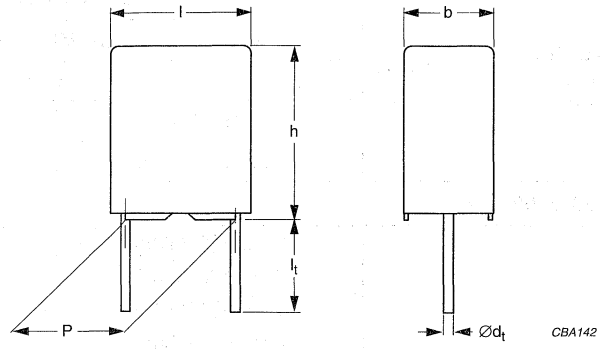


Fig.6 Outline.

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:				
$C \leq 0.01\ \mu F$	$\leq 60 \times 10^{-4}$	$\leq 120 \times 10^{-4}$	$\leq 200 \times 10^{-4}$	$\leq 250 \times 10^{-4}$
$0.01\ \mu F < C \leq 0.047\ \mu F$	$\leq 60 \times 10^{-4}$	$\leq 120 \times 10^{-4}$	$\leq 200 \times 10^{-4}$	–
Rated voltage pulse slope $(dU/dt)_R$ at 400 V (DC)	800 V/µs			
R between leads at 100 V; 1 minute	>15000 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(1)	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Ammopack	H = 18.5 mm; note 2	±10%	2222 470 65...	preferred
		±5%	2222 470 66...	preferred
Loose in box	l_t = 4.0 +1.0/–0.5 mm	±10%	2222 470 51...	on request
		±5%	2222 470 52...	on request
	l_t = 26.0 ±2.0 mm	±10%	2222 470 55...	on request
		±5%	2222 470 56...	on request
Taped on reel	H = 18.5 mm; note 2	±10%	2222 470 58...	on request
		±5%	2222 470 59...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

U_{Rdc} = 400 V; U_{Rac} = 220 V

C (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER	
			AMMOPACK	
			H = 18.5 mm	
			C-tol = ±10%	C-tol = ±5%
			catalogue number(1)	last 5 digits(1)
Pitch = 5.0 ±0.3 mm; d_t = 0.50 ±0.05 mm				
0.001	2.5 × 6.5 × 7.2	0.25	2222 470 65**102**	.. 66**102**
0.0012			2222 470 65**122**	.. 66**122**
0.0015			2222 470 65**152**	.. 66**152**
0.0018			2222 470 65**182**	.. 66**182**
0.0022			2222 470 65**222**	.. 66**222**
0.0027			2222 470 65**272**	.. 66**272**
0.0033			2222 470 65**332**	.. 66**332**
0.0039			2222 470 65**392**	.. 66**392**
0.0047			2222 470 65**472**	.. 66**472**
0.0056			2222 470 65**562**	.. 66**562**
0.0068			2222 470 65**682**	.. 66**682**
0.0082			2222 470 65**822**	.. 66**822**
0.01	3.5 × 8.0 × 7.2	0.35	2222 470 65**103**	.. 66**103**
0.012			2222 470 65**123**	.. 66**123**
0.015			2222 470 65**153**	.. 66**153**
0.018	4.5 × 9.0 × 7.2	0.45	2222 470 65**183**	.. 66**183**
0.022			2222 470 65**223**	.. 66**223**
0.027			2222 470 65**273**	.. 66**273**
0.033	6.0 × 11.0 × 7.2	0.60	2222 470 65**333**	.. 66**333**
0.039			2222 470 65**393**	.. 66**393**
0.047			2222 470 65**473**	.. 66**473**

Note

1. The shading indicates preferred types.

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, copper clad iron wire
- Small stand-off pips allow removal of solder flux etc. during cleaning of the printed-circuit board.

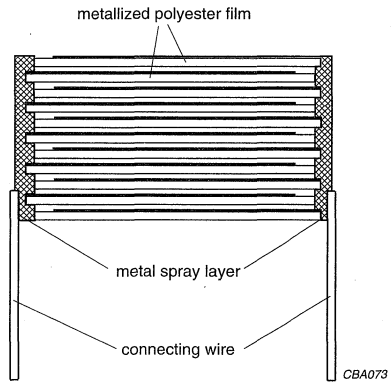


Fig.7 Construction.

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 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: $h_{max} \leq h + 0.3$ mm.

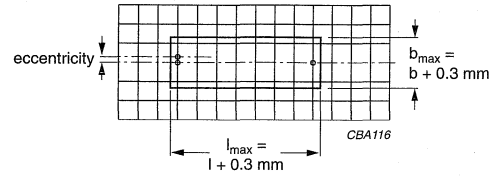


Fig.8 Lay-out..

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 ±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%.

CHARACTERISTICS

Capacitance

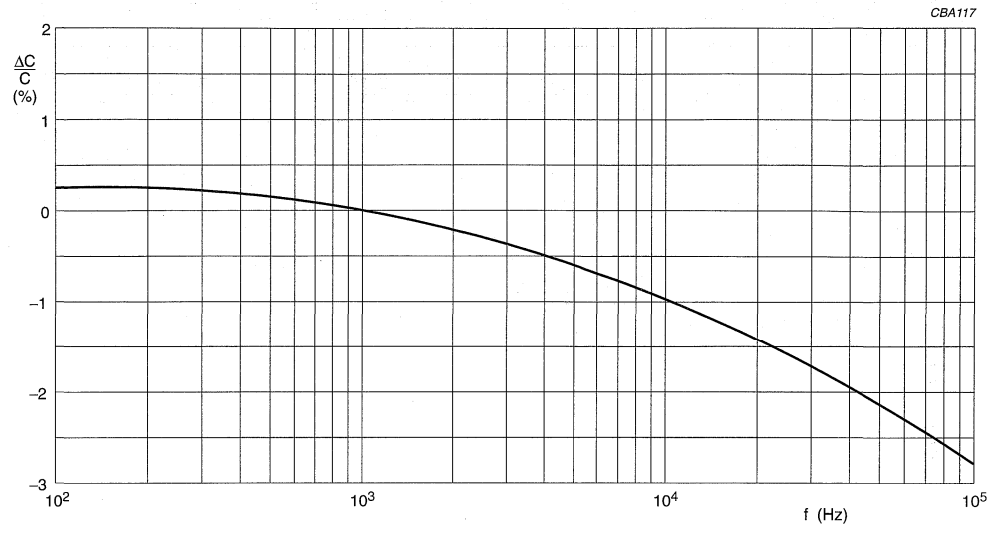


Fig.9 Capacitance change as a function of frequency: typical curve.

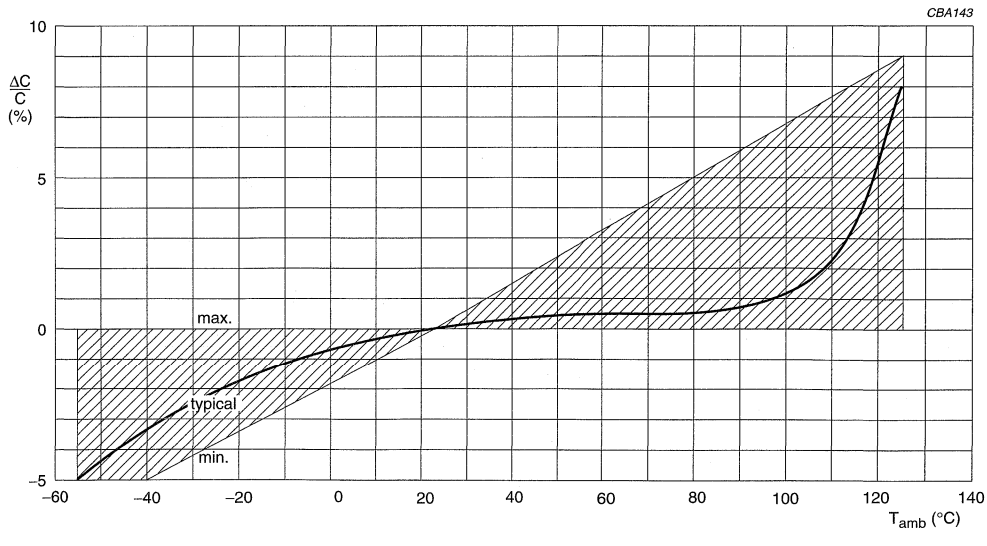


Fig.10 Capacitance change at 1 kHz as a function of temperature: typical curve.

Impedance

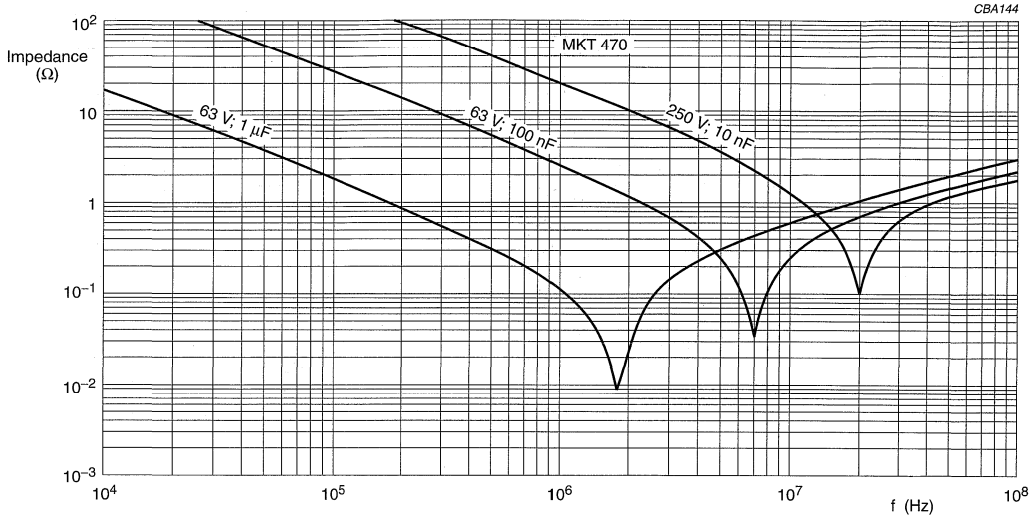


Fig.11 Impedance as a function of frequency: typical curves.

Maximum DC and AC voltage as a function of temperature

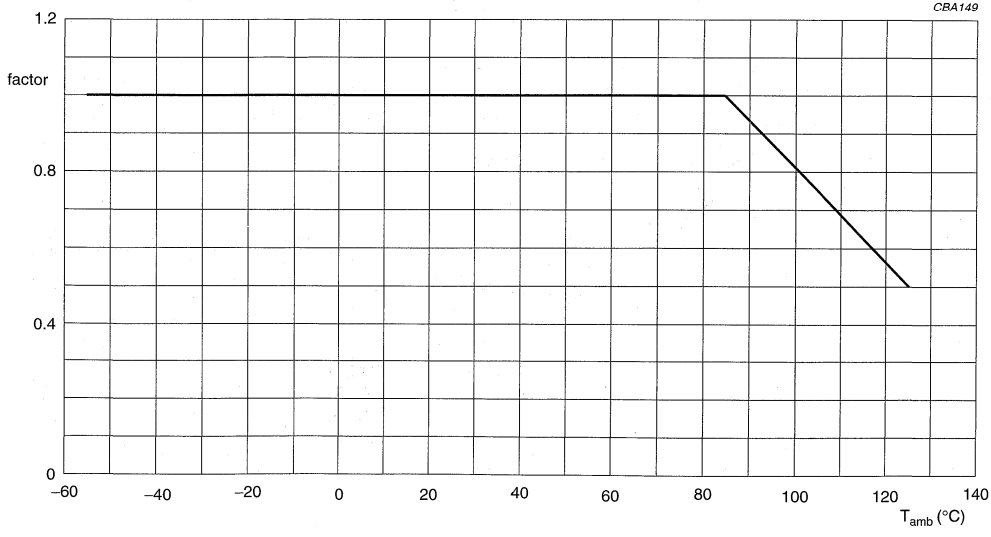


Fig.12 Multiplying factor for DC and AC voltage as a function of temperature.

Maximum RMS voltage (sinewave) as a function of frequency

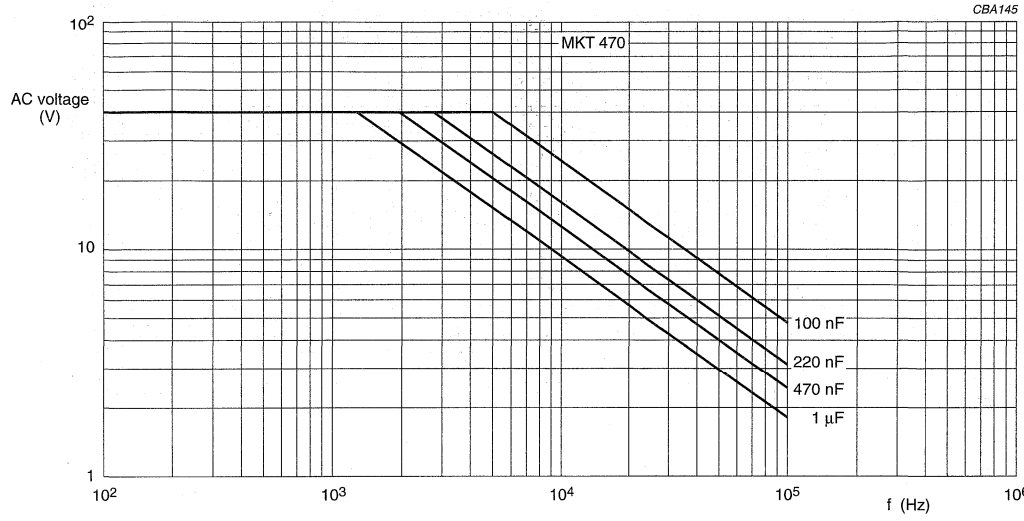


Fig.13 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C for $U_{Rdc} = 63$ V.

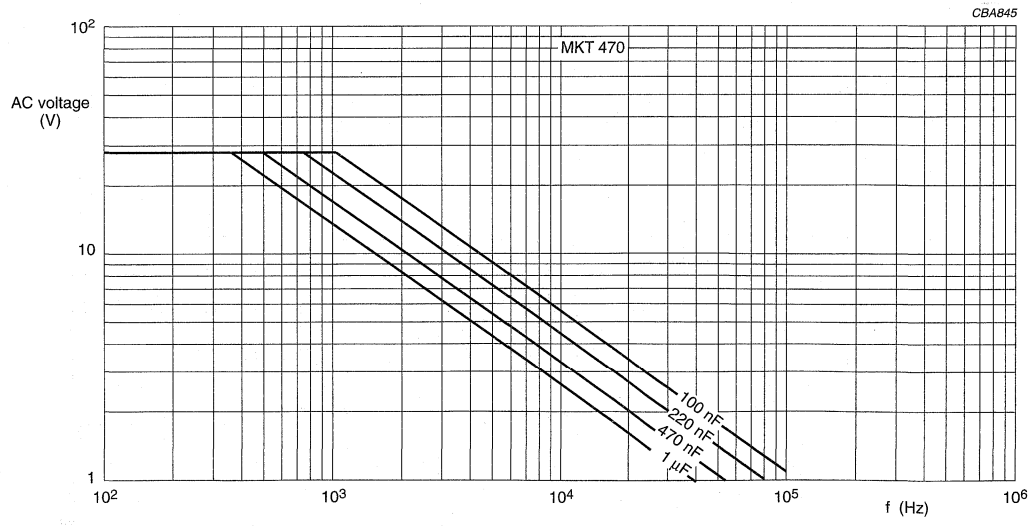


Fig.14 AC voltage (RMS value) as a function of frequency at 85 °C < $T_{amb} \leq 125$ °C for $U_{Rdc} = 63$ V.

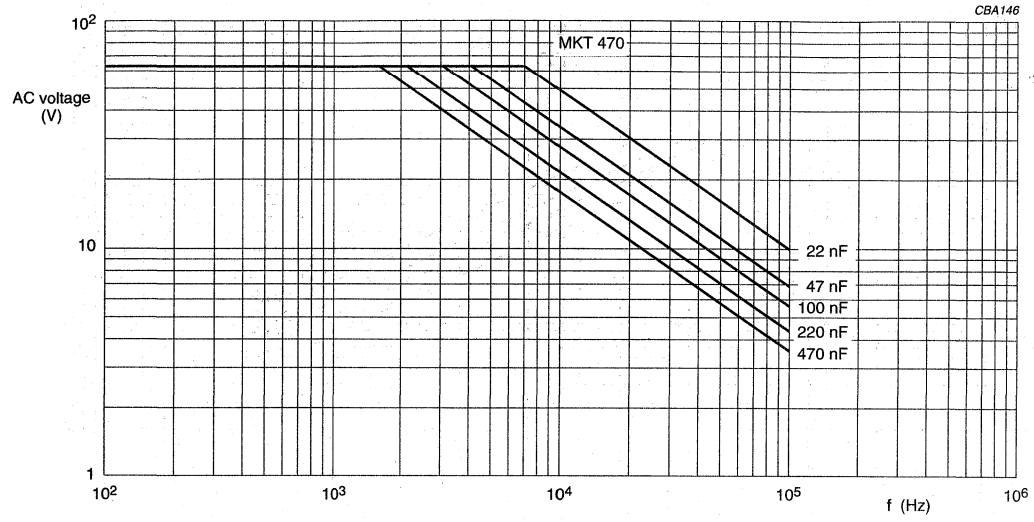


Fig.15 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C for $U_{Rdc} = 100$ V.

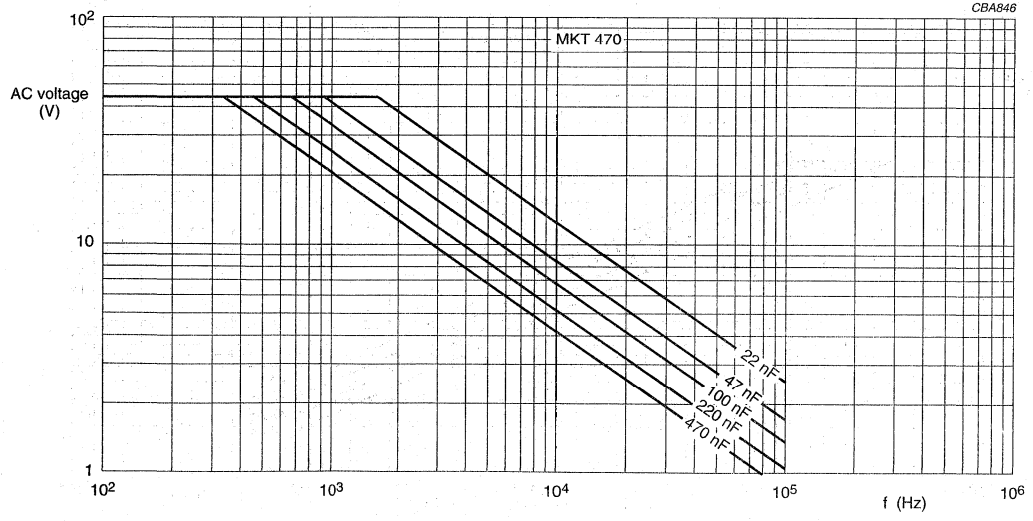


Fig.16 AC voltage (RMS value) as a function of frequency at 85 °C < $T_{amb} \leq 125$ °C for $U_{Rdc} = 100$ V.

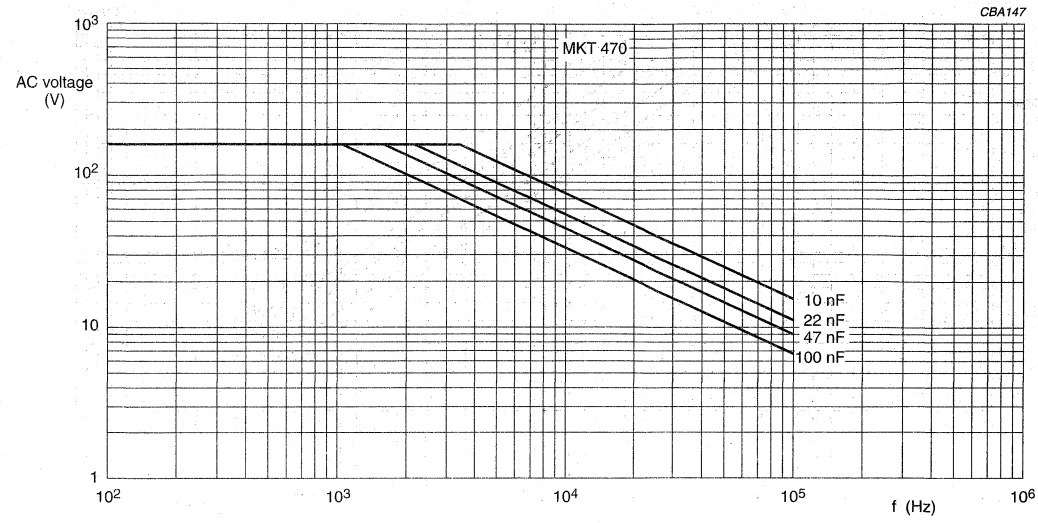


Fig.17 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C for $U_{Rdc} = 250$ V.

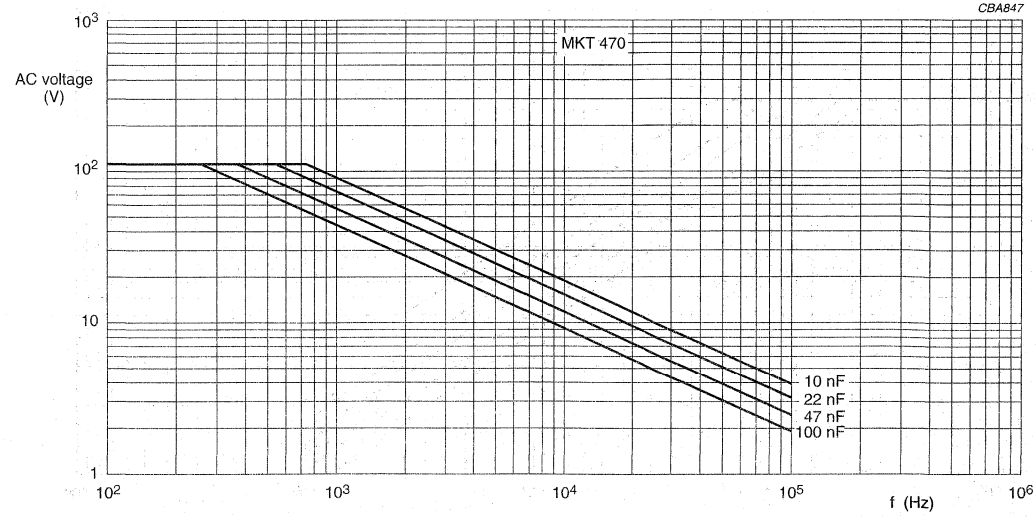


Fig.18 AC voltage (RMS value) as a function of frequency at 85 °C < $T_{amb} \leq 125$ °C for $U_{Rdc} = 250$ V.

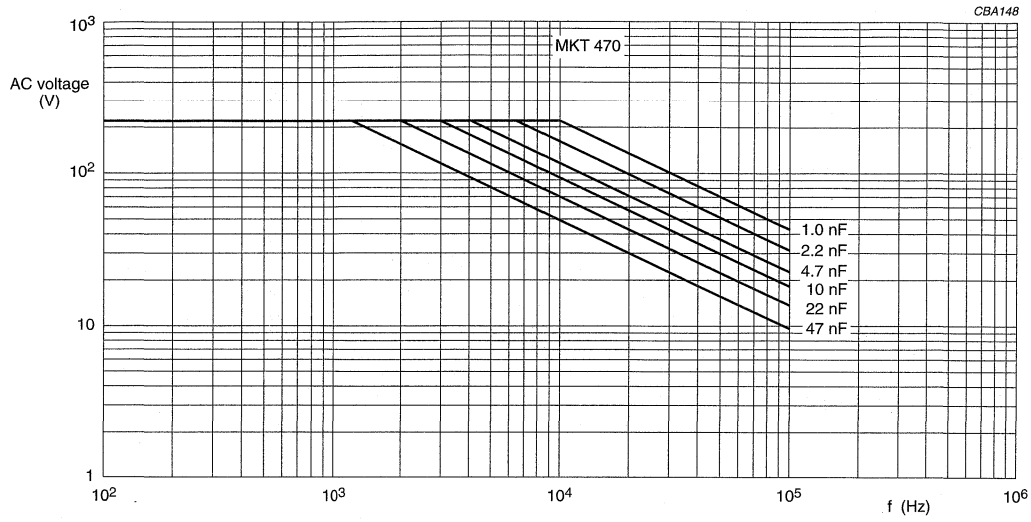


Fig.19 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C for $U_{Rdc} = 400$ V.

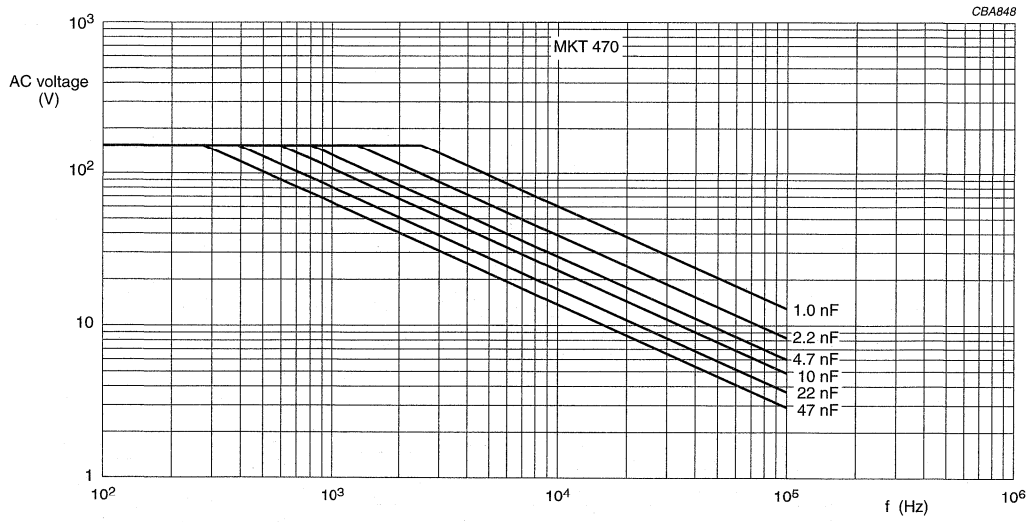


Fig.20 AC voltage (RMS value) as a function of frequency at 85 °C < $T_{amb} \leq 125$ °C for $U_{Rdc} = 400$ V.

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.

Tangent of loss angle

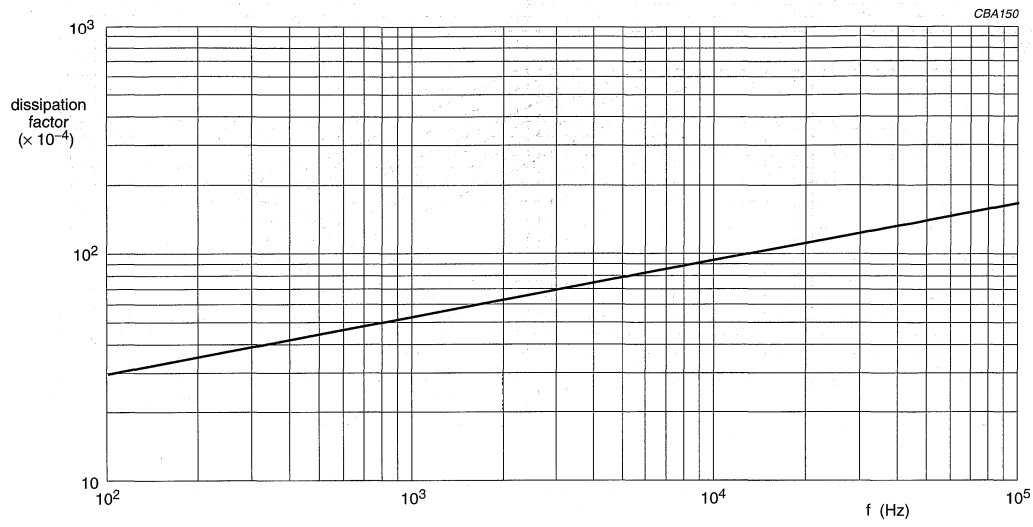


Fig.21 Tangent of loss angle as a function of frequency: typical curve.

Insulation resistance

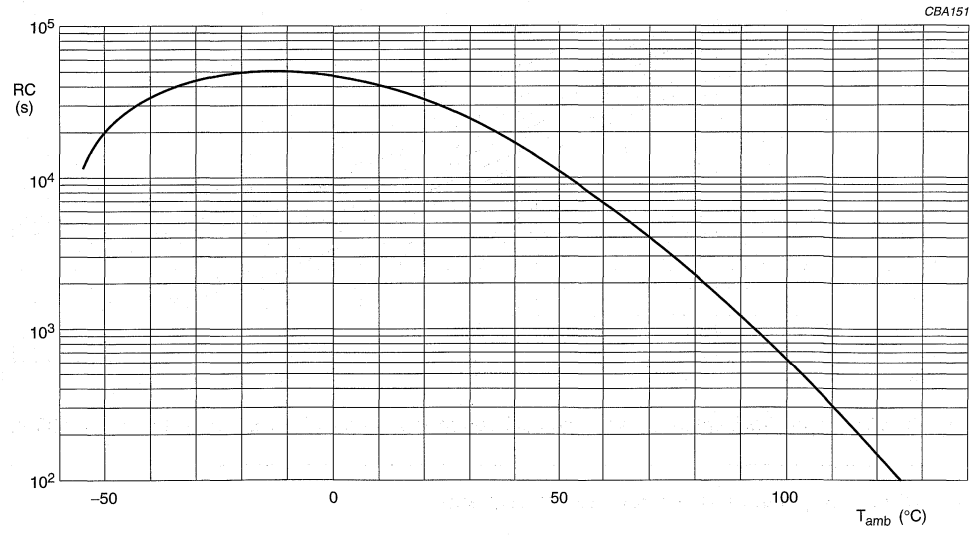


Fig.22 RC product as a function of temperature: typical curve.

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

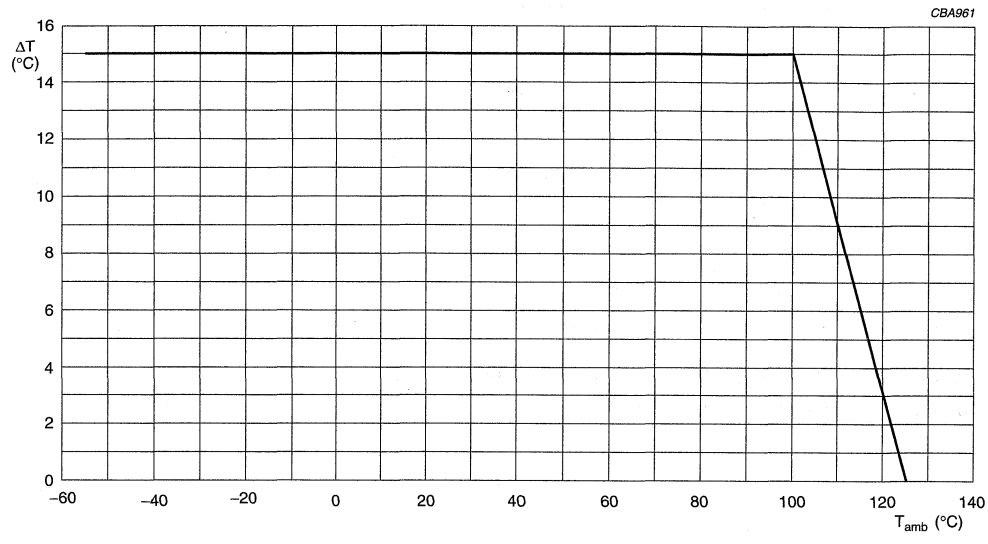


Fig.23 Maximum allowed component temperature rise as a function of the ambient temperature.

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

Table 1 Heat conductivity

b_{max} (mm)	PITCH (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.

Power dissipation can be calculated in accordance with 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).

Measuring the component temperature

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

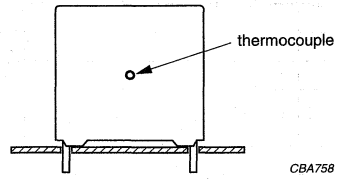


Fig.24 Mounting the thermocouple.

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

These capacitors are not suitable for mains applications as across-the-line capacitors without additional protection; see below. These mains applications are strictly regulated by safety standards and therefore electromagnetic interference suppression capacitors conforming to 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 ($U_{p\text{-}p}$) shall not be greater than the maximum $U_{p\text{-}p}$ 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	$T_{amb} < 85$ °C	$85 < T_{amb} \leq 100$ °C	$100 < T_{amb} \leq 125$ °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 ($V_{o\text{-}p}$) (<2 s)	$1.6 \times U_{Rdc}$	$1.3 \times U_{Rdc}$	$0.8 \times U_{Rdc}$

MARKING

Product marking

The capacitors are marked by YAG laser 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. 9710)
6. Manufacturers type designation (e.g. 470).

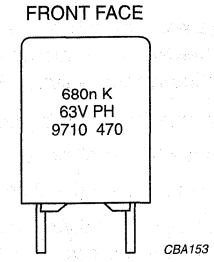
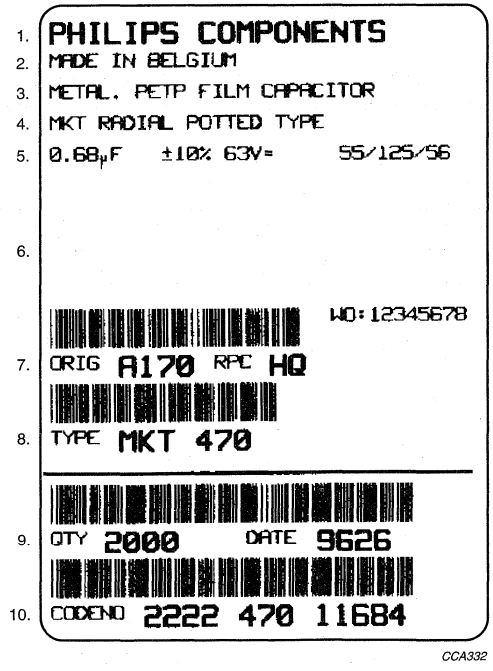


Fig.25 Example of marking.

Package marking

The package containing the capacitors is marked as shown in Fig.26.

Please note:
In due time BC COMPONENTS
will replace PHILIPS COMPONENTS



Barcode label marking

LINE	MARKING EXPLANATION
1	Manufacturer's name
2	Country of origin
3	Sub-family
4	Type description
5	Capacitance value, tolerance and climatic category *("IEC 60068-1")*
6	–
7	Preference origin code: A Country of origin in code: 170 (Belgium) Responsible production centre: HQ Work order: WO Wage number of final inspection
8	Product type description
9	Quantity and production period, year and week code
10	Product code (12NC)

Fig.26 Barcode label.

QUICK REFERENCE TEST REQUIREMENTS (see note 1)

TEST	PROCEDURE (quick reference)	REQUIREMENTS
Robustness of leads		
Tensile strength: *"IEC 60068-2-21"*	load 10 N; 10 s	no visible damage legible marking $\lvert\Delta C/C\rvert \leq 2\%$ $\Delta\tan\delta \leq 50 \times 10^{-4}$ ($C \leq 10$ 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)
Bending: *"IEC 60068-2-21"*	load 5 N; 4 × 90°	
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	$\lvert\Delta C/C\rvert \leq 5\%$ for b = 2.5 mm or $\lvert\Delta C/C\rvert \leq 3\%$ 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)
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	$\lvert\Delta C/C\rvert \leq 5\%$ $\Delta\tan\delta \leq 80 \times 10^{-4}$ ($C \leq 10$ nF) $\Delta\tan\delta \leq 50 \times 10^{-4}$ (10 nF $< C \leq$ 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"*		
Other applicable tests		
Damp heat steady state: *"IEC 60068-2-3"*	56 days; 40 °C; 90 to 95% RH	$\lvert\Delta C/C\rvert \leq 5\%$ $\Delta\tan\delta \leq 50 \times 10^{-4}$ ($C \leq 470$ 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	$\lvert\Delta C/C\rvert \leq 5\%$ $\Delta\tan\delta \leq 50 \times 10^{-4}$ ($C \leq 10$ 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	$\lvert\Delta C/C\rvert \leq 5\%$ $\Delta\tan\delta \leq 50 \times 10^{-4}$ ($C \leq 10$ 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)

TEST	PROCEDURE (quick reference)	REQUIREMENTS
Resistance to detergents	3 minutes in dishwater at 70 °C	$\lvert\Delta C/C\rvert \leq 1\%$ $\Delta\tan\delta \leq 50 \times 10^{-4}$ ($C \leq 10$ 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	$\lvert\Delta C/C\rvert \leq 3\%$ for b = 2.5 mm or $\lvert\Delta C/C\rvert \leq 5\%$ 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

Note

1. For detailed information: see *"Type detail specification HQN-384-02/104"*.

Metallized PPS film capacitor MKPS 395

MKPS RADIAL EPOXY LACQUERED TYPE PITCH 10 mm

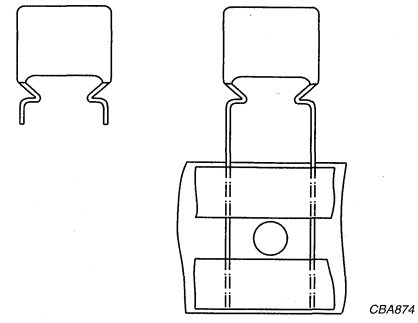


Fig.1 Simplified outlines.

FEATURES

- Low-inductive wound cell of metallized (PPS) film
- Lacquered with epoxy resin
- Radial leads of solder-coated wire.

APPLICATIONS

- Automotive electronics
- High temperature
- High frequency
- High stability
- Where high reliability is required
- Stable filters, oscillators and timers.

DETAIL SPECIFICATION

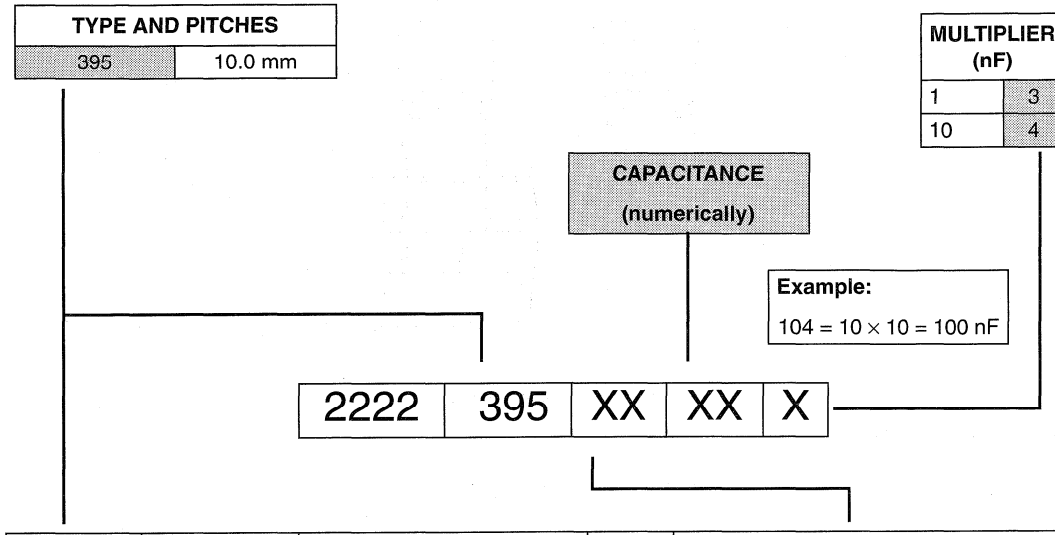
For more detailed data and test requirements see *"Type detail specification HQN-000-03/001"*.

QUICK REFERENCE DATA

DESCRIPTION	VALUE
Capacitance range	0.01 to 0.47 µF
Capacitance tolerance	±10%; ±5%
Rated (DC) voltage	63 V
Climatic category	55/125/56
Rated temperature	125 °C
Performance grade	grade 1 (long life)
Maximum application temperature	140 °C

Metallized PPS film capacitor MKPS 395

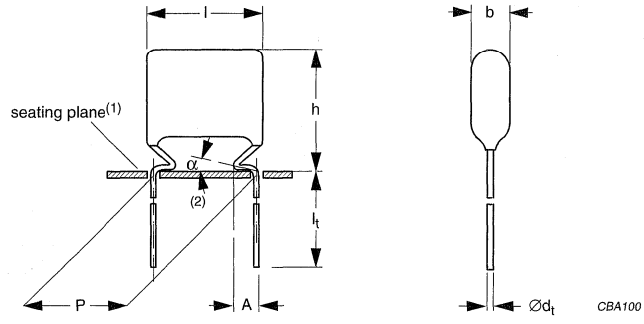
COMPOSITION OF CATALOGUE NUMBER



TYPE	PACKAGING	LEAD CONFIGURATION	C-TOL	63 V
395	loose in box	lead length 3.5 mm	±10%	05
			±5%	06
		lead length 19.5 mm	±10%	08
			±5%	09
	taped on reel	H = 16.0 mm; P_0 = 12.7 mm	±10%	02
			±5%	03

Metallized PPS film capacitor MKPS 395

MKPS 395 GENERAL DATA PITCH 10 mm



(1) Hole Ø1.0 for d_t = 0.6 mm.
(2) $0 \leq \alpha < 50°$

Fig.3 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: 0.01 µF ≤ C ≤ 0.47 µF	$\leq 20 \times 10^{-4}$	$\leq 25 \times 10^{-4}$	$\leq 45 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 63 V (DC)	200 V/µs		
R between leads, at 50 V; 1 minute	>10000 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(1)	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	l_t = 3.5 ±0.5 mm	±10%	2222 395 05...	preferred
		±5%	2222 395 06...	on request
	l_t = 19.5 ±4.0 mm	±10%	2222 395 08...	on request
		±5%	2222 395 09...	on request
Taped on reel	H = 16.0 mm; note 2	±10%	2222 395 02...	on request
		±5%	2222 395 03...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height: for detailed specifications refer to this handbook, chapter *"Packaging information"*.

U_{Rdc} = 63 V; U_{Rac} = 40 V **loose**

C (µF)	DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER(1)
			LOOSE IN BOX
			l_t = 3.5 ±0.5 mm
			C-tol = ±10%
Pitch = 10.0 ±0.4 mm; d_t = 0.60 ±0.06 mm; A = 2.0 ±0.5 mm			
0.01	4.0 × 13.0 × 12.5	0.40	2222 395 05103
0.012			2222 395 05123
0.015			2222 395 05153
0.018			2222 395 05183
0.022			2222 395 05223
0.027			2222 395 05273
0.033			2222 395 05333
0.039			2222 395 05393
0.047			2222 395 05473
0.056			2222 395 05563
0.068			2222 395 05683
0.082			2222 395 05823
0.1			2222 395 05104
0.12			2222 395 05124
0.15			2222 395 05154
0.18			2222 395 05184
0.22			2222 395 05224
0.27			2222 395 05274
0.33	4.5 × 14.0 × 12.5	0.45	2222 395 05334
0.39			2222 395 05394
0.47	5.0 × 14.0 × 12.5	0.55	2222 395 05474

Note

1. The shading indicates preferred types.

Metallized PPS film capacitor MKPS 395

CONSTRUCTION

Description

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

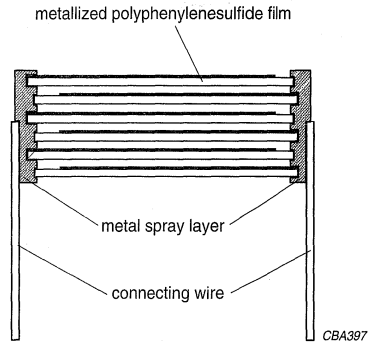


Fig.4 Construction.

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.

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 ±2%.

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

CHARACTERISTICS

Capacitance

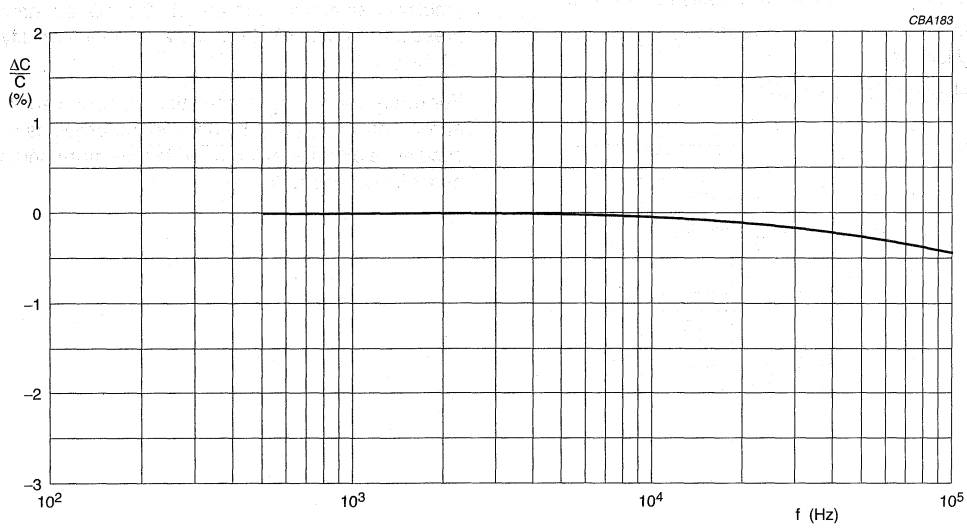


Fig.5 Capacitance change as a function of frequency: typical curve.

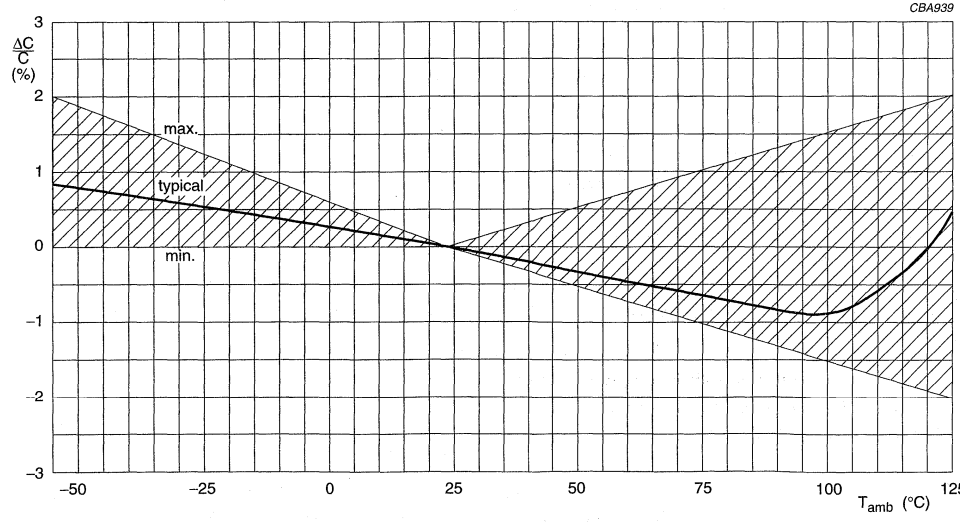


Fig.6 Capacitance change at 1 kHz as a function of ambient free air temperature: typical curve.

Impedance

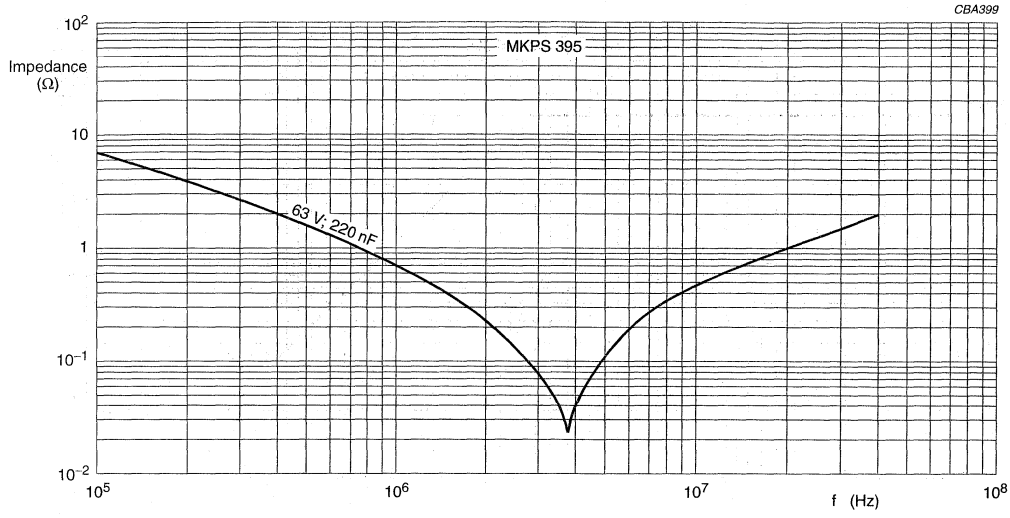


Fig.7 Impedance as a function of frequency: typical curves.

Maximum RMS voltage (sinewave) as a function of frequency for $T_{amb} \leq 125$ °C

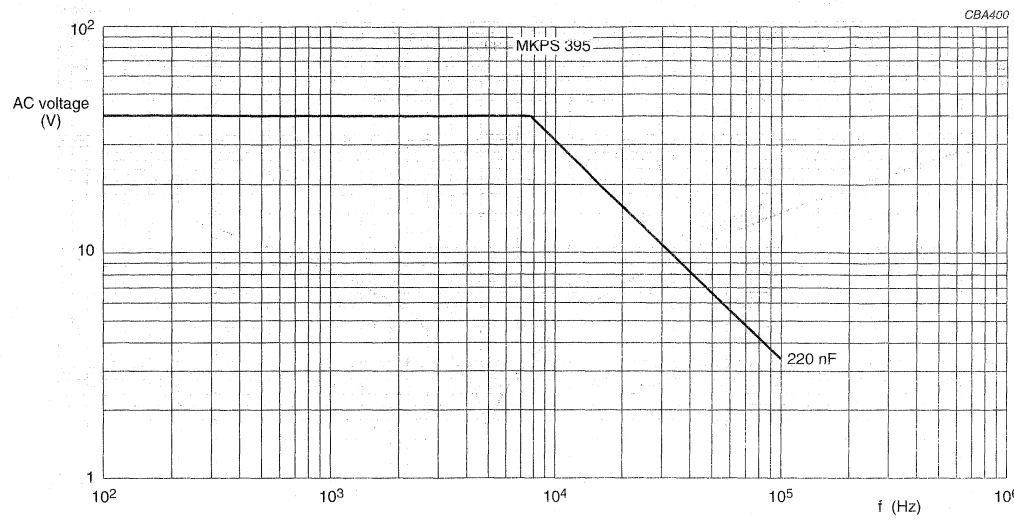


Fig.8 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 125$ °C for $U_{Rdc} = 63$ V.

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 Fig.8.

Tangent of loss angle

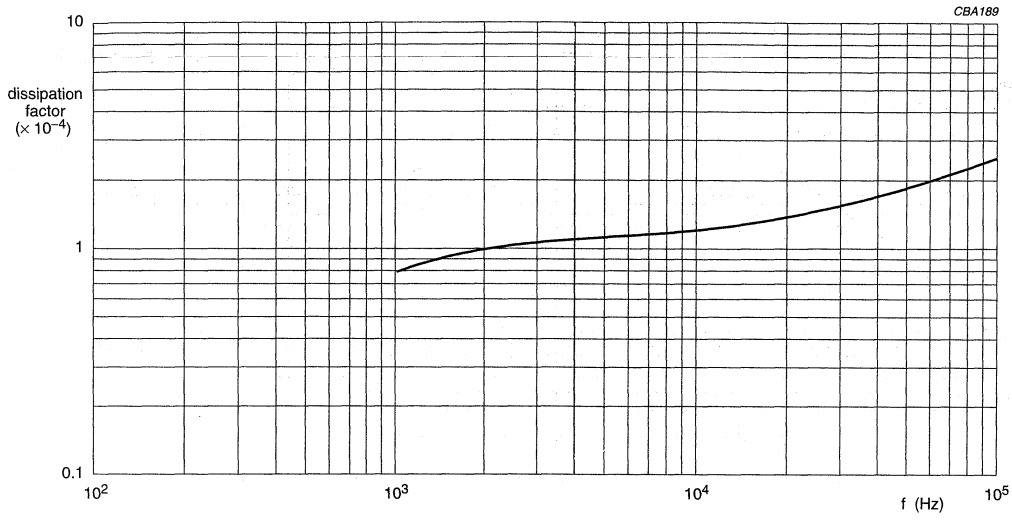


Fig.9 Tangent of loss angle as a function of frequency: typical curve.

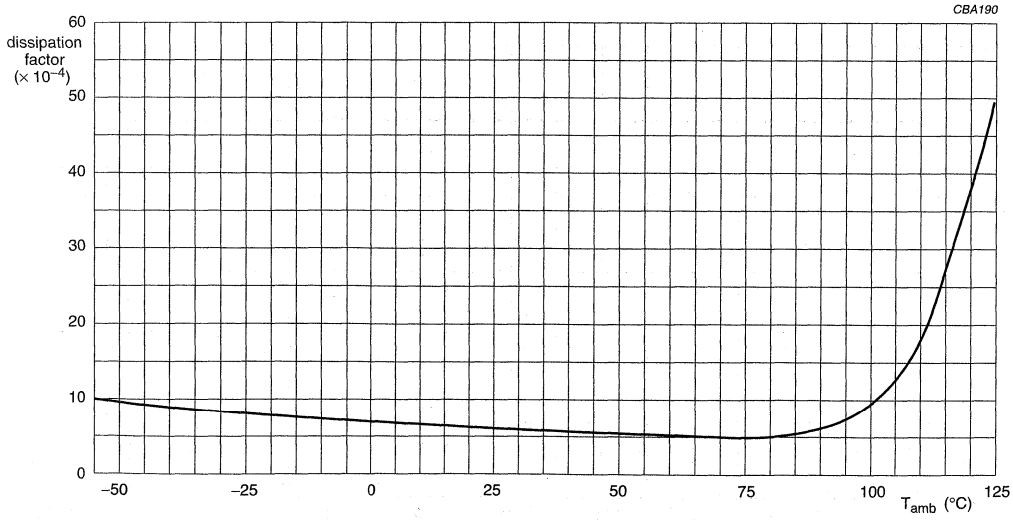


Fig.10 Tangent of loss angle as a function of ambient temperature: typical curve.

Insulation resistance

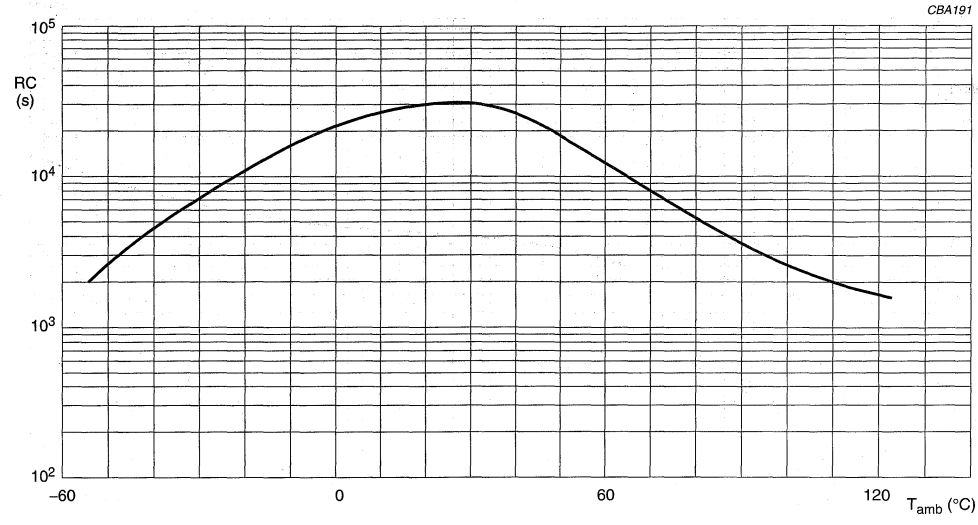


Fig.11 RC product as a function of ambient free air temperature: typical curve.

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

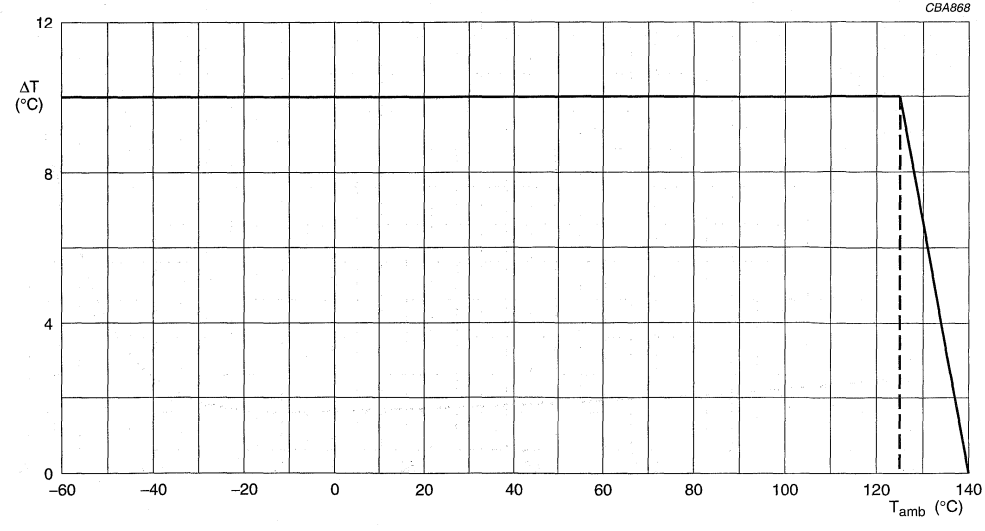


Fig.12 Maximum allowed component temperature rise as a function of the ambient temperature.

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

Table 1 Heat conductivity

b_{max} (mm)	G (mW/°C)
4.0	4.0
4.5	4.5
5.0	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.

Power dissipation can be calculated in accordance with 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).

Measuring the component temperature

A thermocouple must be attached to the capacitor body; see Fig.13.

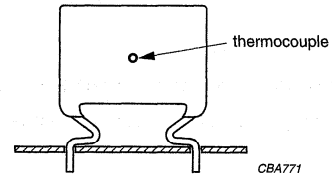


Fig.13 Mounting the thermocouple.

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.12.
5. The maximum component surface temperature must be lower than 140 °C.

MARKING

Product marking

The capacitors are marked on the top (see Fig.14) with the following information:

1. Product type: PPS
2. Capacitance code in accordance with *"IEC 60062"*: p = pF; n = nF; μ = μF
3. Tolerance on rated capacitance: M = ±20%; K = ±10%; J = ±5%.
4. Rated (DC) voltage (e.g. 63 V).

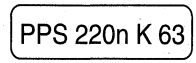


Fig.14 Example of marking.

Package marking

The package containing the capacitors is marked as shown in Fig.15.

Please note:
In due time BC COMPONENTS
will replace PHILIPS COMPONENTS

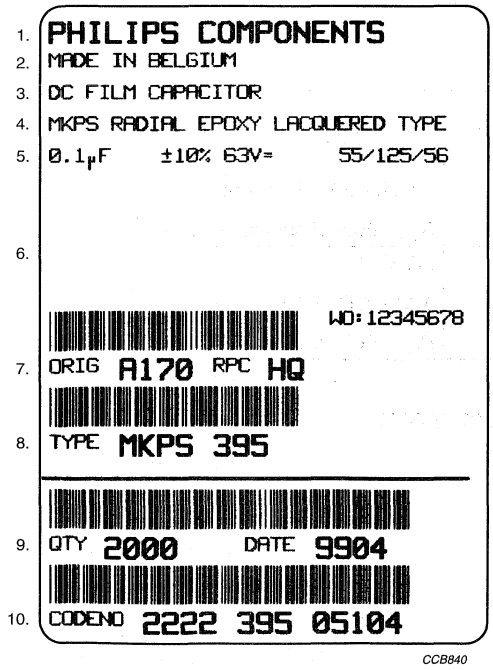


Fig.15 Barcode label.

Barcode label marking

LINE	MARKING EXPLANATION
1	Manufacturer's name
2	Country of origin
3	Sub-family
4	Type description
5	Capacitance value, tolerance, voltage and climatic category (*"IEC 60068-1"*)
6	–
7	Preference origin code: A Country of origin in code: 170 (Belgium) Responsible production centre: HQ WO: work order
8	Product type description
9	Quantity and production period, year and week code
10	Product code (12NC)

QUICK REFERENCE TEST REQUIREMENTS (see note 1)

TEST	PROCEDURE (quick reference)	REQUIREMENTS
Robustness of leads		
Tensile: *"IEC 60068-2-21"*	load 10 N; 10 s	no visible damage legible marking $\lvert\Delta C/C\rvert \leq 3\%$ $\Delta\tan\delta \leq 50 \times 10^{-4}$; note 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	
Climatic sequence		
Dry heat: *"IEC 60068-2-2"*	16 hours; 125 °C	$\lvert\Delta C/C\rvert \leq 5\%$ $\Delta\tan\delta \leq 60 \times 10^{-4}$; note 2 $R_{ins} \geq 50\%$ 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	$\lvert\Delta C/C\rvert \leq 3\%$ $\Delta\tan\delta \leq 50 \times 10^{-4}$; note 2 $R_{ins} \geq 50\%$ of specified value
Endurance (DC): *"IEC 60384-2"*	2000 hours; $1.25 \times U_{Rdc}$; 125 °C	$\lvert\Delta C/C\rvert \leq 5\%$ $\Delta\tan\delta \leq 50 \times 10^{-4}$; note 2 $R_{ins} \geq 50\%$ of specified value

Notes

1. For detail information: see *"Type detail specification HQN-000-03/001"*.
2. Measuring frequency 100 kHz.

Polyester film capacitors KT 347

KT RADIAL PHENOLIC LACQUERED TYPE **PITCH 10/15/22.5/27.5 mm**

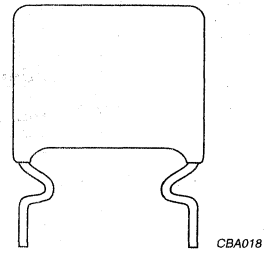


Fig.1 Simplified outline.

FEATURES

- Low-inductive wound cell of metal foil and a polyethylene terephthalate film
- Lacquered, which is self-extinguishing
- Radial leads of solder-coated wire.

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 1 μF
Capacitance tolerance	±20%; ±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

Polyester film capacitors KT 347

COMPOSITION OF CATALOGUE NUMBER

TYPE AND PITCHES	
347	10.16 mm
	15.24 mm
	22.86 mm
	27.94 mm

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

CAPACITANCE (numerically)

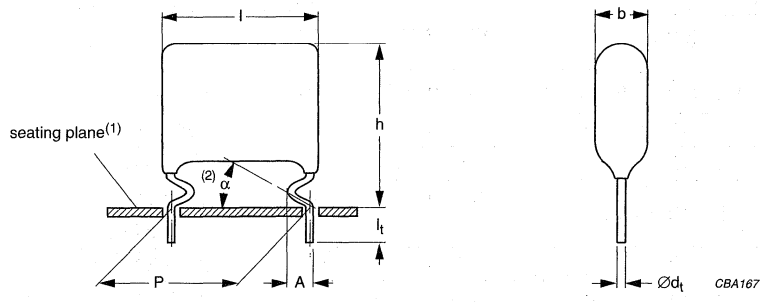
Example:
104 = 10 × 10 = 100 nF

2222	347	XX	XX	X

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

Polyester film capacitors KT 347

KT 347 GENERAL DATA PITCH 10/15/22.5/27.5 mm



(1) Hole ∅0.8 for d_t 0.6 mm.
Hole ∅1.0 for d_t = 0.8 mm.
(2) $0 \leq \alpha < 50°$.

Fig.3 Outline.

Specific reference data for the 100 V DC capacitors

DESCRIPTION	VALUE	
	at 1 kHz	at 10 kHz
Tangent of loss angle	$\leq 60 \times 10^{-4}$	$\leq 110 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 100 V (DC)	>10000 V/µs	
R between leads, for C ≤ 0.33 µF at 100 V; 1 minute	>50000 MΩ	
RC between leads, for C > 0.33 µF at 100 V; 1 minute	>16500 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(1)	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	l_t = 4.0 +1.0/–0.5 mm	±10%	2222 347 21...	preferred
		±20%	2222 347 20...	on request

Note

1. For SPQ refer to this handbook, chapter *"Packaging information"*.

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

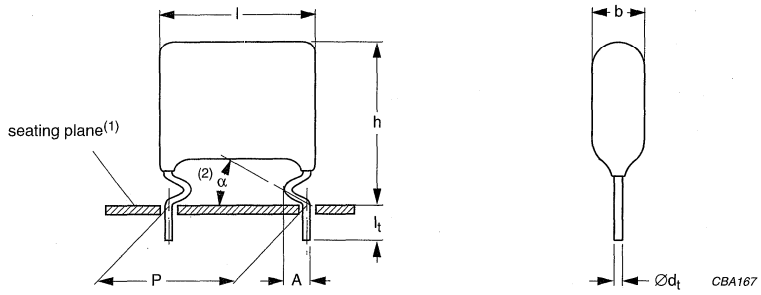
C (µF)	DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER[1] LOOSE IN BOX; l_t = 4.0 +1.0/–0.5 mm C-tol = ±10%
Pitch = 10.16 ±0.30 mm; d_t = 0.60 ±0.06 mm; A = 2.0 ±0.5 mm			
0.015	4.5 × 12.5 × 14.0	0.4	2222 347 21**153**
0.018	5.0 × 12.5 × 14.0	0.5	2222 347 21**183**
0.022	5.5 × 13.0 × 14.0	0.6	2222 347 21**223**
0.027		0.7	2222 347 21**273**
0.033	6.0 × 13.5 × 14.0	0.7	2222 347 21**333**
0.039	6.5 × 14.0 × 14.0	0.8	2222 347 21**393**
0.047	7.0 × 14.5 × 14.0	0.9	2222 347 21**473**
Pitch = 15.24 ±0.30 mm; d_t = 0.80 ±0.08 mm; A = 3.5 ±1.0 mm			
0.056	5.5 × 14.0 × 19.0	1.2	2222 347 21**563**
0.068	6.0 × 14.5 × 19.0	1.3	2222 347 21**683**
0.082	7.0 × 15.5 × 19.0	1.5	2222 347 21**823**
0.1	7.5 × 16.0 × 19.0	1.7	2222 347 21**104**
0.12	8.0 × 16.5 × 19.0	1.9	2222 347 21**124**
0.15	8.5 × 17.0 × 19.0	2.3	2222 347 21**154**
Pitch = 22.86 ±0.30 mm; d_t = 0.80 ±0.08 mm; A = 3.5 ±1.0 mm			
0.18	7.5 × 18.0 × 27.0	2.8	2222 347 21**184**
0.22	7.5 × 18.5 × 27.0	3.2	2222 347 21**224**
0.27	8.0 × 19.5 × 27.0	3.8	2222 347 21**274**
0.33	9.0 × 20.0 × 27.0	4.4	2222 347 21**334**
0.39	10.0 × 21.0 × 27.0	5.1	2222 347 21394
0.47	11.0 × 22.0 × 27.0	6.0	2222 347 21**474**
Pitch = 27.94 ±0.30 mm; d_t = 0.80 ±0.08 mm; A = 3.5 ±1.0 mm			
0.56	10.5 × 22.5 × 32.0	7.0	2222 347 21**564**
0.68	11.5 × 23.5 × 32.0	8.4	2222 347 21**684**
0.82	12.5 × 24.5 × 32.5	10.2	2222 347 21**824**
1	14.0 × 26.0 × 32.5	12.5	2222 347 21**105**

Note

1. The shading indicates preferred types.

Polyester film capacitors KT 347

KT 347 GENERAL DATA PITCH 10/15/22.5/27.5 mm



(1) Hole Ø0.8 for $d_t = 0.6$ mm.
Hole Ø1.0 for $d_t = 0.8$ mm.
(2) $0 \leq \alpha < 50°$.

Fig.4 Outline.

Specific reference data for the 250 V DC capacitors

DESCRIPTION	VALUE	
	at 1 kHz	at 10 kHz
Tangent of loss angle	$\leq 60 \times 10^{-4}$	$\leq 110 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 250 V (DC)	>10000 V/μs	
R between leads, for C ≤ 0.33 μF at 100 V; 1 minute	>50000 MΩ	
RC between leads, for C > 0.33 μF at 100 V; 1 minute	>16500 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(1)	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 4.0$ +1.0/−0.5 mm	±10%	2222 347 41...	preferred
		±20%	2222 347 40...	on request

Note

1. For SPQ refer to this handbook, chapter *"Packaging information"*.

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

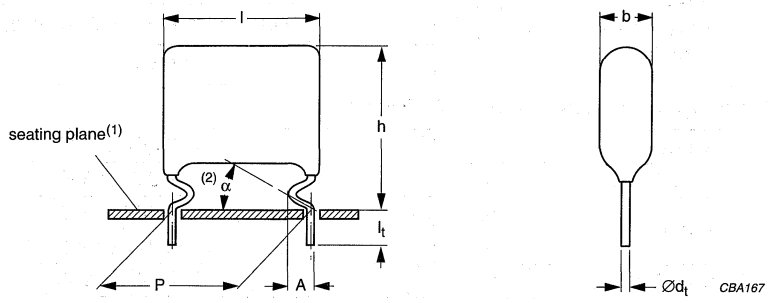
C (µF)	DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER[1] LOOSE IN BOX; l_t = 4.0 +1.0/–0.5 mm C-tol = ±10%
Pitch = 10.16 ±0.30 mm; d_t = 0.60 ±0.06 mm; A = 2.0 ±0.5 mm			
0.0082	4.5 × 12.0 × 13.5	0.4	2222 347 41**822**
0.01	5.0 × 12.5 × 13.5	0.5	2222 347 41**103**
0.012	5.5 × 13.0 × 13.5	0.5	2222 347 41**123**
0.015		0.6	2222 347 41**153**
0.018	6.0 × 13.5 × 13.5	0.7	2222 347 41**183**
0.022	6.5 × 14.0 × 13.5	0.8	2222 347 41**223**
0.027	7.0 × 14.5 × 13.5	0.9	2222 347 41**273**
Pitch = 15.24 ±0.30 mm; d_t = 0.80 ±0.08 mm; A = 3.5 ±1.0 mm			
0.033	5.5 × 14.0 × 19.0	1.1	2222 347 41**333**
0.039	6.0 × 14.5 × 19.0	1.3	2222 347 41**393**
0.047	7.0 × 15.5 × 19.0	1.4	2222 347 41**473**
0.056	7.5 × 16.0 × 19.0	1.6	2222 347 41**563**
0.068	8.0 × 16.5 × 19.0	1.8	2222 347 41**683**
0.082	8.5 × 17.0 × 19.0	2.1	2222 347 41**823**
Pitch = 22.86 ±0.30 mm; d_t = 0.80 ±0.08 mm; A = 3.5 ±1.0 mm			
0.1	7.5 × 18.0 × 27.0	2.7	2222 347 41**104**
0.12	7.5 × 18.5 × 27.0	3.0	2222 347 41**124**
0.15	8.0 × 19.5 × 27.0	3.5	2222 347 41**154**
0.18	9.0 × 20.0 × 27.0	4.0	2222 347 41**184**
0.22	10.0 × 21.0 × 27.0	4.5	2222 347 41**224**
0.27	11.0 × 22.0 × 27.0	5.3	2222 347 41**274**
Pitch = 27.94 ±0.30 mm; d_t = 0.80 ±0.08 mm; A = 3.5 ±1.0 mm			
0.33	10.5 × 22.5 × 32.0	6.3	2222 347 41**334**
0.39	11.5 × 23.5 × 32.0	7.6	2222 347 41**394**
0.47	12.5 × 24.5 × 32.5	9.1	2222 347 41**474**
0.56	14.0 × 26.0 × 32.5	10.8	2222 347 41**564**
0.68	15.5 × 27.5 × 32.5	13.1	2222 347 41**684**

Note

1. The shading indicates preferred types.

Polyester film capacitors KT 347

KT 347 GENERAL DATA PITCH 10/15/22.5/27.5 mm



(1) Hole ∅0.8 for $d_t = 0.6$ mm.
Hole ∅1.0 for $d_t = 0.8$ mm.
(2) $0 \leq \alpha < 50°$.

Fig.5 Outline.

Specific reference data for the 400 V DC capacitors

DESCRIPTION	VALUE	
	at 1 kHz	at 10 kHz
Tangent of loss angle	$\leq 60 \times 10^{-4}$	$\leq 110 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 400 V (DC)	>10000 V/µs	
R between leads, for C ≤ 0.33 µF at 100 V; 1 minute	>50000 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(1)	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	l_t = 4.0 +1.0/–0.5 mm	±10%	2222 347 51...	preferred
		±20%	2222 347 50...	on request

Note

1. For SPQ refer to this handbook, chapter *"Packaging information"*.

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

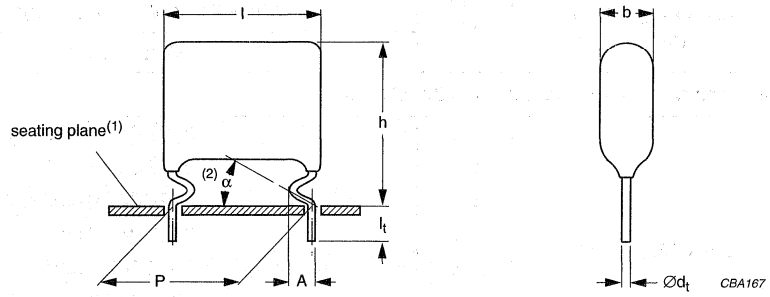
C (µF)	DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER[1] LOOSE IN BOX; l_t = 4.0 +1.0/–0.5 mm C-tol = ±10%
Pitch = 10.16 ±0.30 mm; d_t = 0.60 ±0.06 mm; A = 2.0 ±0.5 mm			
0.0047	4.5 × 12.0 × 13.5	0.4	2222 347 51**472**
0.0056	5.0 × 12.5 × 13.5	0.5	2222 347 51**562**
0.0068	5.5 × 13.0 × 13.5	0.5	2222 347 51**682**
0.0082		0.6	2222 347 51**822**
0.01	6.0 × 13.5 × 13.5	0.7	2222 347 51**103**
0.012	6.5 × 14.0 × 13.5	0.8	2222 347 51**123**
0.015	7.0 × 14.5 × 13.5	0.9	2222 347 51**153**
Pitch = 15.24 ±0.30 mm; d_t = 0.80 ±0.08 mm; A = 3.5 ±1.0 mm			
0.018	5.5 × 14.0 × 19.0	1.1	2222 347 51**183**
0.022	6.0 × 14.5 × 19.0	1.2	2222 347 51**223**
0.027	7.0 × 15.5 × 19.0	1.4	2222 347 51**273**
0.033	7.5 × 16.0 × 19.0	1.6	2222 347 51**333**
0.039	8.0 × 16.5 × 19.0	1.8	2222 347 51**393**
0.047	8.5 × 17.0 × 19.0	2.1	2222 347 51**473**
Pitch = 22.86 ±0.30 mm; d_t = 0.80 ±0.08 mm; A = 3.5 ±1.0 mm			
0.056	7.5 × 18.0 × 27.0	2.5	2222 347 51**563**
0.068	7.5 × 18.5 × 27.0	2.9	2222 347 51**683**
0.082	8.0 × 19.5 × 27.0	3.2	2222 347 51**823**
0.1	9.0 × 20.0 × 27.0	3.8	2222 347 51**104**
0.12	10.0 × 21.0 × 27.0	4.4	2222 347 51**124**
0.15	11.0 × 22.0 × 27.0	5.2	2222 347 51**154**
Pitch = 27.94 ±0.30 mm; d_t = 0.80 ±0.08 mm; A = 3.5 ±1.0 mm			
0.18	10.5 × 22.5 × 32.0	6.0	2222 347 51**184**
0.22	11.5 × 23.5 × 32.0	6.9	2222 347 51**224**
0.27	12.5 × 24.5 × 32.5	8.0	2222 347 51**274**
0.33	14.0 × 26.0 × 32.5	9.5	2222 347 51**334**

Note

1. The shading indicates preferred types.

KT 347 GENERAL DATA

PITCH 10/15/22.5/27.5 mm



(1) Hole Ø0.8 for $d_t = 0.6$ mm.
Hole Ø1.0 for $d_t = 0.8$ mm.
(2) $0 \leq \alpha < 50°$.

Fig.6 Outline.

Specific reference data for the 630 V DC capacitors

DESCRIPTION	VALUE	
	at 1 kHz	at 10 kHz
Tangent of loss angle	$\leq 60 \times 10^{-4}$	$\leq 110 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 630 V (DC)	>10000 V/µs	
R between leads, for C ≤ 0.33 µF at 100 V; 1 minute	>50000 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(1)	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 4.0$ +1.0/–0.5 mm	±10%	2222 347 61...	preferred
		±20%	2222 347 60...	on request

Note

1. For SPQ refer to this handbook, chapter *"Packaging information"*.

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

C (µF)	DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER[1] LOOSE IN BOX; l_t = 4.0 +1.0/–0.5 mm C-tol = ±10%
Pitch = 10.16 ±0.30 mm; d_t = 0.60 ±0.06 mm; A = 2.0 ±0.5 mm			
0.001	5.5 × 13.0 × 13.5	0.5	2222 347 61**102**
0.0012		0.5	2222 347 61**122**
0.0015		0.6	2222 347 61**152**
0.0018		0.7	2222 347 61**182**
0.0022		0.5	2222 347 61**222**
0.0027		0.6	2222 347 61**272**
0.0033		0.5	2222 347 61**332**
0.0039		0.6	2222 347 61**392**
0.0047	6.0 × 13.5 × 13.5	0.7	2222 347 61**472**
0.0056	6.5 × 14.0 × 13.5	0.8	2222 347 61**562**
0.0068	7.0 × 14.5 × 13.5	0.9	2222 347 61**682**
Pitch = 15.24 ±0.30 mm; d_t = 0.80 ±0.08 mm; A = 3.5 ±1.0 mm			
0.0082	5.5 × 14.0 × 19.0	1.1	2222 347 61**822**
0.01	6.0 × 14.5 × 19.0	1.2	2222 347 61**103**
0.012	7.0 × 15.5 × 19.0	1.3	2222 347 61**123**
0.015	7.5 × 16.0 × 19.0	1.5	2222 347 61**153**
0.018	8.0 × 16.5 × 19.0	1.7	2222 347 61**183**
0.022	8.5 × 17.0 × 19.0	2.0	2222 347 61**223**
Pitch = 22.86 ±0.30 mm; d_t = 0.80 ±0.08 mm; A = 3.5 ±1.0 mm			
0.027	7.5 × 18.0 × 27.0	2.5	2222 347 61**273**
0.033	7.5 × 18.5 × 27.0	2.8	2222 347 61**333**
0.039	8.0 × 19.5 × 27.0	3.0	2222 347 61**393**
0.047	9.0 × 20.0 × 27.0	3.5	2222 347 61**473**
0.056	10.0 × 21.0 × 27.0	3.8	2222 347 61**563**
0.068	11.0 × 22.0 × 27.0	4.4	2222 347 61**683**
Pitch = 27.94 ±0.30 mm; d_t = 0.80 ±0.08 mm; A = 3.5 ±1.0 mm			
0.082	10.5 × 22.5 × 32.0	5.2	2222 347 61**823**
0.1	11.5 × 23.5 × 32.0	6.2	2222 347 61**104**
0.12	12.5 × 24.5 × 32.5	7.2	2222 347 61**124**
0.15	14.0 × 26.0 × 32.5	8.7	2222 347 61**154**

Note

1. The shading indicates preferred types.

CONSTRUCTION

Description

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

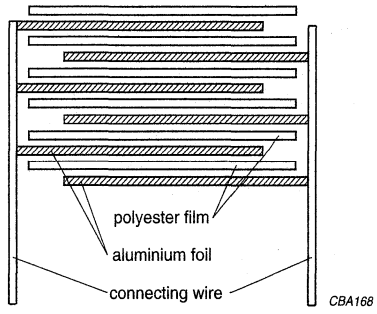


Fig.7 Construction.

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 ±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%.

RATINGS AND CHARACTERISTICS

Capacitance

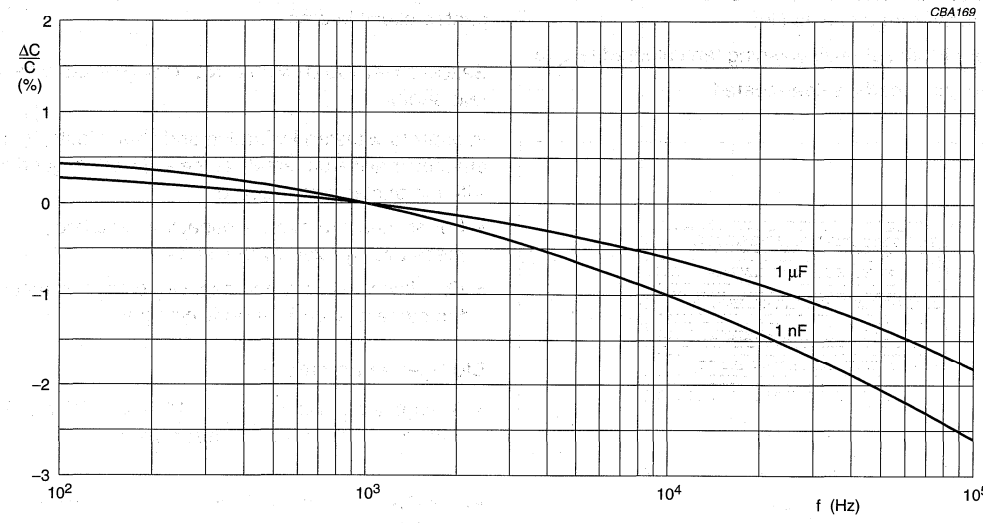


Fig.8 Capacitance change as a function of frequency: typical curves.

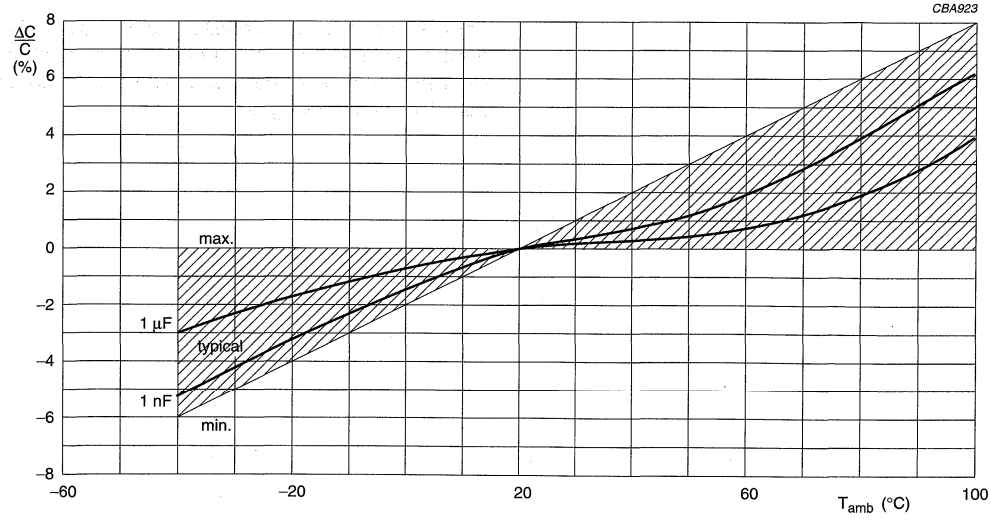


Fig.9 Capacitance change at 1 kHz as a function of ambient free air temperature.

Tangent of loss angle

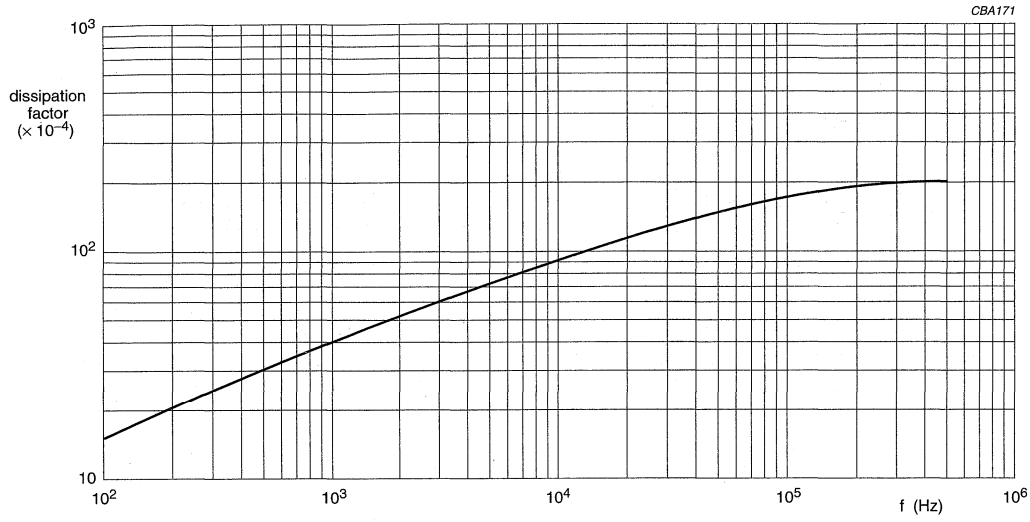


Fig.10 Tangent of loss angle as a function of frequency: typical curve.

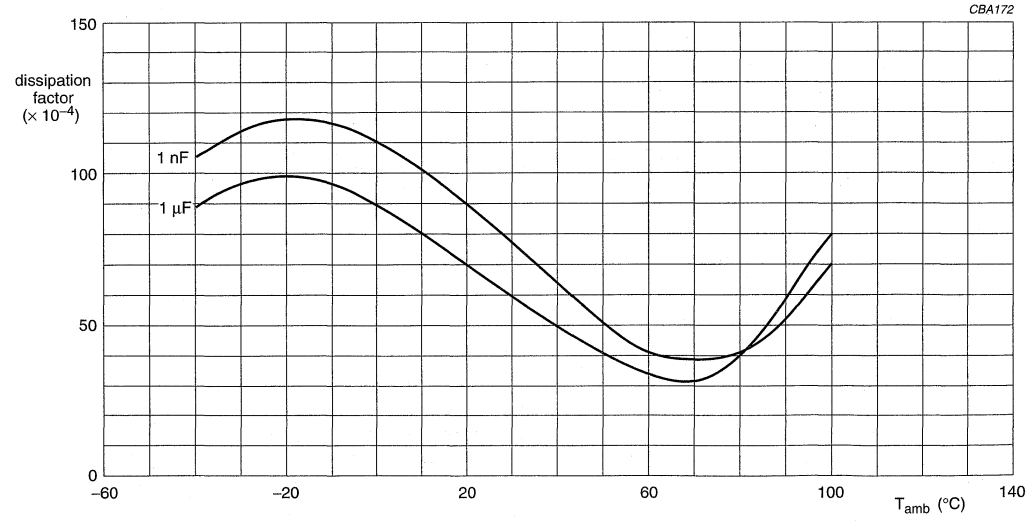


Fig.11 Tangent of loss angle as a function of ambient free air temperature: typical curves. Measuring frequency is 10 kHz.

Insulation resistance

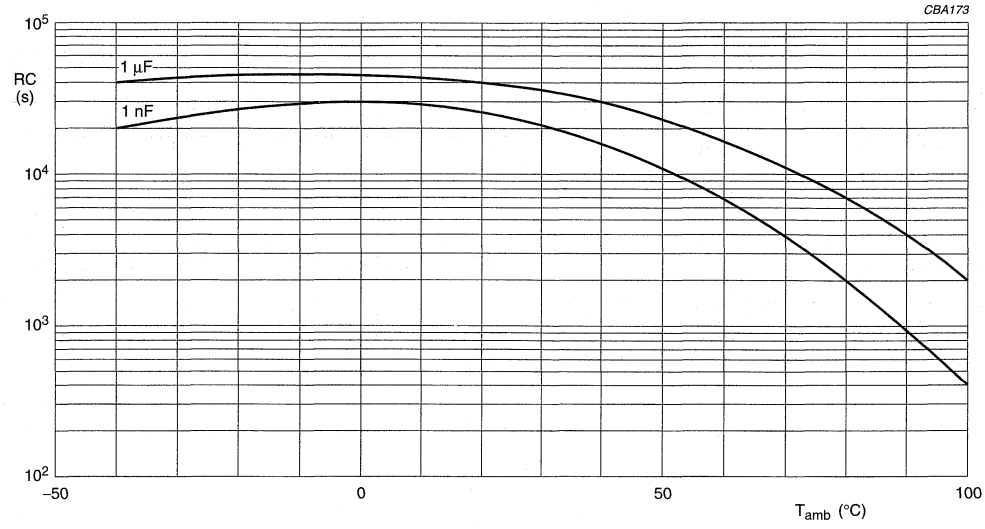


Fig.12 RC-product as a function of ambient free air temperature: typical curves.

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

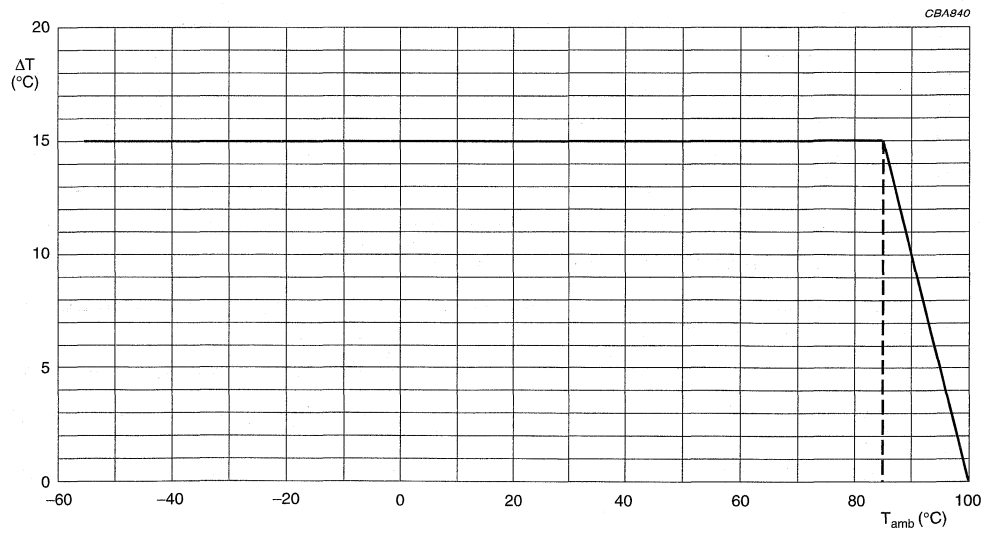


Fig.13 Maximum allowed component temperature rise as a function of the ambient temperature.

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

Table 1 Heat conductivity

b_{max} (mm)	PITCH (mm)			
	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.

Power dissipation can be calculated in accordance with 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).

Measuring the component temperature

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

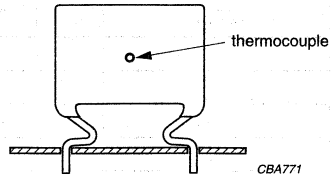


Fig.14 Mounting the thermocouple.

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 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.13.
4. The maximum component surface temperature must be lower than 100 °C.

Example

C = 470 nF, 250 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 V is lower than 250 V (DC).
2. The peak-to-peak voltage 70 V is lower than
   $2 \times \sqrt{2} \times 80$ V (AC) = 225 U_{p-p}.
3. The dissipated power is about 166 mW as calculated with tgδ = 0.0090 at 10 kHz.
   This gives a temperature rise of
   $\frac{166 \text{ mW}}{30 \text{ mW/°C}} = 5.5$ °C, which is permitted;
   see Fig.13.
4. Component temperature will be 55.5 °C, which is lower than 100 °C.

MARKING

Product marking

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

1. Manufacturer
2. Rated capacitance code in accordance with *"IEC 60062"*
3. Tolerance on rated capacitance: M ±20%; K = ±10%
4. Rated (DC) voltage (e.g. 250 V)
5. Code for dielectric material (KT)
6. Code for factory of origin (HQ).

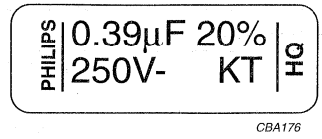
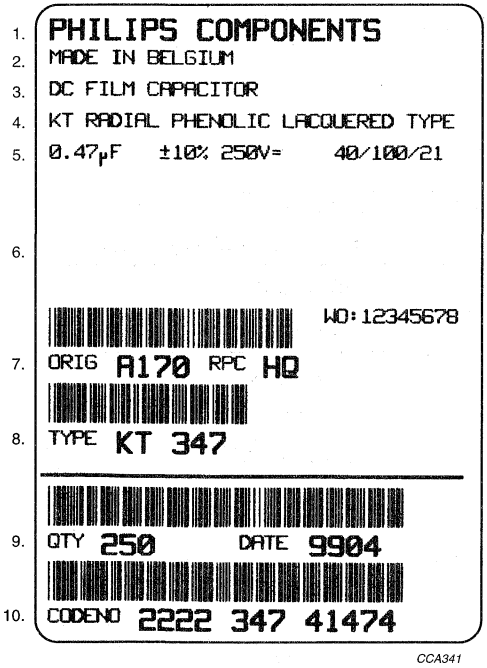


Fig.15 Example of marking.

Package marking

The package containing the capacitors is marked as shown in Fig.16.

Please note:
In due time BC COMPONENTS
will replace PHILIPS COMPONENTS



Barcode label marking

LINE	MARKING EXPLANATION
1	Manufacturer's name
2	Country of origin
3	Sub-family
4	Type description
5	Capacitance value, tolerance, voltage and climatic category (*"IEC 60068-1"*)
6	–
7	Preference origin code: A Country of origin in code: 170 (Belgium) Responsible production centre: HQ Work order: WO
8	Product type description
9	Quantity and production period, year and week code
10	Product code (12NC)

Fig.16 Barcode label.

QUICK REFERENCE TEST REQUIREMENTS (see note 1)

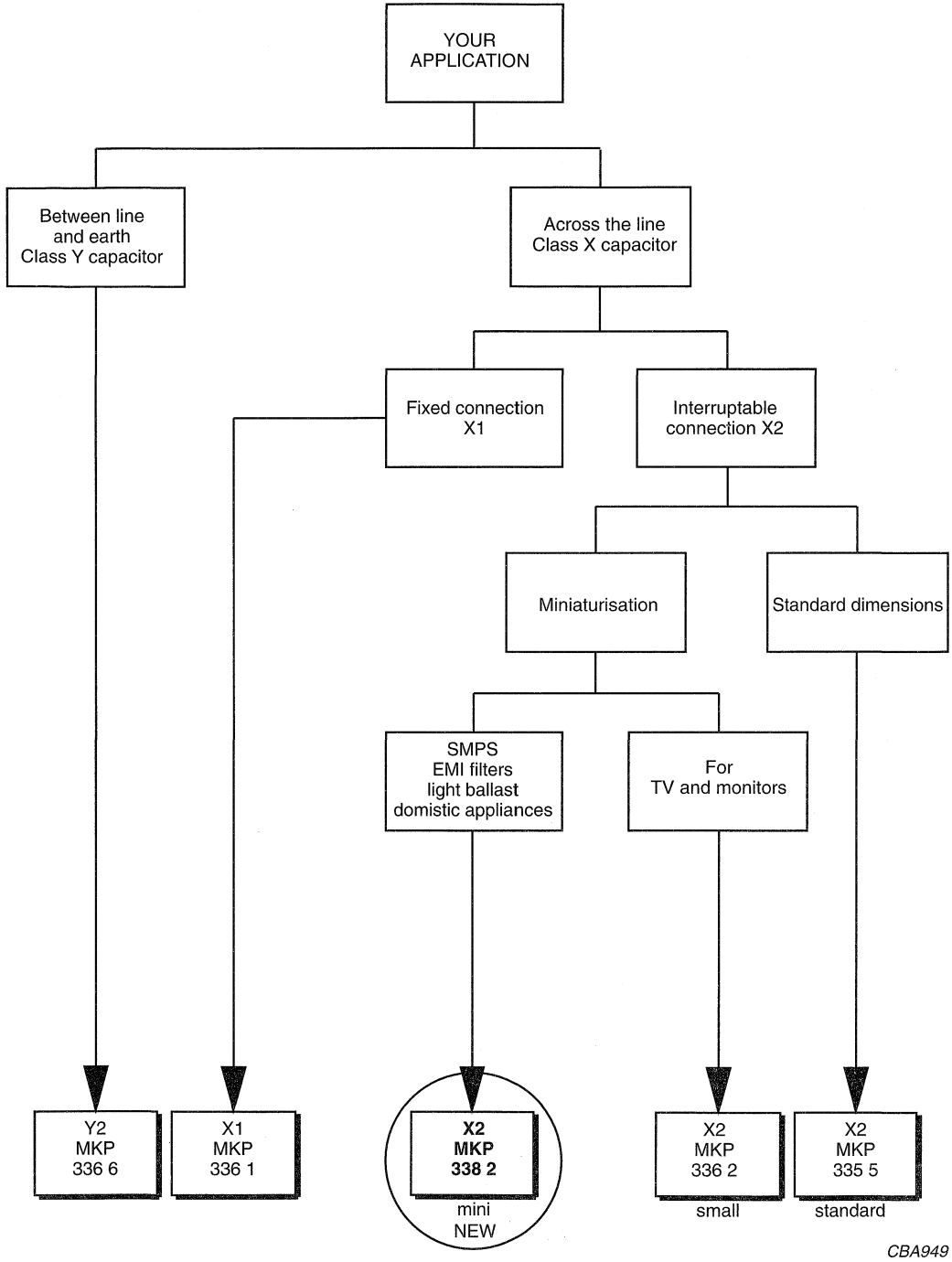
TEST	PROCEDURE (quick reference)	REQUIREMENTS
Robustness of leads		
Tensile: *"IEC 60068-2-21"*	load 10 N; 10 s	no visible damage legible marking $\lvert\Delta C/C\rvert \leq 2\%$
Bending: *"IEC 60068-2-21"*	load 5 N; 4 × 90°	
Resistance to soldering heat *"IEC 60068-2-20 A"*	solder bath: 260 °C; 10 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	$\lvert\Delta C/C\rvert \leq 5\%$
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	$\lvert\Delta C/C\rvert \leq 5\%$ $R_{ins} \geq 50\%$ 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	$\lvert\Delta C/C\rvert \leq 5\%$ $R_{ins} \geq 50\%$ of specified value
Endurance (DC): *"IEC 60384-11"*	1000 hours; $1.5 \times U_{Rdc}$; 85 °C $1.2 \times U_{Rdc}$; 100 °C	$\lvert\Delta C/C\rvert \leq 10\%$ $R_{ins} \geq 50\%$ of specified value
Heat storage: *"IEC 60384-11"*	1000 hours; 100 °C	$\lvert\Delta C/C\rvert \leq 5\%$
Resistance to soldering heat with preheating: *"IEC 60384-11"*	body temperature: 100 °C; bath temperature: 260 °C; dwell time: 10 s	$\lvert\Delta C/C\rvert \leq 2\%$

Note

1. For detailed information, see *"Type detail specification HQN-384-11/101"*.

INTERFERENCE SUPPRESSION CAPACITORS

HOW TO SELECT



Interference suppression film capacitors MKP 336 6

MKP RADIAL POTTED TYPE **PITCH 10/15 mm**

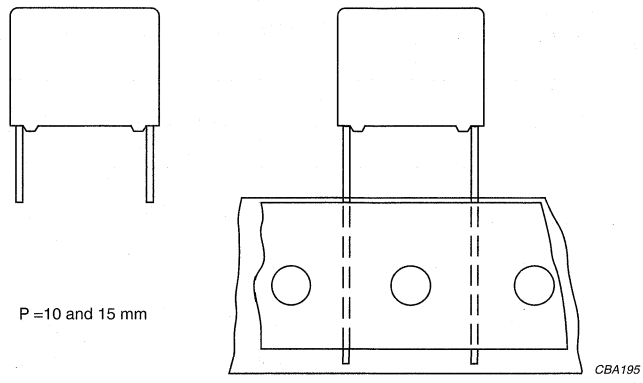


Fig.1 Simplified outlines.

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 NEW REQUIREMENTS of the new *"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/C
Rated temperature	100 °C
Maximum application temperature	100 °C
Reference specifications	IEC 60384-14 2nd edition and EN 132400
Safety approvals	UL1414; UL1283; CSA-C22.2 No 1; SEV; VDE; ÖVE; note 1 CCEE; note 2
Materials	qualified in accordance with UL94 V-0
Safety class	Y2

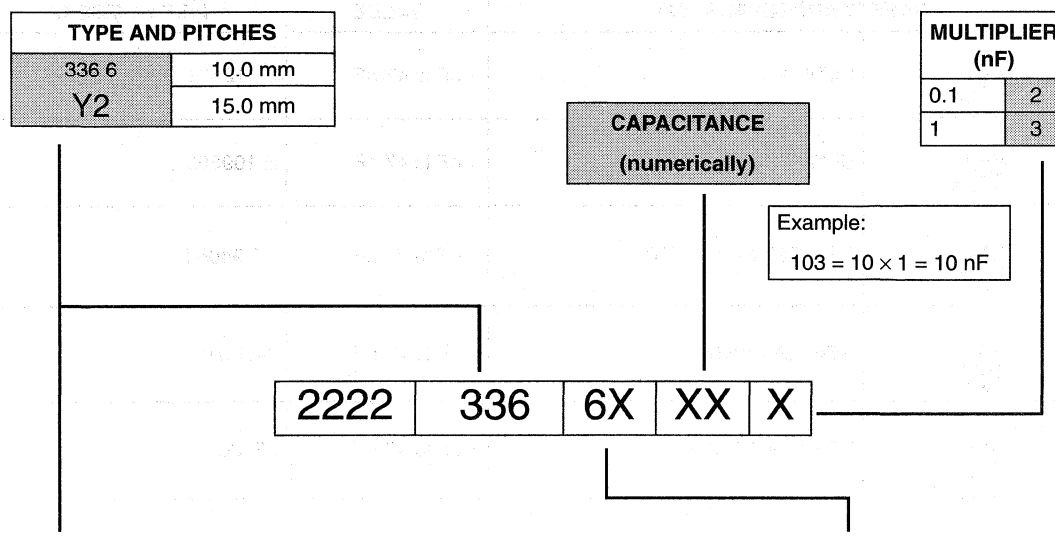
Notes

1. Approved.
2. Pending.

SAFETY APPROVALS

SAFETY APPROVALS (Y2)		VALUE	FILE NUMBERS
	UL1414	1 nF to 47 nF	E 112471
	UL1283	1 nF to 47 nF	E 109565
	CSA-C22.2 No.1-M90	1 nF to 47 nF	LR 94054
	SEV (EN132400)	1 nF to 47 nF	94.1 01167
	VDE (EN132400)	1 nF to 47 nF	83620
	ÖVE (EN132400)	1 nF to 47 nF	E 260-007-00
	CCEE	1 nF to 47 nF	pending

COMPOSITION OF CATALOGUE NUMBER



TYPE	PACKAGING[1]	LEAD CONFIGURATION	C-TOL	PREFERRED TYPES
336 6 Y2	loose in box	lead length 3.5 mm	±20%	0
		lead length 25.0 mm		6
				ON REQUEST
336 6 Y2	loose in box	lead length 3.5 mm	±10%	2222 336 61...
		lead length 25.0 mm		2222 336 67...
	taped on reel	H = 18.5 mm; note 2	±20%	2222 336 63...
			±10%	2222 336 64...

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

Interference suppression film capacitors MKP 336 6

MKP 336 6 GENERAL DATA **PITCH 10/15 mm**

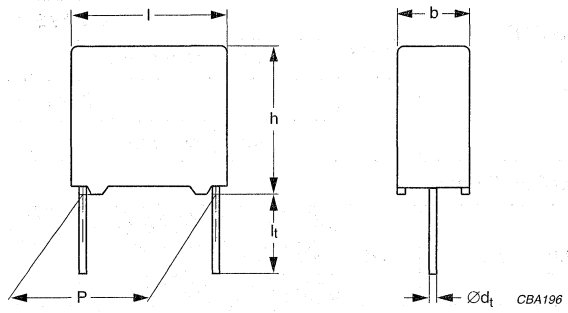


Fig.3 Outline.

Specific reference data for the 250 V, (Y2) AC 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 385 V (DC)	200 V/μs	
R between leads, for C ≤ 0.33 μF at 100 V; 1 minute	>15000 MΩ	
R between leads and case; 100 V; 1 minute	>30000 MΩ	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	2700 V; 1 s	
Withstanding (AC) voltage between leads and case	2000 V; 1 minute	

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

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

Notes

1. l_t = 3.5 ±0.3 mm for pitch = 15 mm.
2. The shading indicates preferred types.

CONSTRUCTION

Description

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

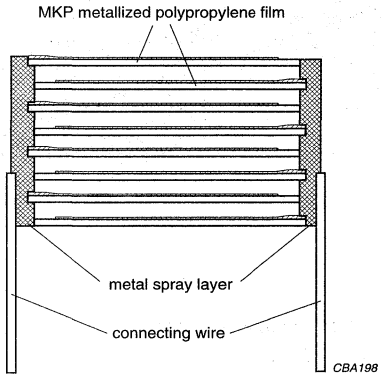


Fig.4 Construction.

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

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: $h_{max} \leq h + 0.3$ mm.

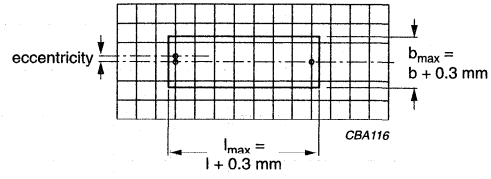


Fig.5 Lay-out.

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 ±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%.

CHARACTERISTICS

Capacitance

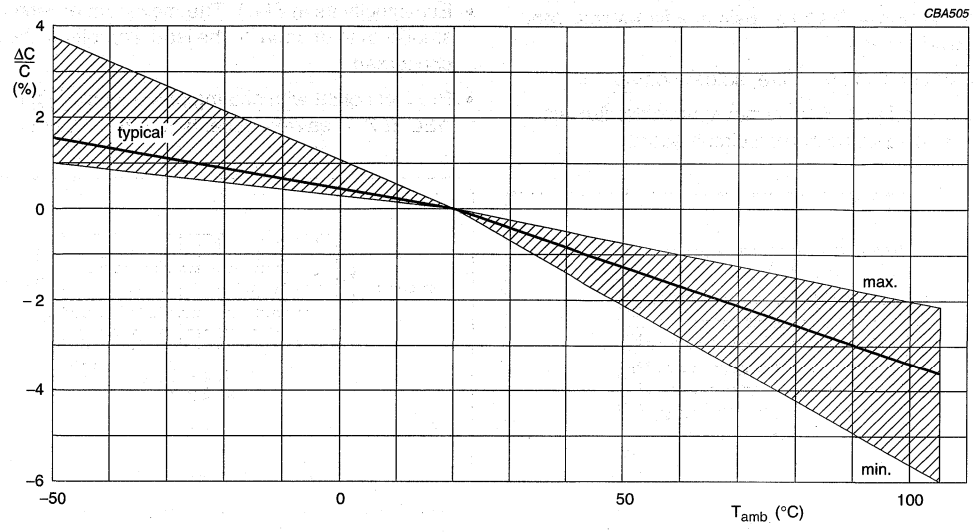


Fig.6 Capacitance change 1 kHz as a function of ambient temperature.

Tangent of loss angle

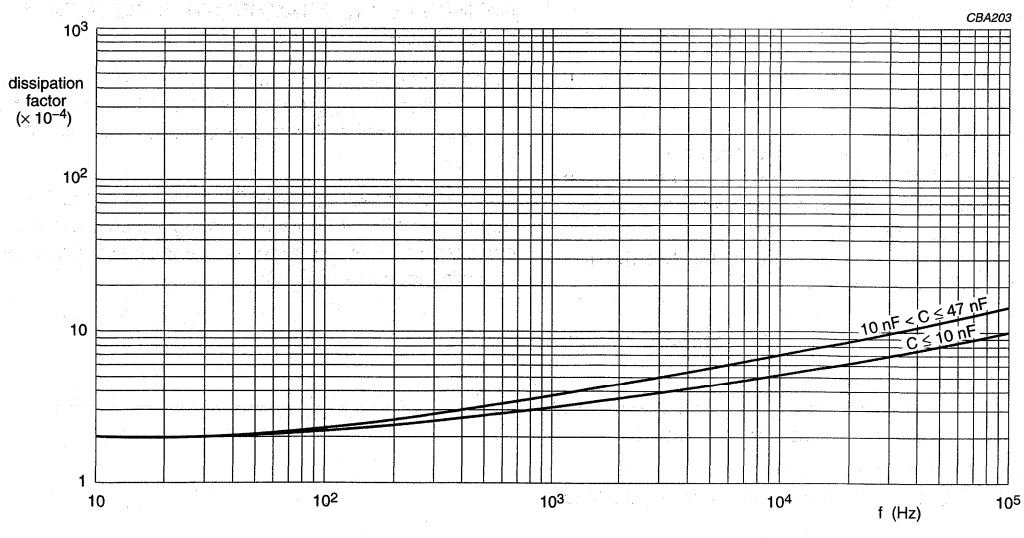


Fig.7 Tangent of loss angle as a function of frequency: typical curves.

Impedance

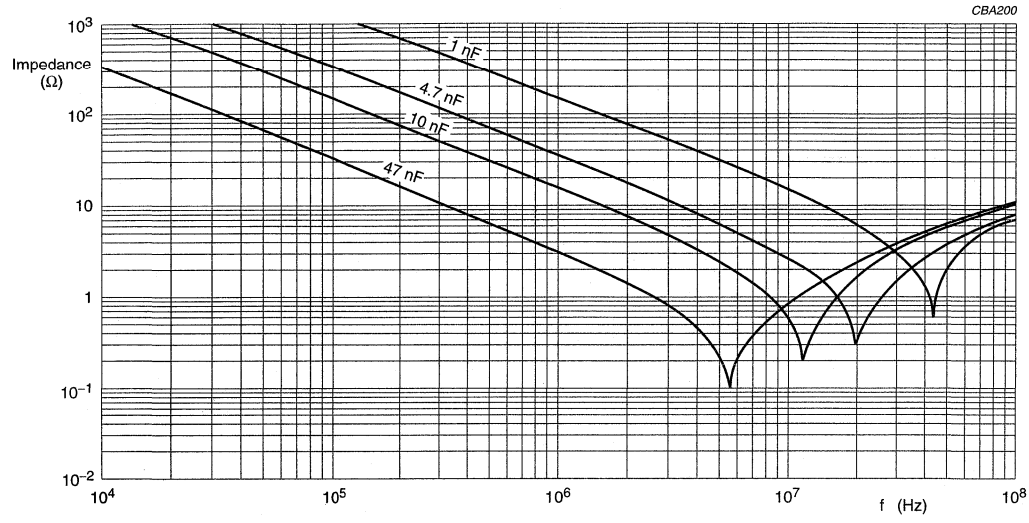


Fig.8 Impedance as a function of frequency: typical curves.

Resonant frequency

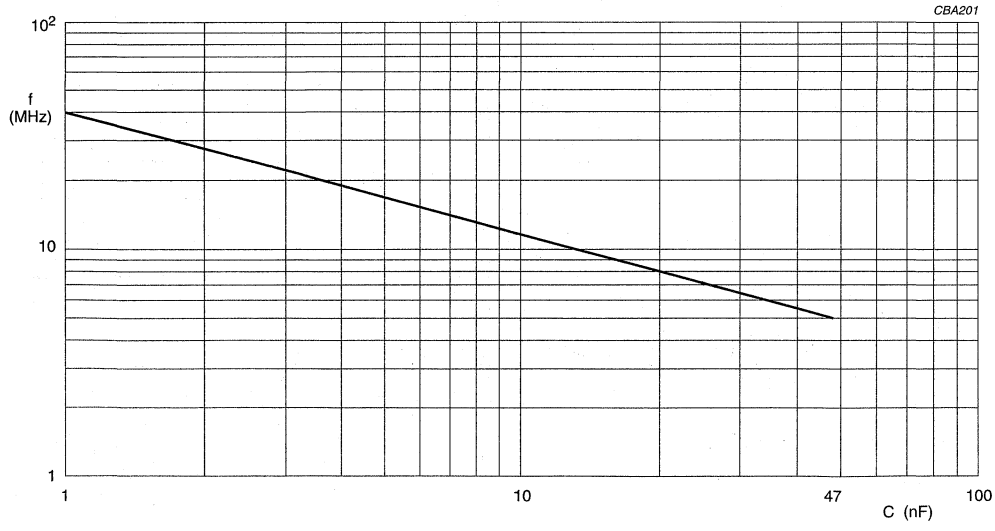


Fig.9 Resonant frequency as a function of capacitance: typical curve.

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

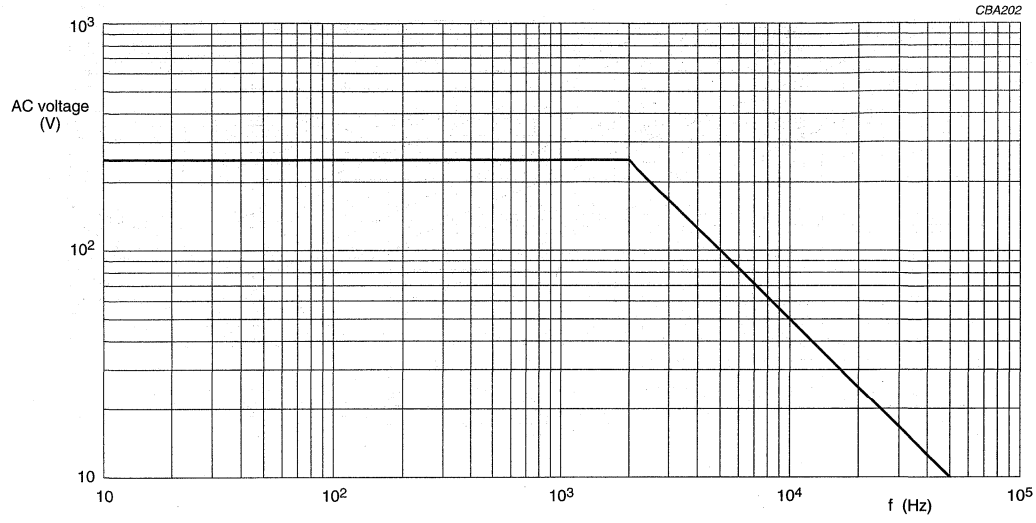


Fig.10 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 100$ °C.

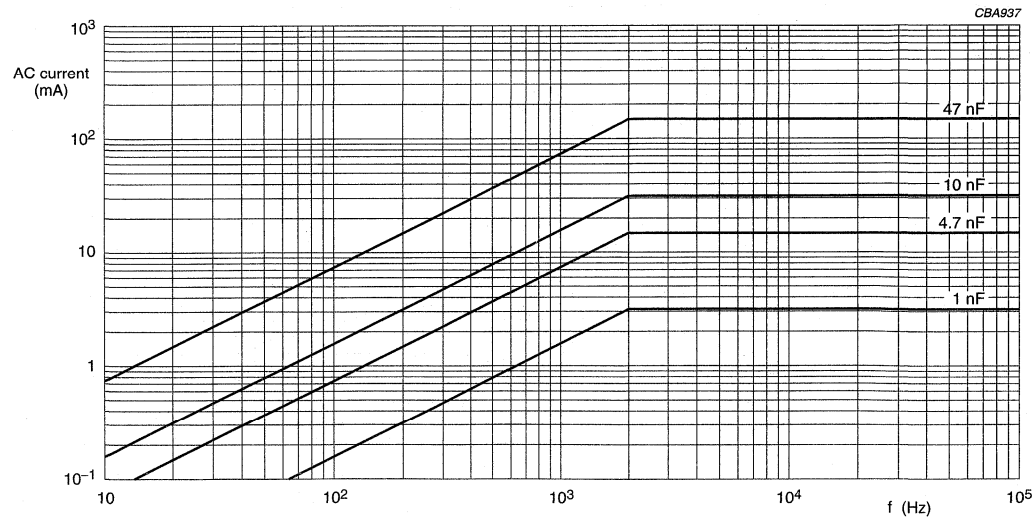


Fig.11 AC current (RMS value) as a function of frequency at $T_{amb} \leq 100$ °C.

Insulation resistance

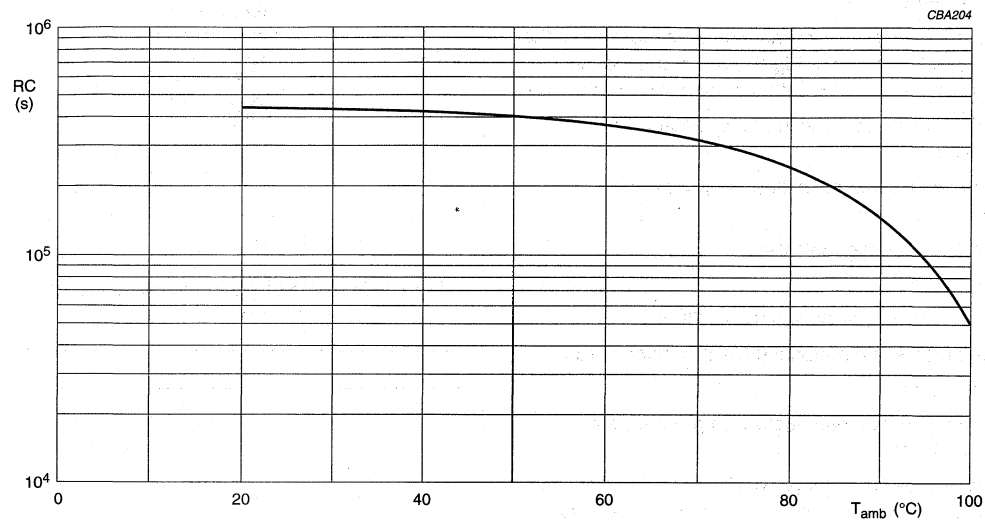


Fig.12 RC product as a function of ambient free air temperature: typical curve.

APPLICATION NOTES

- For Y2 electromagnetic interference suppression between line and earth (50 to 60 Hz) with maximum mains voltage between line and earth of 250 V (AC).
- 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.

MARKING

Product marking

The capacitors are marked by laser print on the top and the side for pitch = 15 mm (see Fig.14) or on one side for pitch = 10 mm (see Fig.13) 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 (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
8. Year and week of manufacture (e.g. 9701) for pitch = 15 mm
9. Safety approvals: products will be marked with approvals depending on the available marking space per product. Although all approvals remain valid as indicated in the reference data.

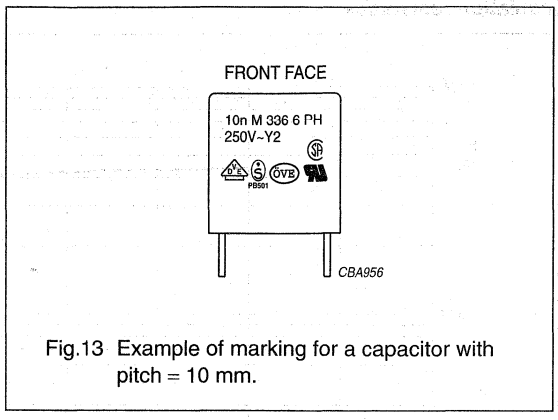


Fig.13 Example of marking for a capacitor with pitch = 10 mm.

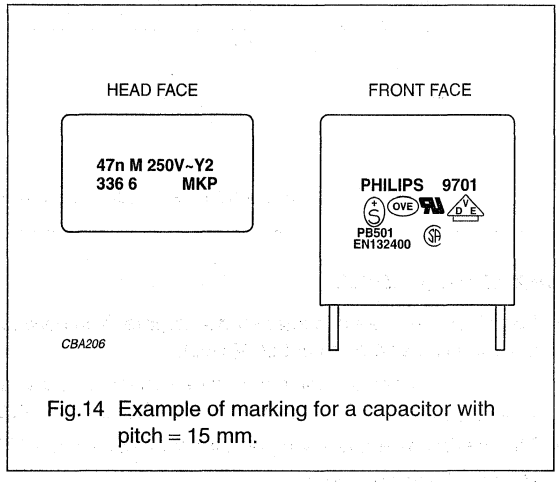
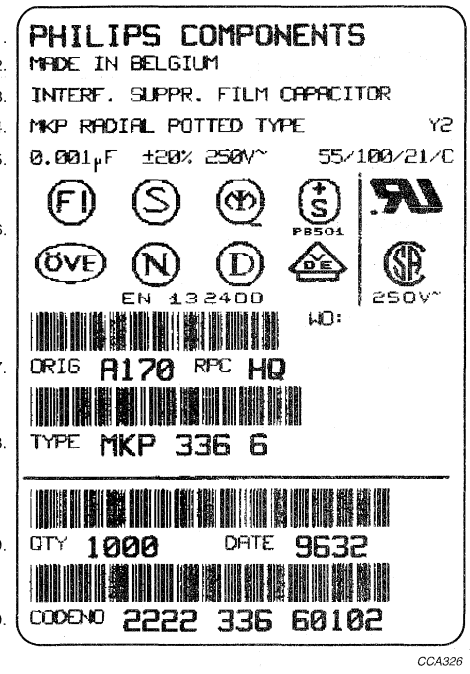


Fig.14 Example of marking for a capacitor with pitch = 15 mm.

Package marking

The package containing the capacitors is marked as shown in Fig.15.

Please note:
In due time BC COMPONENTS
will replace PHILIPS COMPONENTS



Barcode label marking

LINE	MARKING EXPLANATION
1	Manufacturer's name
2	Country of origin
3	Sub-family
4	Type description and sub class Y2
5	Capacitance value, tolerance, voltage and climatic category *("IEC 60068-1")*
6	Safety approvals
7	Preference origin code: A Country of origin in code: 170 (Belgium) Responsible production centre: HQ Work order: WO Wage number of final inspection (only for capacitors with pitch = 10 mm)
8	Product type description
9	Quantity and production period, year and week code
10	Product code (12NC)

Fig.15 Barcode label.

QUICK REFERENCE TEST REQUIREMENTS (see note 1)

TEST	PROCEDURE (quick reference)	REQUIREMENTS
Robustness of leads		
Tensile strength: *"IEC 60068-2-21"*	load 10 N; 10 s	no visible damage legible marking $\lvert\Delta C/C\rvert \leq 5\%$ $\Delta\tan\delta \leq 80 \times 10^{-4}$
Bending: *"IEC 60068-2-21"*	load 5 N; 4 × 90°	
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	$\lvert\Delta C/C\rvert \leq 5\%$ $\Delta\tan\delta \leq 80 \times 10^{-4}$
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	$\lvert\Delta C/C\rvert \leq 5\%$ $\Delta\tan\delta \leq 80 \times 10^{-4}$ $R_{ins} \geq 50\%$ 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	$\lvert\Delta C/C\rvert \leq 5\%$ $\Delta\tan\delta \leq 70 \times 10^{-4}$ $R_{ins} \geq 50\%$ of specified value
Endurance (AC): *"IEC 60384-14"*	3 × 5 kV pulse voltage; 1000 hours; 1.7 × 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	$\lvert\Delta C/C\rvert \leq 10\%$ $\Delta\tan\delta \leq 80 \times 10^{-4}$ $R_{ins} \geq 50\%$ of specified value
Charge and discharge: *"IEC 60384-14"*	10000 cycles; 5 ms; 1.5 × dV/dt	$\lvert\Delta C/C\rvert \leq 10\%$ $\Delta\tan\delta \leq 80 \times 10^{-4}$ $R_{ins} \geq 50\%$ of specified value
Passive flammability: *"IEC 60384-14"*	class C	no burning

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

Note

1. For detailed information: see *"Type detail specification HQN-384-14/109"*.

Interference suppression film capacitors MKP 336 1

MKP RADIAL POTTED TYPE **PITCH 10/15/22.5/27.5 mm**

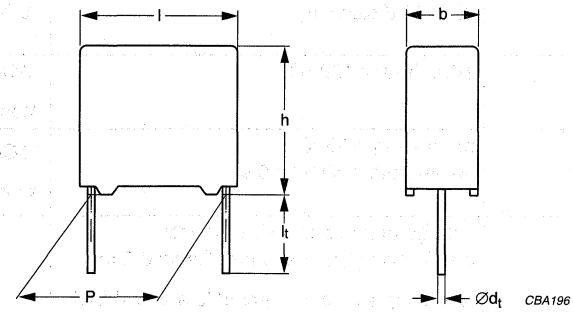


Fig.1 Simplified outlines.

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 NEW REQUIREMENTS of the new *"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)	1 nF to 1 µF
Capacitance tolerance	±20%; ±10%; ±5%
Rated (AC) voltage, 50 to 60 Hz	275 V
Rated (DC) voltage	630 V
Climatic category	55/100/21/C
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; CSA-C22.2 No 1; note 1 UL1283; SEV; VDE; FI; N; D; S; IMQ; ÖVE; note 1; CCEE; note 2
Materials	qualified in accordance with UL94V-O
Safety class	X1

Notes

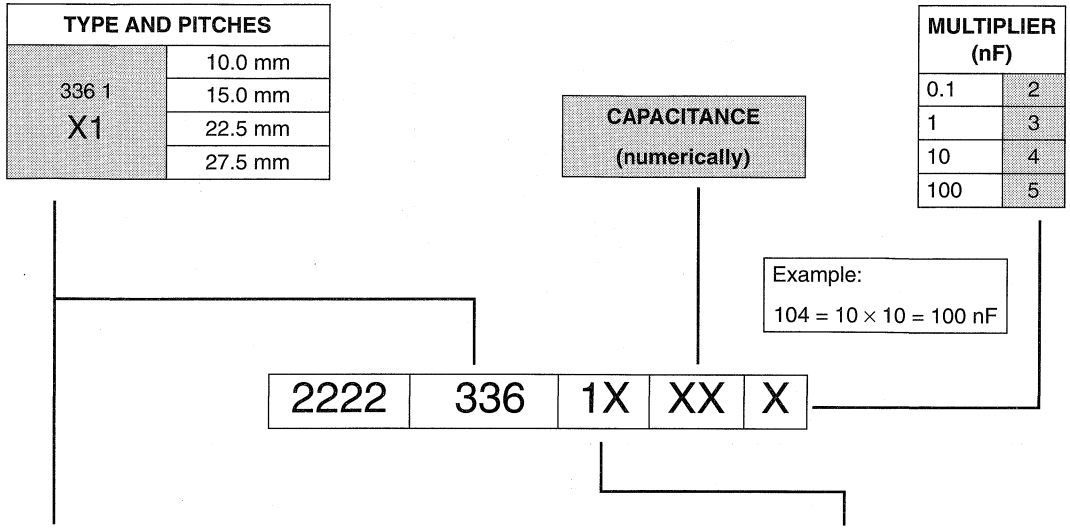
1. Approved.
2. Pending.

Interference suppression film capacitors MKP 336 1

SAFETY 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-M90	250 V (AC)	1 nF to 1 µF	LR 94054
	SEV (EN132400)	275 V (AC)	1 nF to 1 µF	96,770678
	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	P94102557
	DEMKO (EN132400)	275 V (AC)	1 nF to 1 µF	303086
	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 260-001-00
	CCEE	275 V (AC)	1 nF to 1 µF	pending

COMPOSITION OF CATALOGUE NUMBER



TYPE	PACKAGING[1]	LEAD CONFIGURATION	C-TOL	PREFERRED TYPES
336 1 X1	loose in box	lead length 3.5 mm	±20%	2222 336 10...
		lead length 25.0 mm		2222 336 16...
				ON REQUEST
336 1 X1	loose in box	lead length 3.5 mm	±10%	2222 336 11...
		lead length 25.0 mm		2222 336 17...
	taped on reel	H = 18.5 mm; note 2	±20%	2222 336 13...
			±10%	2222 336 14...

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*; taped on reel pitch = 27.5 mm is not available.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

Interference suppression film capacitors MKP 336 1

MKP 336 1 GENERAL DATA **PITCH 10/15 mm**

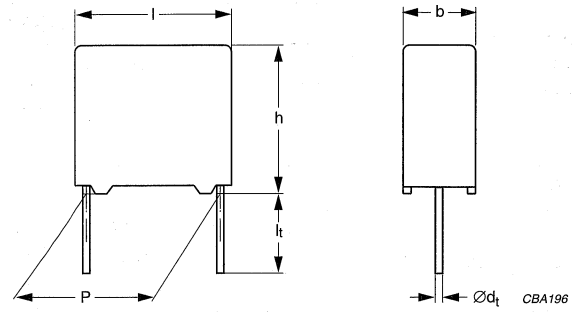


Fig.3 Outline.

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)	200 V/µs	
R between leads, for $C \leq 0.33$ µF at 100 V; 1 minute	>15000 MΩ	
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	

Interference suppression film capacitors MKP 336 1

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

C (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER	
			LOOSE IN BOX	
			l_t = 3.5 +1/–0.5 mm(1)	l_t = 25.0 ±2.0 mm
			C-tol = ±20%	
			catalogue number(2)	last 5 digits(2)
Pitch = 10.0 ±0.4 mm; d_t = 0.60 ±0.06 mm				
0.001	4.0 × 10.0 × 12.5	0.6	2222 336 10**102**	.. 16**102**
0.0015			2222 336 10**152**	.. 16**152**
0.0022			2222 336 10**222**	.. 16**222**
0.0033	5.0 × 11.0 × 12.5	0.9	2222 336 10**332**	.. 16**332**
0.0047			2222 336 10**472**	.. 16**472**
0.0068			2222 336 10**682**	.. 16**682**
0.01	6.0 × 12.0 × 12.5	1.0	2222 336 10**103**	.. 16**103**
Pitch = 15.0 ±0.4 mm; d_t = 0.80 ±0.08 mm				
0.01	5.0 × 11.0 × 17.5	1.2	2222 336 19**001**	.. 19**007**
0.015			2222 336 10**153**	.. 16**153**
0.022			2222 336 10**223**	.. 16**223**
0.033	6.0 × 12.0 × 17.5	1.4	2222 336 10**333**	.. 16**333**
0.047	7.0 × 13.5 × 17.5	1.9	2222 336 10**473**	.. 16**473**
0.068	8.5 × 15.0 × 17.5	2.6	2222 336 10**683**	.. 16**683**
0.1	10.0 × 16.5 × 17.5	3.1	2222 336 10**104**	.. 16**104**

Notes

1. l_t = 3.5 ±0.3 mm for pitch = 15 mm.
2. The shading indicates preferred types.

Interference suppression film capacitors MKP 336 1

MKP 336 1 GENERAL DATA PITCH 22.5/27.5 mm

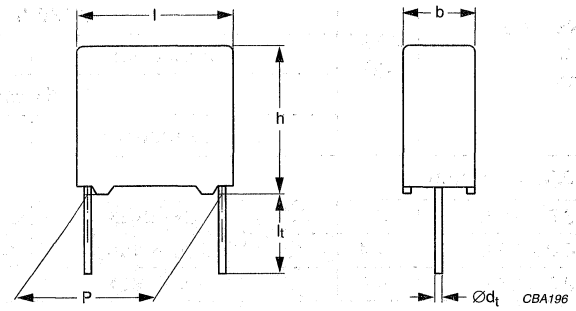


Fig.4 Outline.

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	$\leq 20 \times 10^{-4}$	$\leq 100 \times 10^{-4}$
C > 470 nF	$\leq 70 \times 10^{-4}$	–
Rated voltage pulse slope $(dU/dt)_R$ at 385 V (DC)	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	

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

C (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER	
			LOOSE IN BOX	
			l_t = 3.5 ±0.3 mm	l_t = 25.0 ±2.0 mm
			C-tol = ±20%	
			catalogue number(1)	last 5 digits(1)
Pitch = 22.5 ±0.4 mm; d_t = 0.80 ±0.08 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 ±0.4 mm; d_t = 0.80 ±0.08 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. The shading indicates preferred types.

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:
  - Copper clad steel wire for pitch = 10 and 15 mm
  - Copper wire for pitch = 22.5 and 27.5 mm
- Small stand-off pips allow removal of solder flux etc. during cleaning of the printed-circuit board.

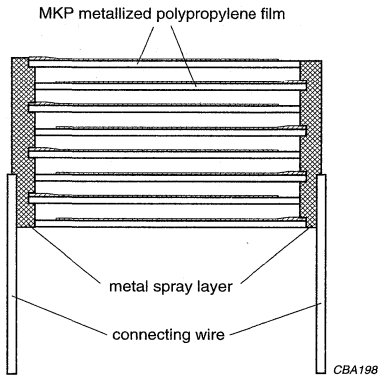


Fig.5 Construction.

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 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.

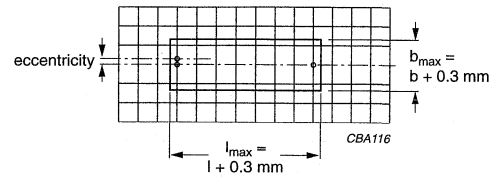


Fig.6 Lay-out.

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%.

CHARACTERISTICS

Capacitance

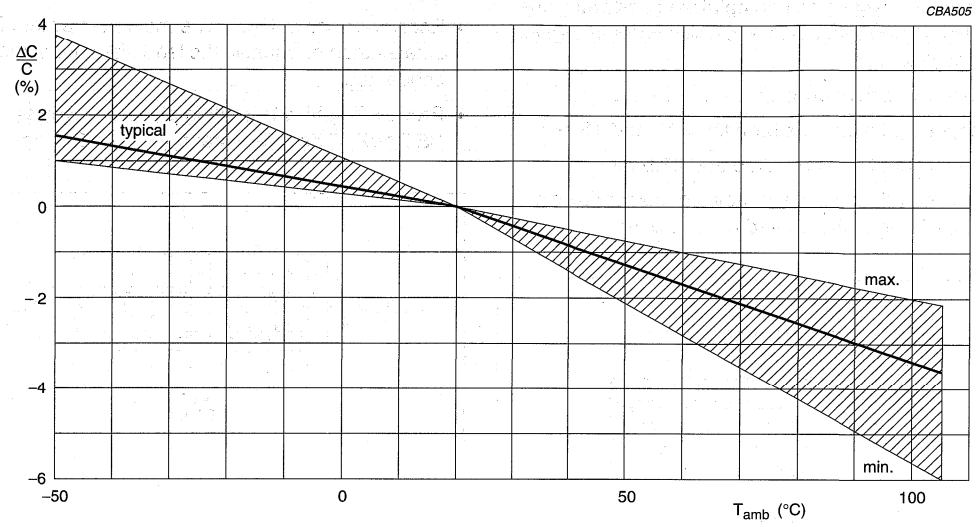


Fig.7 Capacitance change at 1 kHz as a function of temperature.

Tangent of loss angle

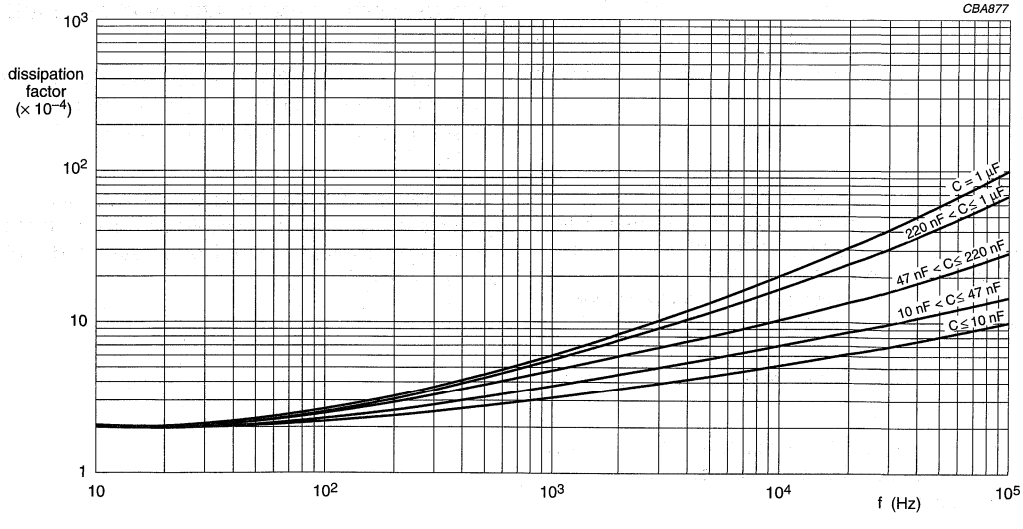


Fig.8 Tangent of loss angle as a function of frequency: typical curves.

Impedance

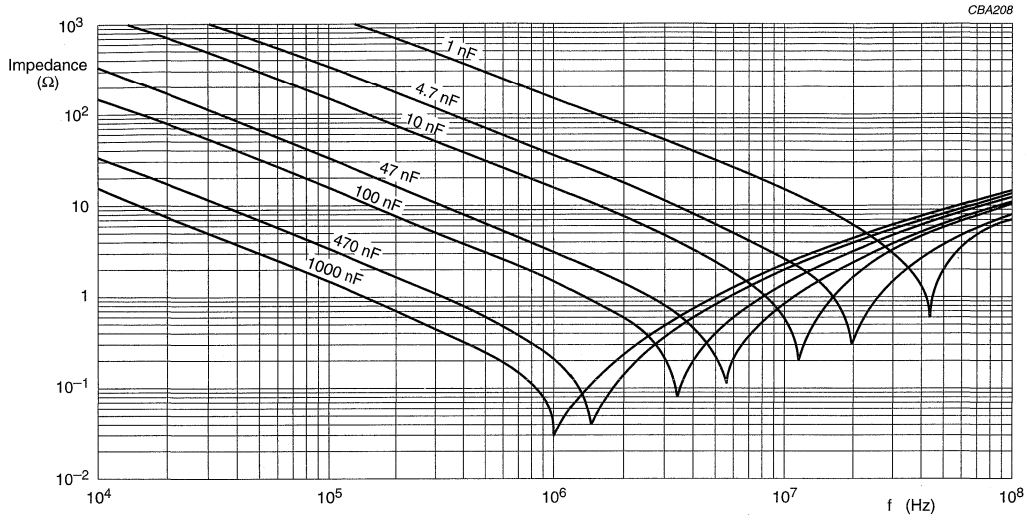


Fig.9 Impedance as a function of frequency: typical curves.

Resonant frequency

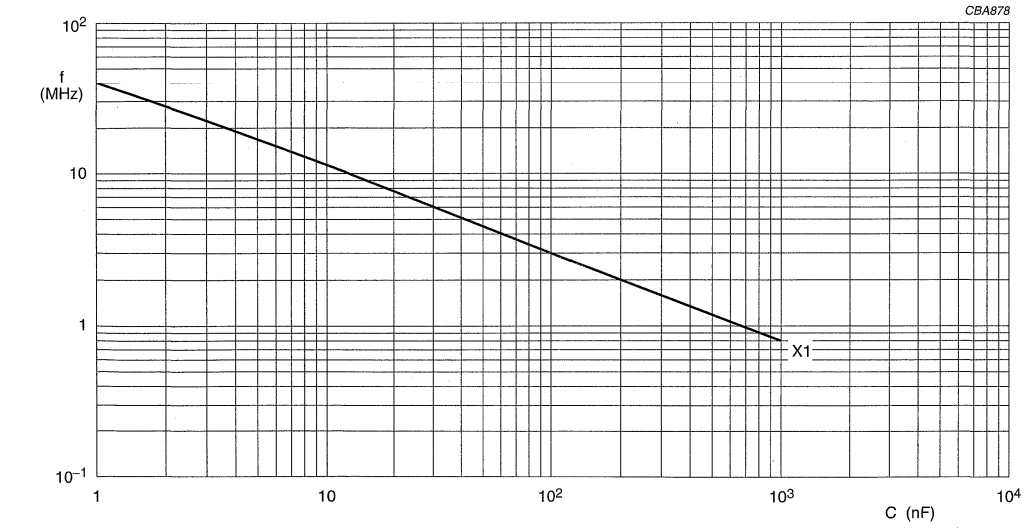


Fig.10 Resonant frequency as a function of capacitance: typical curves.

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

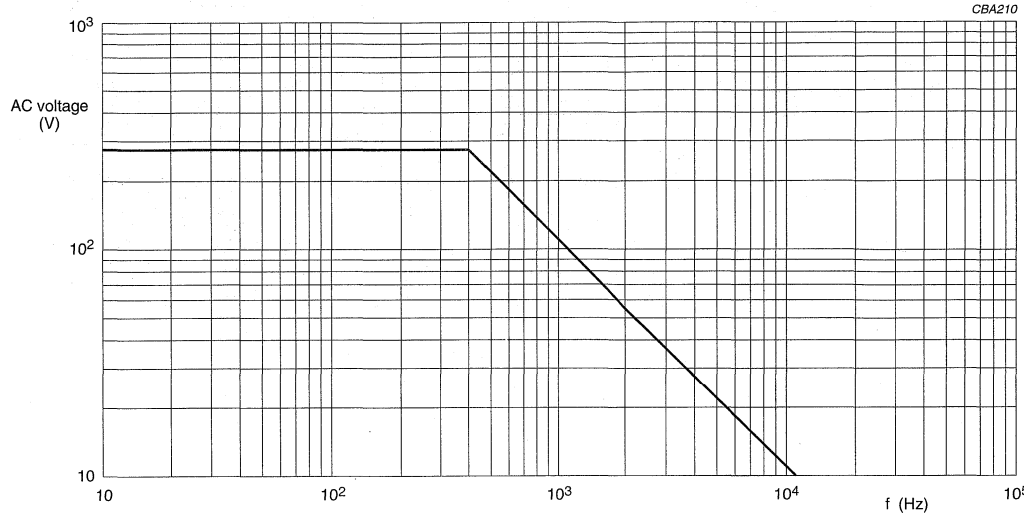


Fig.11 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 100$ °C.

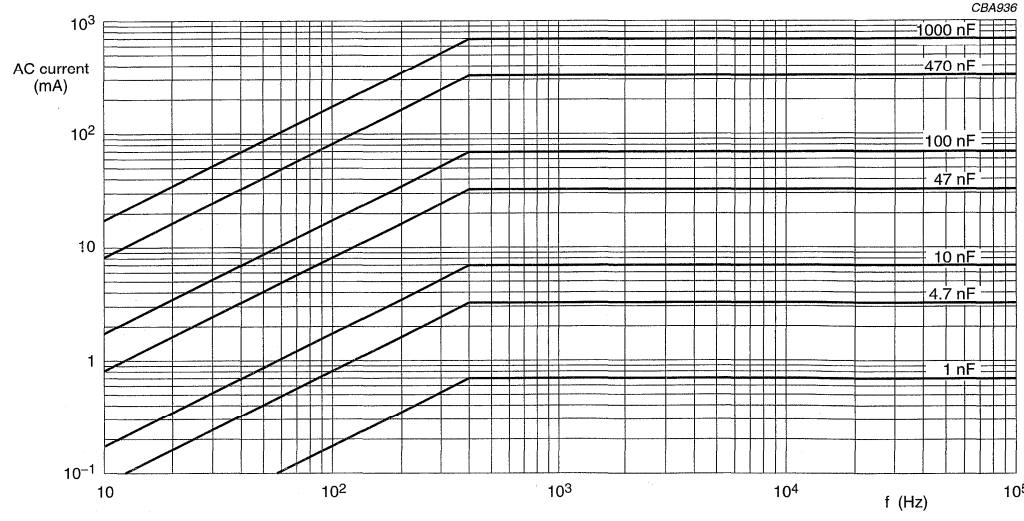


Fig.12 AC current (RMS value) as a function of frequency at $T_{amb} \leq 100$ °C.

Insulation resistance

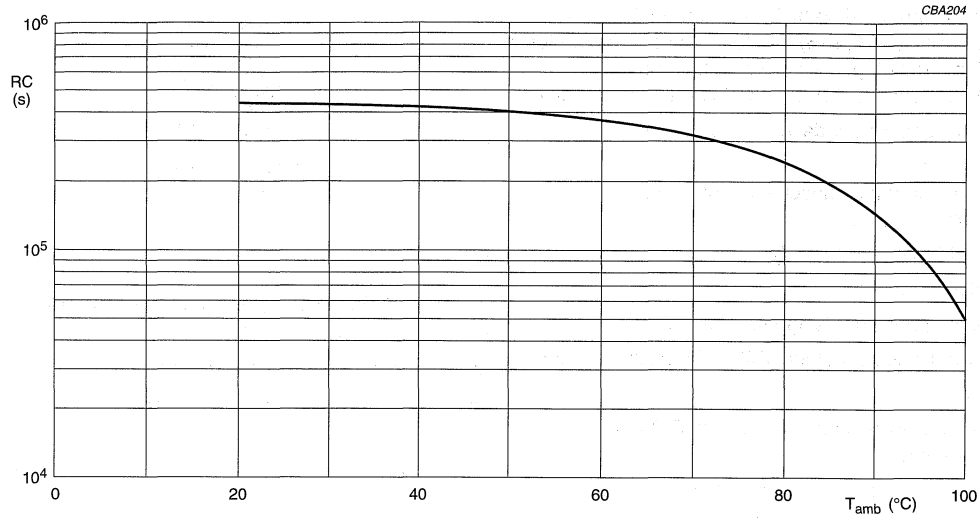


Fig.13 RC product as a function of ambient free air temperature: typical curve.

APPLICATION NOTES

- For X2 electromagnetic interference suppression in across the line applications (50 to 60 Hz) with a maximum mains voltage of 275 V (AC).
- 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.

MARKING

Product marking

The capacitors are marked by laser print; 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 = ±20%; K = ±10%; J = ±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
8. Year and week of manufacture (e.g. 9701) for pitch ≥15 mm
9. Safety approvals: products will be marked with approvals depending on the available marking space per product. Although all approvals remain valid as indicated in the reference data.

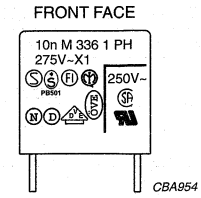


Fig.14 Example of marking for a capacitor with pitch = 10 mm.

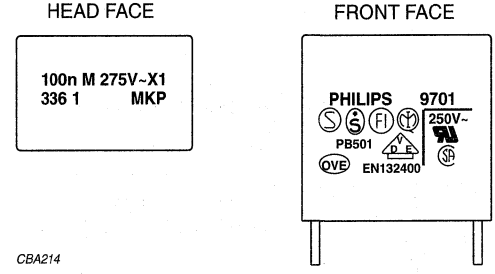


Fig.15 Example of marking for a capacitor with pitch = 15 mm.

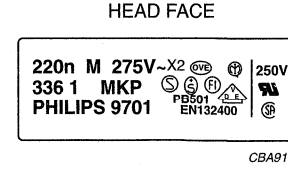
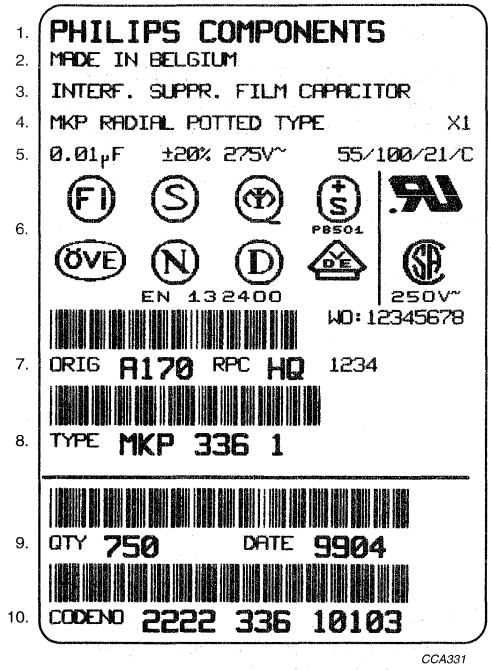


Fig.16 Example of marking for a capacitor with pitch = 22.5 or 27.5 mm.

Package marking

The package containing the capacitors is marked as shown Fig.17.

Please note:
In due time BC COMPONENTS
will replace PHILIPS COMPONENTS



Barcode label marking

LINE	MARKING EXPLANATION
1	Manufacturer's name
2	Country of origin
3	Sub-family
4	Type description and sub class
5	Capacitance value, tolerance, voltage and climatic category *("IEC 60068-1")*
6	Safety approvals
7	Preference origin code: A Country of origin in code: 170 (Belgium) Responsible production centre: HQ Work order: WO Wage number of final inspection (only for capacitors with pitch = 10 mm)
8	Product type description
9	Quantity and production period, year and week code
10	Product code (12NC)

Fig.17 Barcode label.

QUICK REFERENCE TEST REQUIREMENTS (see note 1)

TEST	PROCEDURE (quick reference)	REQUIREMENTS
Robustness of leads		
Tensile strength: *"IEC 60068-2-21"*	load 10 N; 10 s	no visible damage legible marking $\lvert\Delta C/C\rvert \leq 5\%$ $\Delta\tan\delta \leq 100 \times 10^{-4}$ ($C \leq 100$ nF); note 2 $\Delta\tan\delta \leq 200 \times 10^{-4}$ (100 nF $< C \leq$ 470 nF); note 2 $\Delta\tan\delta \leq 70 \times 10^{-4}$ ($C >$ 470 nF); note 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	
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	$\lvert\Delta C/C\rvert \leq 5\%$ $\Delta\tan\delta \leq 100 \times 10^{-4}$ ($C \leq 100$ nF); note 2 $\Delta\tan\delta \leq 200 \times 10^{-4}$ (100 nF $< C \leq$ 470 nF); note 2 $\Delta\tan\delta \leq 70 \times 10^{-4}$ ($C >$ 470 nF); note 2
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	$\lvert\Delta C/C\rvert \leq 5\%$ $\Delta\tan\delta \leq 100 \times 10^{-4}$ ($C \leq 100$ nF); note 2 $\Delta\tan\delta \leq 200 \times 10^{-4}$ (100 nF $< C \leq$ 470 nF); note 2 $\Delta\tan\delta \leq 70 \times 10^{-4}$ ($C >$ 470 nF); note 2 $R_{ins} \geq 50\%$ 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 ; 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	$\lvert\Delta C/C\rvert \leq 5\%$ $\Delta\tan\delta \leq 70 \times 10^{-4}$ $R_{ins} \geq 50\%$ of specified value
Endurance (AC): *"IEC 60384-14"*	3 × 4.0 kV pulse voltage 1000 hours; 1.25 × 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	$\lvert\Delta C/C\rvert \leq 10\%$ $\Delta\tan\delta \leq 100 \times 10^{-4}$ ($C \leq 100$ nF); note 2 $\Delta\tan\delta \leq 200 \times 10^{-4}$ (100 nF $< C \leq$ 470 nF); note 2 $\Delta\tan\delta \leq 70 \times 10^{-4}$ ($C >$ 470 nF); note 2 $R_{ins} \geq 50\%$ of specified value

TEST	PROCEDURE (quick reference)	REQUIREMENTS
Charge and discharge: *"IEC 60384-14"*	10000 cycles; 5 ms; 1.5 × dV/dt	$\lvert\Delta C/C\rvert \leq 10\%$ $\Delta\tan\delta \leq 100 \times 10^{-4}$ ($C \leq 100$ nF); note 2 $\Delta\tan\delta \leq 200 \times 10^{-4}$ (100 nF $< C \leq$ 470 nF); note 2 $\Delta\tan\delta \leq 70 \times 10^{-4}$ ($C >$ 470 nF); note 2 $R_{ins} \geq 50\%$ of specified value
Passive flammability: *"IEC 60384-14"*	class C	no burning
Active flammability: *"IEC 60384-14"*	20 × 4 kV discharge	no burning
Heat storage: *"IEC 60384-14"*	1000 hours; 100 °C	$\lvert\Delta C/C\rvert \leq 5\%$ $\Delta\tan\delta \leq 100 \times 10^{-4}$ ($C \leq 100$ nF); note 2 $\Delta\tan\delta \leq 200 \times 10^{-4}$ (100 nF $< C \leq$ 470 nF); note 2 $\Delta\tan\delta \leq 70 \times 10^{-4}$ ($C >$ 470 nF); note 2
Resistance to soldering heat with preheating: *"IEC 60384-14"*	preheating: 100 °C; solder bath: 260 °C; 10 s	$\lvert\Delta C/C\rvert \leq 5\%$ $\Delta\tan\delta \leq 100 \times 10^{-4}$ ($C \leq 100$ nF); note 2 $\Delta\tan\delta \leq 200 \times 10^{-4}$ (100 nF $< C \leq$ 470 nF); note 2 $\Delta\tan\delta \leq 70 \times 10^{-4}$ ($C >$ 470 nF); note 2
Active flammability test	voltage proof up to 4 kV (DC) or until breakdown (100 V/s, current limited 2 mA) failed capacitors connected to a 250 V (AC) power supply during 5 minutes	no burning

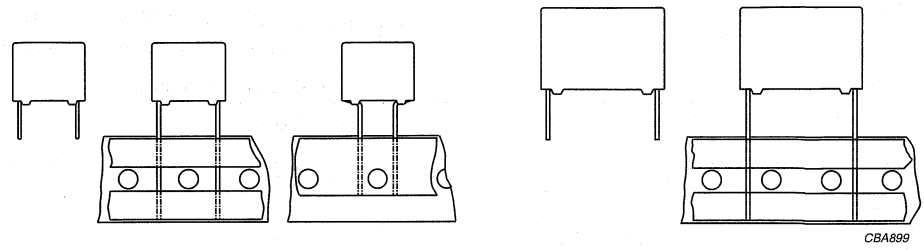
Notes

1. For detailed information: see *"Type detail specification HQN-384-14/108"*.
2. Measuring frequency 100 kHz for $C \leq 470$ nF and 10 kHz for $C >$ 470 nF.

Interference suppression film capacitors — MKP 338 2

MKP RADIAL POTTED TYPE

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



P = 7.5, 10 and 15 mm | P(bent back leads) = 7.5 mm | P = 22.5 and 27.5 mm

Fig.1 Simplified outlines.

FEATURES

- 7.5 to 27.5 mm lead pitch
- Supplied loose in box, taped on ammopack 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)	1 nF to 3.3 µF
Capacitance tolerance	±20%; ±10%; ±5%
Rated (AC) voltage, 50 to 60 Hz	275 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: 250 V 275 V	 CSA-C22.2 No 1; UL1414; note 1 UL1283; CSA-C22.2 No 8; CCEE; note 2 SEV; VDE; FI; N; D; S; IMQ; ÖVE; note 1
Materials	qualified in accordance with UL94V-O
Safety class	X2

Notes

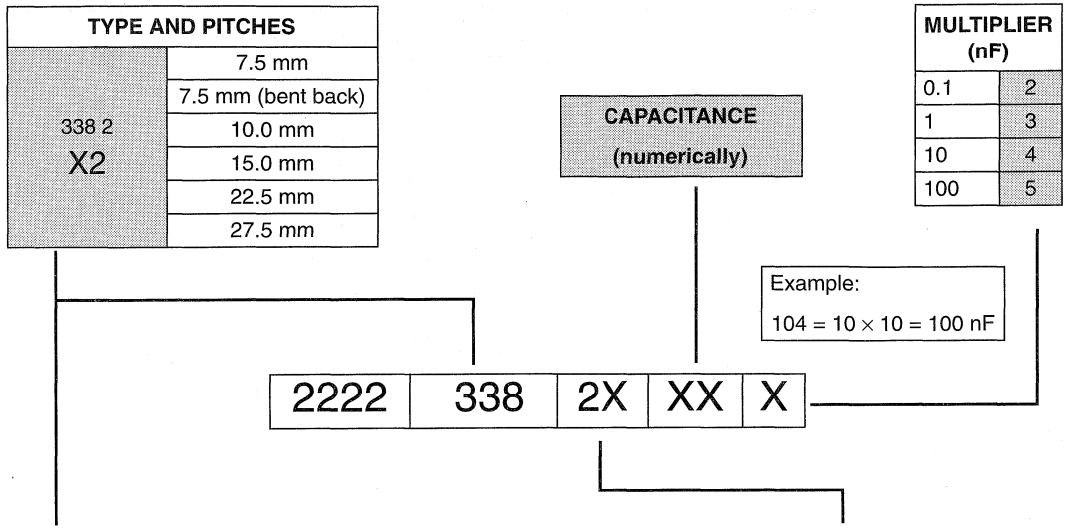
1. Approved.
2. Pending.

SAFETY APPROVALS

SAFETY APPROVALS (X2)		VOLTAGE	VALUE	FILE NUMBERS
	UL1414	250 V (AC)	1 nF to 1 µF	E112471
	UL1283	275 V (AC)	1 nF to 3.3 µF	pending
	CSA-C22.2 No.1-M90	250 V (AC)	1 nF to 1 µF	LR94054
	CSA-C22.2 No.8-M90	275 V (AC)	1 nF to 3.3 µF	pending
	SEV (EN132400)	275 V (AC)	1 nF to 3.3 µF	98.7 70718.01
	VDE (EN132400)	275 V (AC)	1 nF to 3.3 µF	115223
	FI (EN132400)	275 V (AC)	1 nF to 3.3 µF	FI 11681
	NEMKO (EN132400)	275 V (AC)	1 nF to 3.3 µF	P98102295
	DEMKO (EN132400)	275 V (AC)	1 nF to 3.3 µF	308077
	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	E260-009-00
	CCEE	275 V (AC)	1 nF to 3.3 µF	pending

Interference suppression film capacitors | MKP 338 2

COMPOSITION OF CATALOGUE NUMBER



TYPE	PACKAGING[1]	STANDARD DIMENSIONS		PREFERRED TYPES	
338 2 X2	loose in box	lead length 3.5 mm	±20%	0	see handbook
		lead length 5.0 mm		2	
		lead length 25.0 mm		4	
	taped	pitch = 7.5 mm or bent back to 7.5 mm		6	
		ALTERNATIVE LARGER PITCH SIZES		**ON REQUEST**	
338 2 X2	loose in box	lead length 3.5 mm	±20%	1	see data sheet
		lead length 5.0 mm		3	
		lead length 25.0 mm		5	
	taped	H = 18.5 mm; for P_0 = 12.7 mm; note 2		7	
		ALTERNATIVE C-TOL		**ON REQUEST**	
338 2 X2	loose in box	lead length 3.5 mm	±10%	2222 338 2....	see type detail specification
			±5%	2222 338 2....	
		lead length 5.0 mm	±10%	2222 338 2....	
			±5%	2222 338 2....	
		lead length 25.0 mm	±10%	2222 338 2....	
			±5%	2222 338 2....	
	taped	pitch = 7.5 mm or bent back to 7.5 mm	±10%	2222 338 2....	
			±5%	2222 338 2....	
		H = 18.5 mm; for P_0 = 12.7 mm; note 2	±10%	2222 338 2....	
			±5%	2222 338 2....	

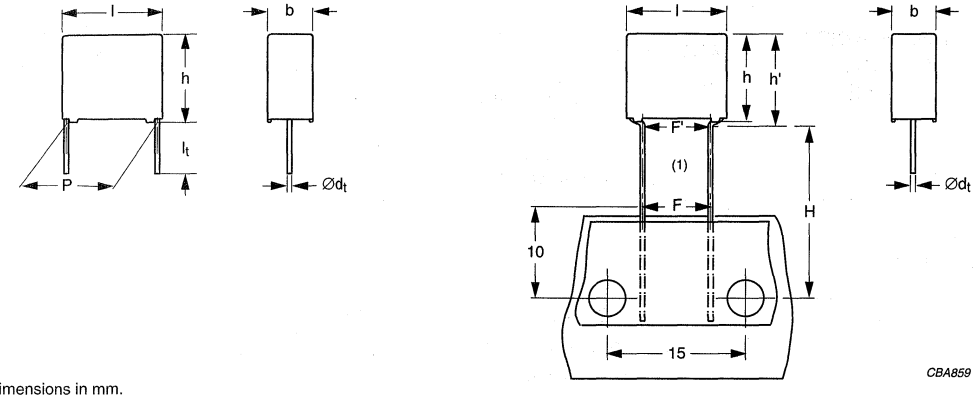
Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*; taped on reel pitch = 27.5 mm is not available.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

Interference suppression film capacitors MKP 338 2

MKP 338 2 GENERAL DATA

PITCH 7.5/10 mm
PITCH 7.5 mm (bent back leads)



Dimensions in mm.

(1) $|F - F'| < 0.3$ m.
$F = 7.5 +0.6/-0.1$ 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: $C \leq 100$ 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 $C \leq 0.33$ µF at 100 V; 1 minute	>15000 MΩ		
R between leads and case; 100 V; 1 minute	>30000 MΩ		
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		

Interference suppression film capacitors MKP 338 2

U_{Rac} = 275 V (X2); U_{Rdc} = 630 V

C (µF)	DIMENSIONS[1] b × h (h') × l (mm)	MASS (g)	CATALOGUE NUMBER			
			LOOSE IN BOX			AMMOPACK OR REEL[2]
			short leads		long leads	
			l_t = 3.5 +1/–0.5 mm	l_t = 5.0 ±1.0 mm	l_t = 25.0 ±2.0 mm	
			C-tol = ±20%			C-tol = ±20%
			catalogue number[3]	last 5 digits[3]		last 5 digits[3]
Pitch = 7.5 ±0.4 mm; d_t = 0.50 ±0.05 mm						**ammopack; pitch = 7.5 mm; d_t = 0.50 mm**
0.001	4.0 × 9.0 × 10.0	0.5	2222 338 20**102**	.. 22**102**	.. 24**102**	.. 26**102**
0.0015			2222 338 20**152**	.. 22**152**	.. 24**152**	.. 26**152**
0.0022			2222 338 20**222**	.. 22**222**	.. 24**222**	.. 26**222**
0.0033			2222 338 20**332**	.. 22**332**	.. 24**332**	.. 26**332**
0.0047			2222 338 20**472**	.. 22**472**	.. 24**472**	.. 26**472**
0.0068			2222 338 20**682**	.. 22**682**	.. 24**682**	.. 26**682**
0.01			2222 338 20**103**	.. 22**103**	.. 24**103**	.. 26**103**
0.015			2222 338 20**153**	.. 22**153**	.. 24**153**	.. 26**153**
0.022			2222 338 20**223**	.. 22**223**	.. 24**223**	.. 26**223**
0.033	5.0 × 10.5 × 10.0	0.9	2222 338 20**333**	.. 22**333**	.. 24**333**	.. 26**333**
0.047	6.0 × 11.5 × 10.0	1.0	2222 338 20**473**	.. 22**473**	.. 24**473**	.. 26**473**
Pitch = 10.0 ±0.4 mm; d_t = 0.60 ±0.06 mm						**reel; pitch = 7.5 mm (bent back); d_t = 0.60 mm**
0.068	6.0 × 12.0 (14.0) × 12.5	1.3	2222 338 20**683**	.. 22**683**	.. 24**683**	.. 26**683**
0.1			2222 338 20**104**	.. 22**104**	.. 24**104**	.. 26**104**

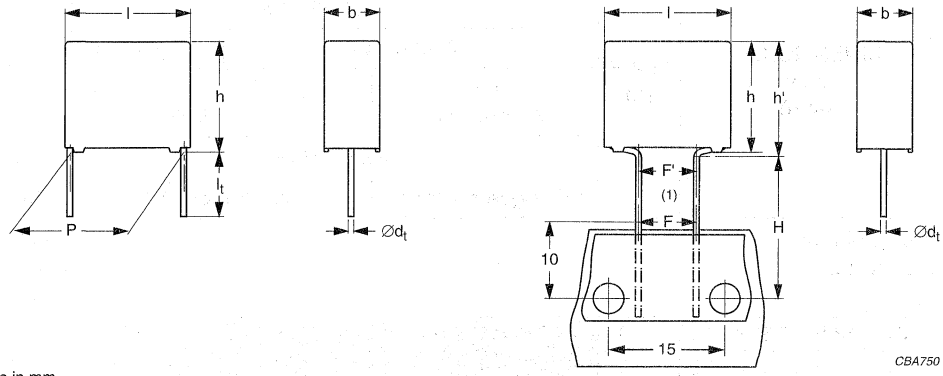
Notes

1. Dimensions in brackets for bent back leads.
2. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*:
   a) For pitch = 7.5 mm: H = 18.5 mm and P_0 = 12.7 mm.
   b) For pitch = 7.5 mm (bent back): H = 16.0 mm and P_0 = 15.0 mm.
   The reel diameter = 500 mm; reel diameter = 356 mm is available on request.
3. The shading indicates preferred types.

Interference suppression film capacitors MKP 338 2

MKP 338 2 GENERAL DATA

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



Dimensions in mm.

(1) $|F - F'| < 0.3$ m.
$F = 7.5\ ^{+0.6}_{-0.1}$ mm.

Fig.4 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:			
100 nF < C ≤ 470 nF	$\leq 10 \times 10^{-4}$	$\leq 20 \times 10^{-4}$	$\leq 100 \times 10^{-4}$
470 nF < C ≤ 1 μF	$\leq 20 \times 10^{-4}$	$\leq 70 \times 10^{-4}$	–
C > 1 μF	$\leq 30 \times 10^{-4}$	–	–
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	2200 V; 1 minute		
C > 1 μF	1800 V; 1 minute		
Withstanding (AC) voltage between leads and case	2050 V; 1 minute		

Interference suppression film capacitors — MKP 338 2

U_{Rac} = 275 V (X2); U_{Rdc} = 630 V

C (µF)	DIMENSIONS[1] b × h (h') × l (mm)	MASS (g)	CATALOGUE NUMBER			
			LOOSE IN BOX			REEL[2][3]
			short leads		long leads	
			l_t = 3.5 ±0.3 mm	l_t = 5.0 ±1.0 mm	l_t = 25.0 ±2.0 mm	
			C-tol = ±20%			C-tol = ±20%
			catalogue number[4]	last 5 digits[4]		last 5 digits[4]
Pitch = 15.0 ±0.4 mm; d_t = 0.80 ±0.08 mm						**pitch = 7.5 mm (bent back); d_t = 0.80 mm**
0.15	7.0 × 13.5 (15.5) × 17.5	1.9	2222 338 20154	.. 22154	.. 24154	.. 26154
0.22	8.5 × 15.0 (17.0) × 17.5	2.6	2222 338 20224	.. 22224	.. 24224	.. 26224
0.33	10.0 × 16.5 (18.5) × 17.5	3.1	2222 338 20334	.. 22334	.. 24334	26334
Pitch = 22.5 ±0.4 mm; d_t = 0.80 ±0.08 mm						
0.47	8.5 × 18.0 × 26.0	4.4	2222 338 20474	.. 22474	.. 24474	not available
0.68	10.0 × 19.5 × 26.0	5.5	2222 338 20684	.. 22684	.. 24684	
1	12.0 × 22.0 × 26.0	7.8	2222 338 20105	.. 22105	.. 24105	
Pitch = 27.5 ±0.4 mm; d_t = 0.80 ±0.08 mm						
1.5	15.0 × 25.0 × 31.0	12.8	2222 338 20155	.. 22155	.. 24155	not available
2.2	18.0 × 28.0 × 31.0	17.2	2222 338 20225	.. 22225	.. 24225	
3.3	21.0 × 31.0 × 31.0	20.4	2222 338 20335	.. 22335	.. 24335	

Notes

1. Dimensions in brackets for bent back leads.
2. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*.
3. For pitch = 7.5 mm (bent back): H = 16.0 mm and P_0 = 15.0 mm.
   The reel diameter = 500 mm; reel diameter = 356 mm is available on request.
4. The shading indicates preferred types.

Interference suppression film capacitors MKP 338 2

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 original pitch = 7.5 and 10 mm
  - Copper wire for original pitch = 15, 22.5 and 27.5 mm
- Small stand-off pips allow removal of solder flux etc. during cleaning of the printed-circuit board.

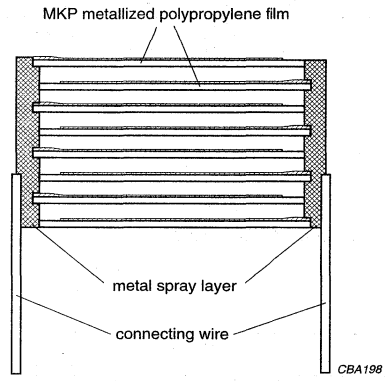


Fig.5 Construction.

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 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.

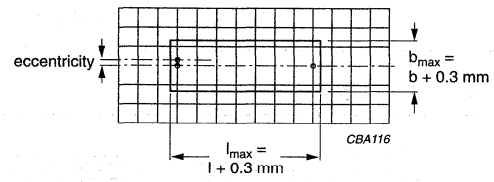


Fig.6 Lay-out.

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%.

CHARACTERISTICS

Capacitance

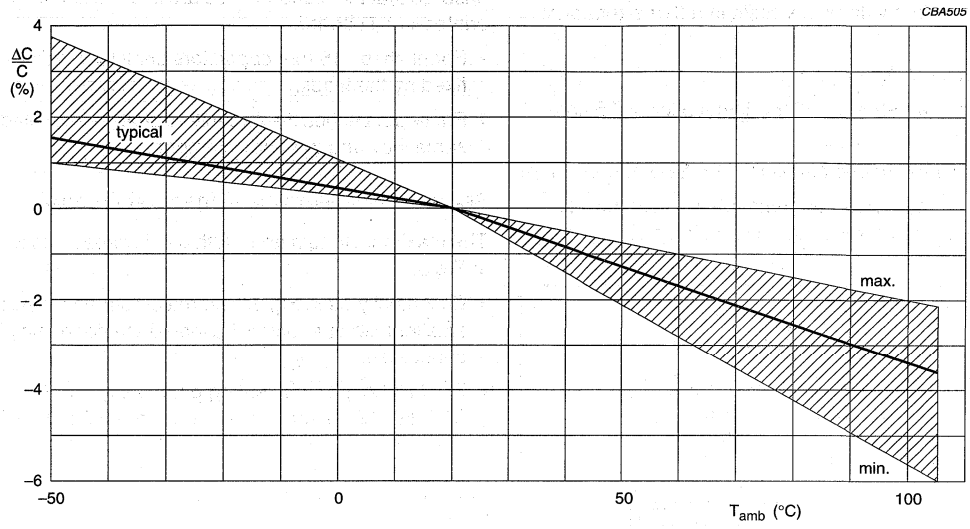


Fig.7 Capacitance change at 1 kHz as a function of temperature.

Tangent of loss angle

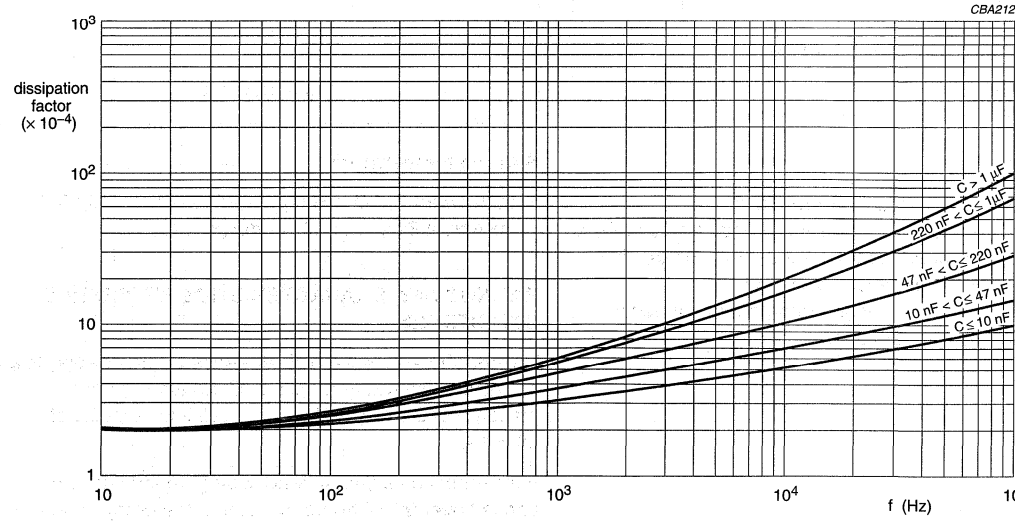


Fig.8 Tangent of loss angle as a function of frequency: typical curves.

Impedance

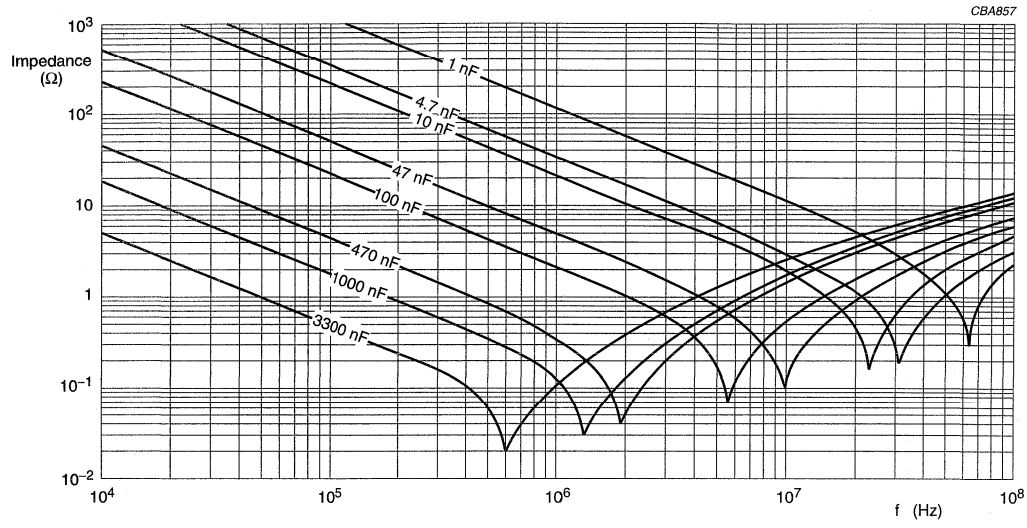


Fig.9 Impedance as a function of frequency: typical curves for 20% values.

Resonant frequency

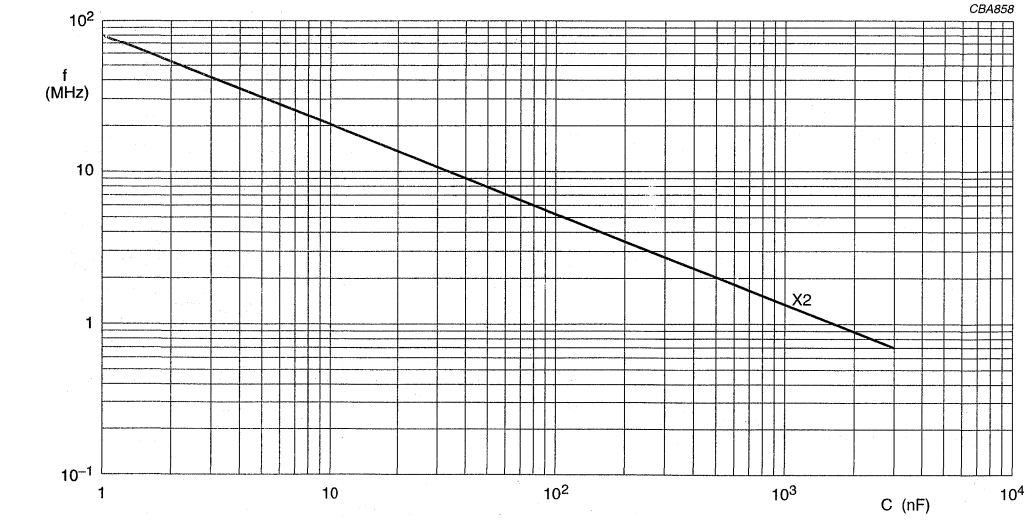


Fig.10 Resonant frequency as a function of capacitance: typical curves for 20% values.

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

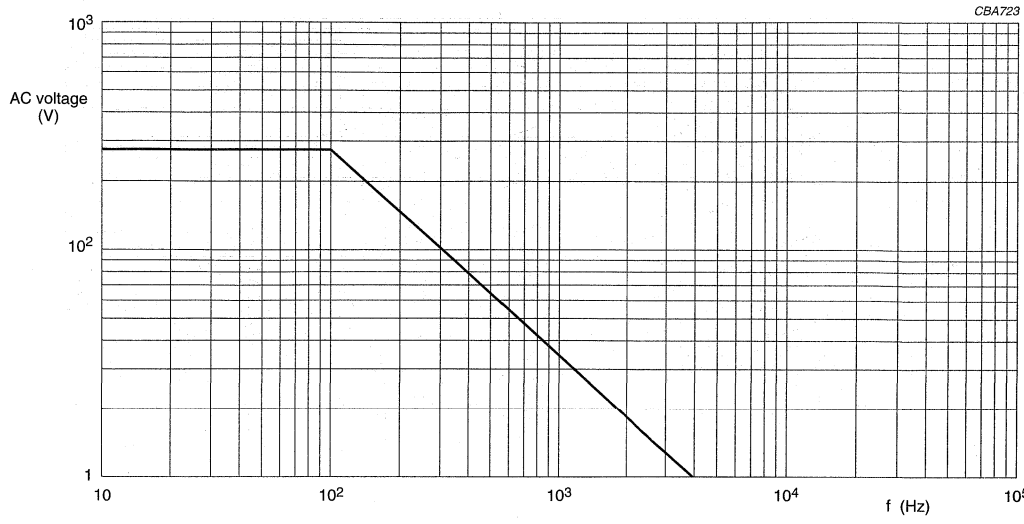


Fig.11 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 105$ °C.

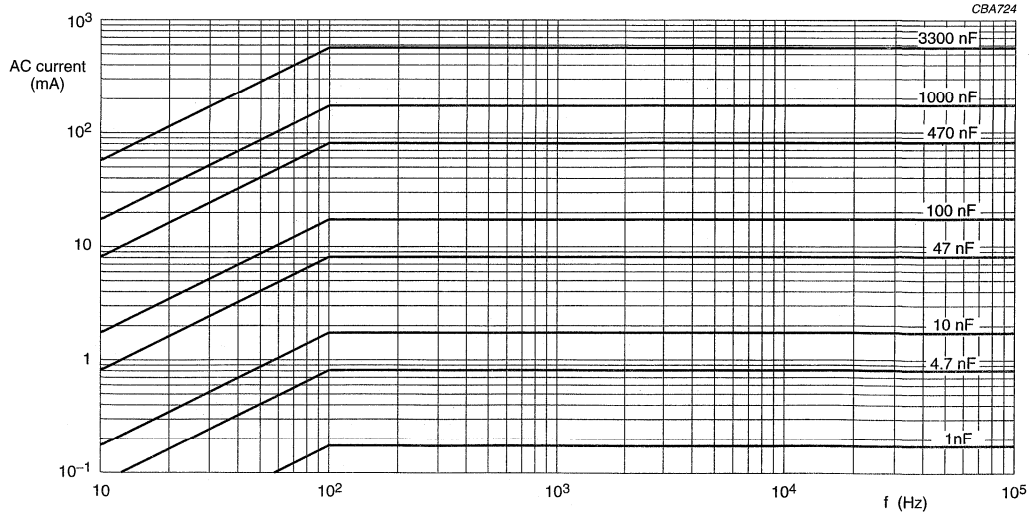


Fig.12 AC current (RMS value) as a function of frequency at $T_{amb} \leq 105$ °C.

Insulation resistance

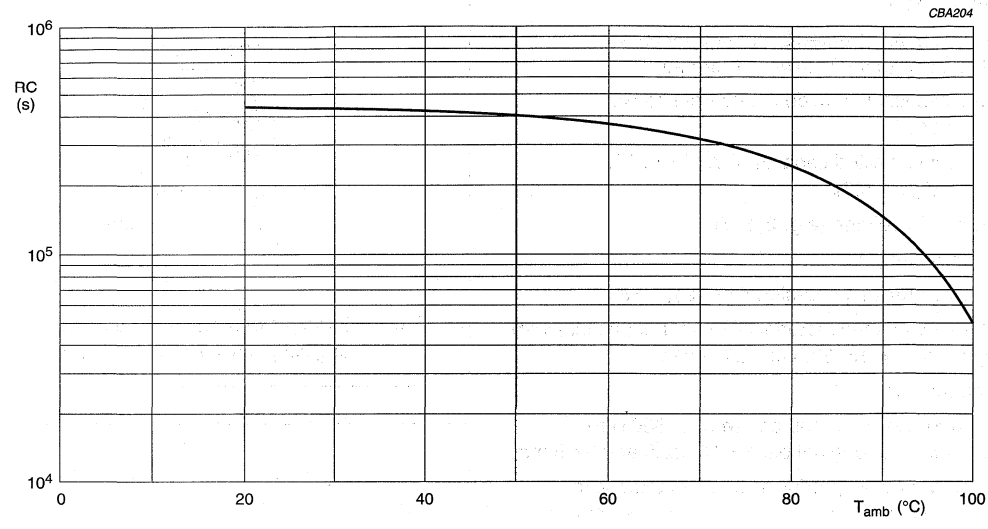


Fig.13 RC product as a function of ambient free air temperature: typical curve.

APPLICATION NOTES

- For X2 electromagnetic interference suppression in across the line applications (50 to 60 Hz) with a maximum mains voltage of 275 V (AC).
- 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.

MARKING

Product marking

The capacitors are marked by laser print (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
8. Year and week of manufacture (e.g. 9801) for capacitors with original pitch = 15, 22.5 and 27.5 mm
9. Safety approvals: products will be marked with european approvals and with UL and CSA marks.

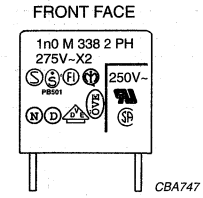


Fig.14 Example of marking for a capacitor with original pitch = 7.5 and 10 mm.

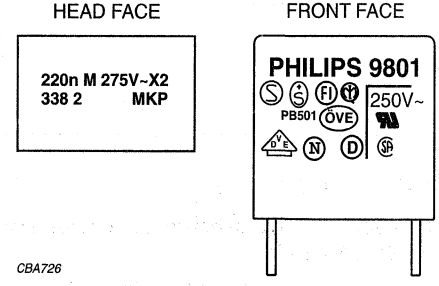


Fig.15 Example of marking for a capacitor with original pitch = 15 mm.

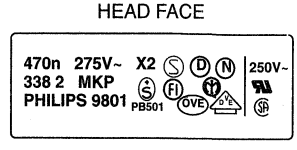
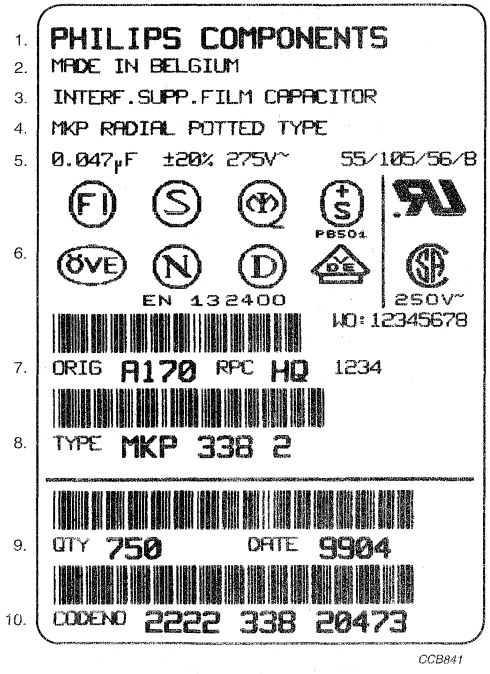


Fig.16 Example of marking for a capacitor with original pitch = 22.5 or 27.5 mm

Package marking

The package containing the capacitors is marked as shown Fig.17.

Please note:
In due time BC COMPONENTS
will replace PHILIPS COMPONENTS



Barcode label marking

LINE	MARKING EXPLANATION
1	Manufacturer's name
2	Country of origin
3	Sub-family
4	Type description and sub class
5	Capacitance value, tolerance, voltage and climatic category (*"IEC 60068-1"*)
6	Safety approvals
7	Preference origin code: A Country of origin in code: 170 (Belgium) Responsible production centre: HQ Work order: WO Wage number of final inspection (only for capacitors with original pitch = 7.5 and 10 mm)
8	Product type description
9	Quantity and production period, year and week code
10	Product code (12NC)

Fig.17 Barcode label.

QUICK REFERENCE TEST REQUIREMENTS (see note 1)

TEST	PROCEDURE (quick reference)	REQUIREMENTS
Robustness of leads		
Tensile strength: *"IEC 60068-2-21"*	load 10 N; 10 s	no visible damage legible marking $\|\Delta C/C\| \leq 5\%$ $\Delta\tan\delta \leq 80 \times 10^{-4}$ ($C \leq 1\ \mu F$); note 2 $\Delta\tan\delta \leq 50 \times 10^{-4}$ ($C > 1\ \mu F$); note 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	
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	$\|\Delta C/C\| \leq 5\%$ $\Delta\tan\delta \leq 80 \times 10^{-4}$ ($C \leq 1\ \mu F$); note 2 $\Delta\tan\delta \leq 50 \times 10^{-4}$ ($C > 1\ \mu F$); note 2
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	$\|\Delta C/C\| \leq 5\%$ $\Delta\tan\delta \leq 80 \times 10^{-4}$ ($C \leq 1\ \mu F$); note 2 $\Delta\tan\delta \leq 50 \times 10^{-4}$ ($C > 1\ \mu F$); note 2 $R_{ins} \geq 50\%$ 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"*	56 days; 40 °C; 90 to 95% RH no load V_p = 1200 V (DC); 1 minute	$\|\Delta C/C\| \leq 5\%$ $\Delta\tan\delta < 80 \times 10^{-4}$ ($C \leq 1\ \mu F$); note 2 $\Delta\tan\delta \leq 50 \times 10^{-4}$ ($C > 1\ \mu F$); note 2 $R_{ins} \geq 50\%$ of specified value
Endurance (AC): *"IEC 60384-14"*	3 × 2.5 kV pulse voltage for X2; 1000 hours; 1.25 × U_{Rac} at 105 °C; once per hour; 0.1 s; 1000 V (RMS) via resistor of 47 Ω; V_p = 1200 V (DC); 1 minute	$\|\Delta C/C\| \leq 10\%$ $\Delta\tan\delta \leq 80 \times 10^{-4}$ ($C \leq 1\ \mu F$); note 2 $\Delta\tan\delta \leq 50 \times 10^{-4}$ ($C > 1\ \mu F$); note 2 $R_{ins} \geq 50\%$ of specified value

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

Notes

1. For detailed information: see *"Type detail specification HQN-384-14/111"*.
2. Measuring frequency 10 kHz for $C \leq 1\ \mu F$ and 1 kHz for $C > 1\ \mu F$.

Interference suppression film capacitors MKP 336 2

MKP RADIAL POTTED TYPE **PITCH 10/15/22.5/27.5 mm**

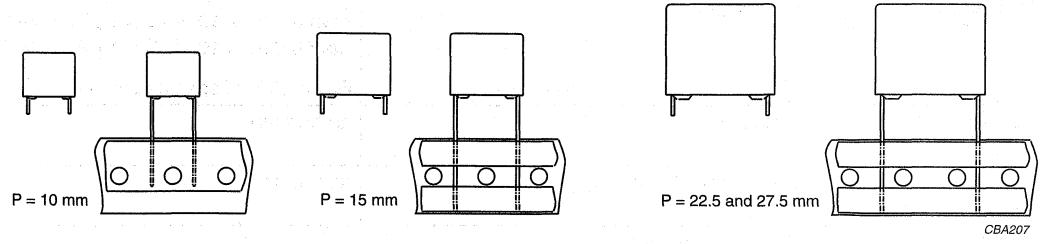


Fig.1 Simplified outlines.

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 NEW REQUIREMENTS of the new *"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.

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)	1 nF to 2.2 µF
Capacitance tolerance	±20%; ±10%; ±5%
Rated (AC) voltage, 50 to 60 Hz	275 V
Rated (DC) voltage	630 V
Climatic category	55/100/21/C
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; CSA-C22.2 No. 1, note 1 UL1283; SEV; VDE; FI; N; D; S; IMQ; ÖVE, note 1; CCEE, note 2
Materials	qualified in accordance with UL94V-O
Safety class	X2

Notes

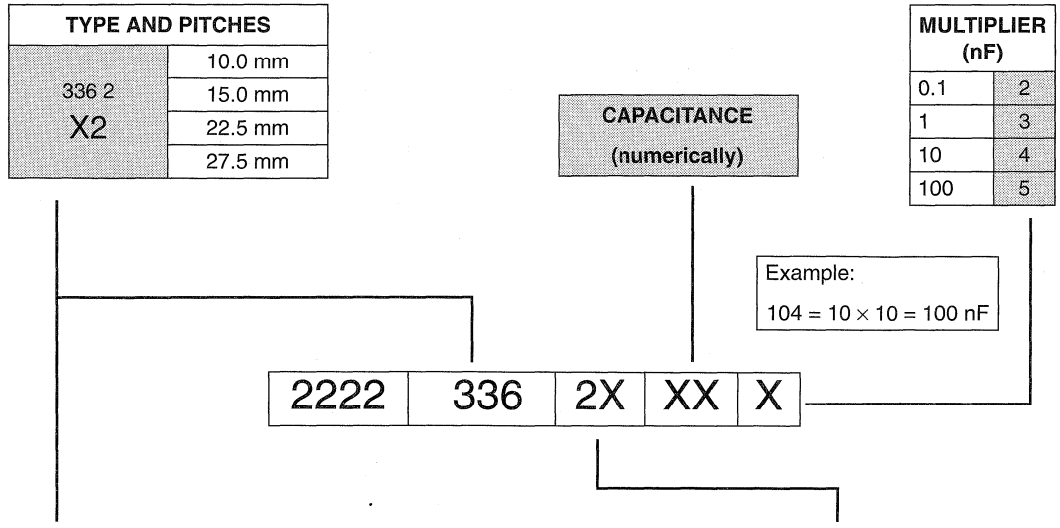
1. Approved.
2. Pending.

Interference suppression film capacitors MKP 336 2

SAFETY 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-M90	250 V (AC)	1 nF to 1 µF	LR 94054
	SEV (EN132400)	275 V (AC)	1 nF to 2.2 µF	96,770678
	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	P94101881
	DEMKO (EN132400)	275 V (AC)	1 nF to 2.2 µF	302811
	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 260-000-00
	CCEE	275 V (AC)	1 nF to 2.2 µF	pending

COMPOSITION OF CATALOGUE NUMBER



TYPE	PACKAGING[1]	LEAD CONFIGURATION	C-TOL	PREFERRED TYPES
336 2 X2	loose in box	lead length 3.5 mm	±20%	0
		lead length 25.0 mm		6
				ON REQUEST
336 2 X2	loose in box	lead length 3.5 mm	±10%	2222 336 21...
		lead length 25.0 mm		2222 336 27...
	taped on reel	H = 18.5 mm; note 2	±20%	2222 336 23...
			±10%	2222 336 24...

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*; taped on reel pitch = 27.5 mm is not available.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

Interference suppression film capacitors MKP 336 2

MKP 336 2 GENERAL DATA **PITCH 10/15 mm**

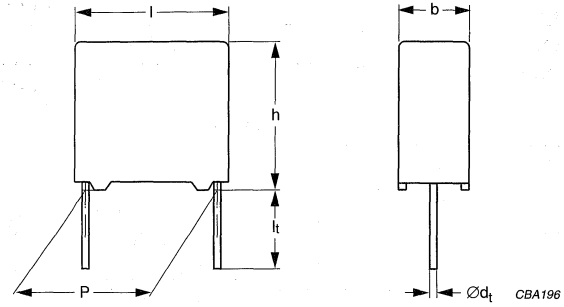


Fig.3 Outline.

Specific reference data for the 275 V AC (X2) capacitors

DESCRIPTION	VALUE	
	at 10 kHz	**at 100 kHz**
Tangent of loss angle:		
C ≤ 100 nF	$\leq 10 \times 10^{-4}$	$\leq 50 \times 10^{-4}$
100 nF < C ≤ 220 nF	$\leq 20 \times 10^{-4}$	$\leq 100 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 385 V (DC)	100 V/µs	
R between leads, for C ≤ 0.33 µF at 100 V; 1 minute	>15000 MΩ	
R between leads and case; 100 V; 1 minute	>30000 MΩ	
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	

U_{Rac} = 275 V (X2); U_{Rdc} = 630 V

C (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER	
			LOOSE IN BOX	
			l_t = 3.5 +1/–0.5 mm(1)	l_t = 25.0 ±2.0 mm
			C-tol = ±20%	
			catalogue number(2)	last 5 digits(2)
Pitch = 10.0 ±0.4 mm; d_t = 0.60 ±0.06 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 ±0.4 mm; d_t = 0.80 ±0.08 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

1. l_t = 3.5 ±0.3 mm for pitch = 15 mm.
2. The shading indicates preferred types.

Interference suppression film capacitors MKP 336 2

MKP 336 2 GENERAL DATA **PITCH 22.5/27.5 mm**

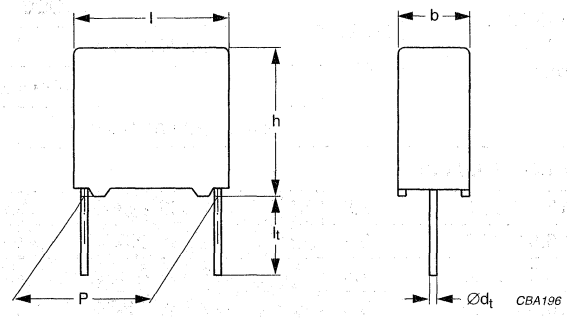


Fig.4 Outline.

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	$\leq 20 \times 10^{-4}$	$\leq 100 \times 10^{-4}$
C > 470 nF	$\leq 70 \times 10^{-4}$	–
Rated voltage pulse slope $(dU/dt)_R$ 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	2200 V; 1 minute	
C > 1 μF	1800 V; 1 minute	
Withstanding (AC) voltage between leads and case	2050 V; 1 minute	

U_{Rac} = 275 V (X2); U_{Rdc} = 630 V

C (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER	
			LOOSE IN BOX	
			l_t = 3.5 ±0.3 mm	l_t = 25.0 ±2.0 mm
			C-tol = ±20%	
			catalogue number(1)	last 5 digits(1)
Pitch = 22.5 ±0.4 mm; d_t = 0.80 ±0.08 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 ±0.4 mm; d_t = 0.80 ±0.08 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. The shading indicates preferred types.

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:
  - Copper clad steel wire for pitch = 10 and 15 mm
  - Copper wire for pitch = 22.5 and 27.5 mm
- Small stand-off pips allow removal of solder flux etc. during cleaning of the printed-circuit board.

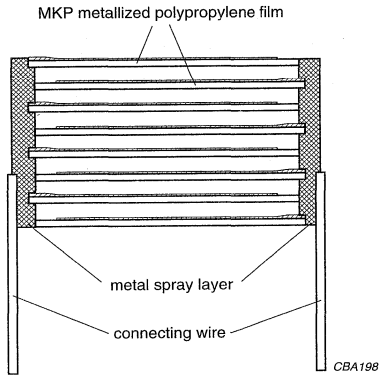


Fig.5 Construction.

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 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.

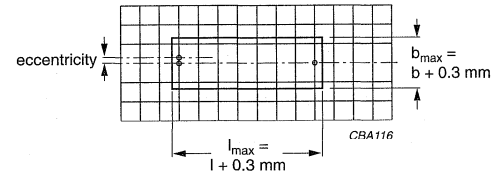


Fig.6 Lay-out.

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%.

CHARACTERISTICS

Capacitance

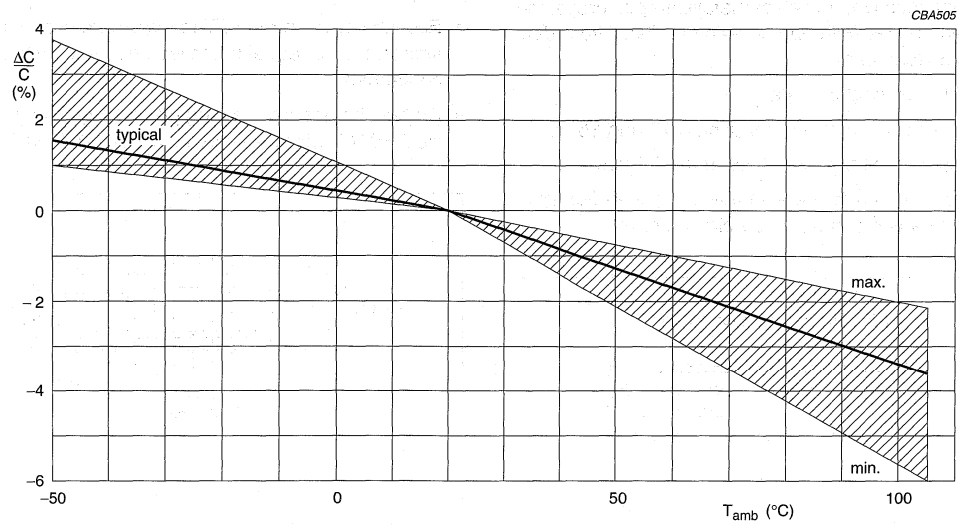


Fig.7 Capacitance change at 1 kHz as a function of temperature.

Tangent of loss angle

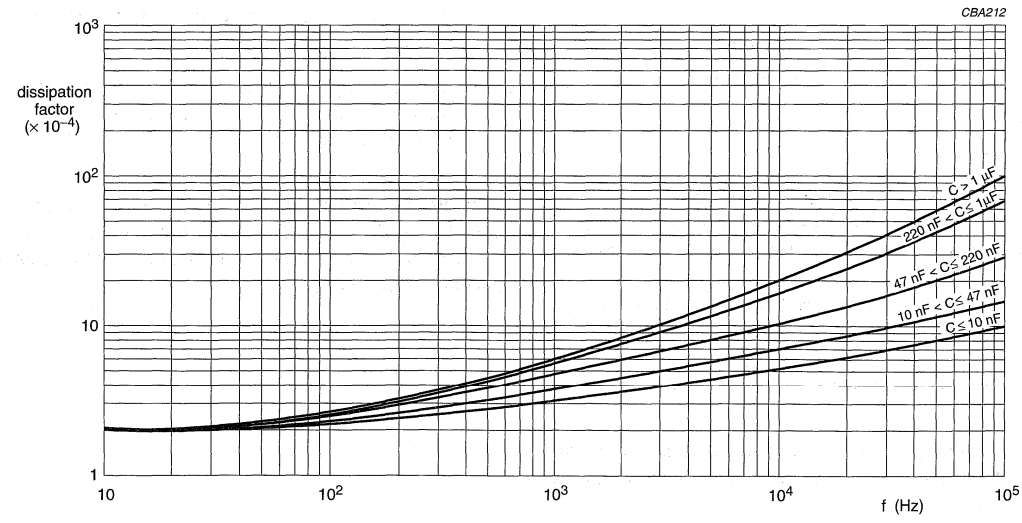


Fig.8 Tangent of loss angle as a function of frequency: typical curves.

Impedance

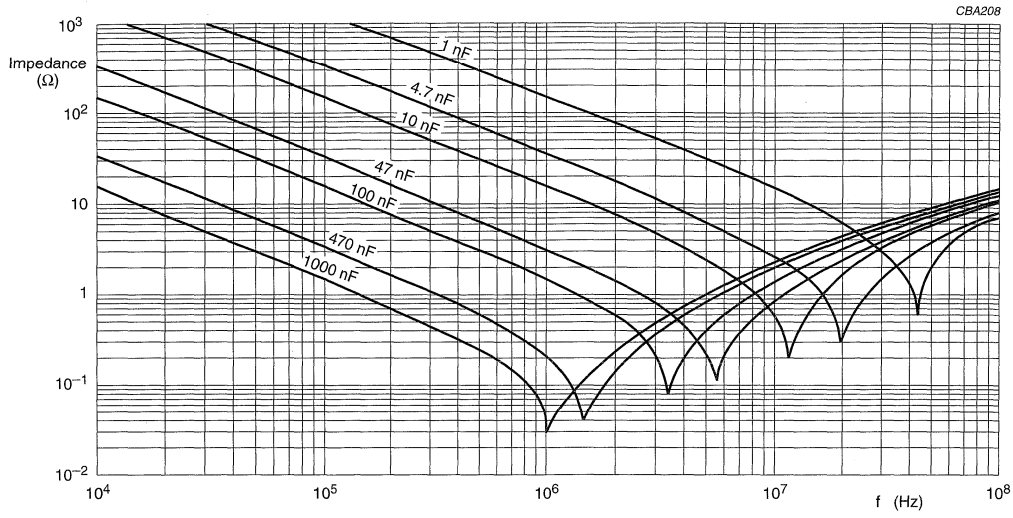


Fig.9 Impedance as a function of frequency: typical curves.

Resonant frequency

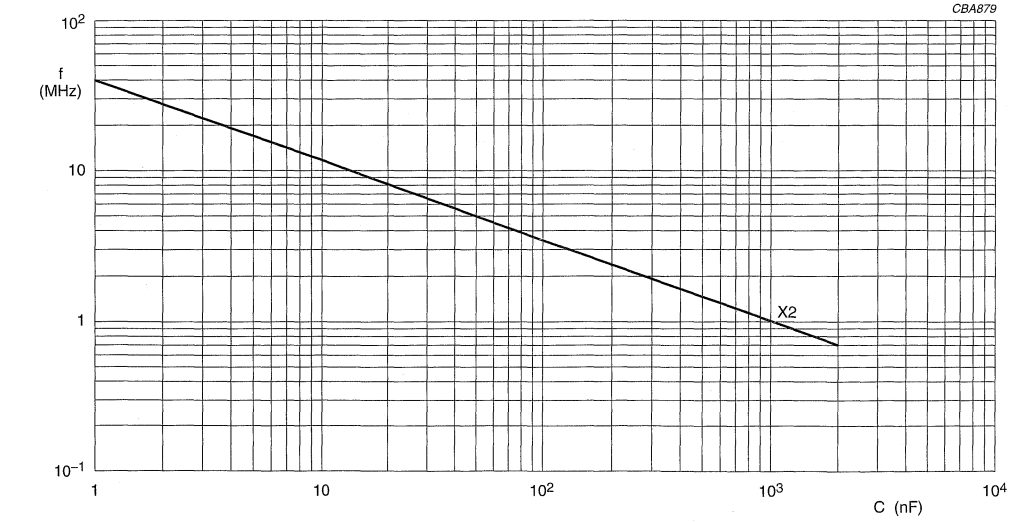


Fig.10 Resonant frequency as a function of capacitance: typical curves.

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

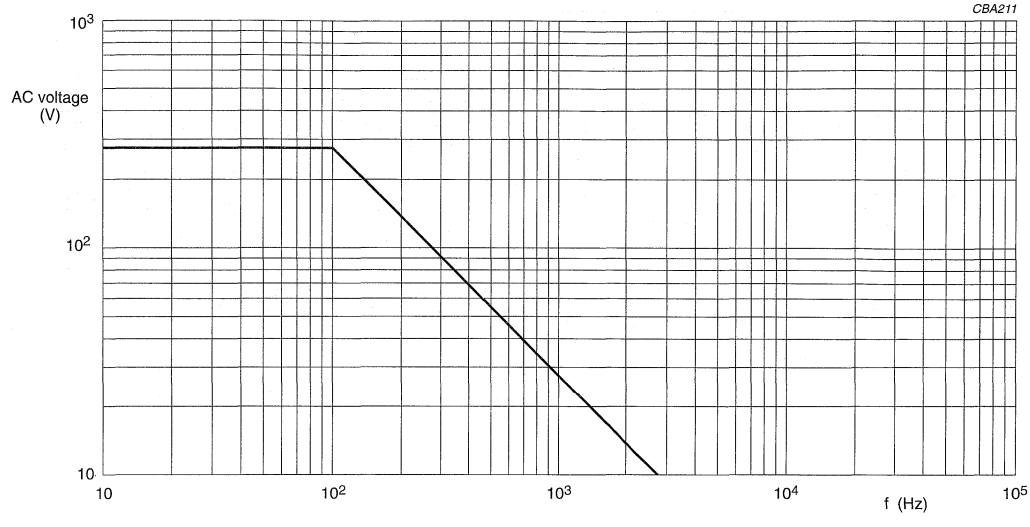


Fig.11 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 100$ °C.

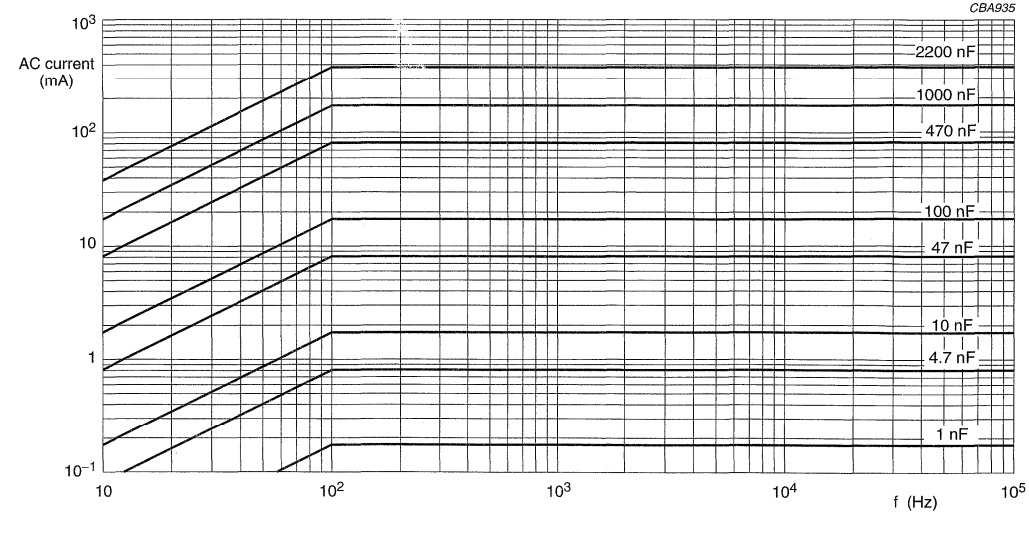


Fig.12 AC current (RMS value) as a function of frequency at $T_{amb} \leq 100$ °C.

Insulation resistance

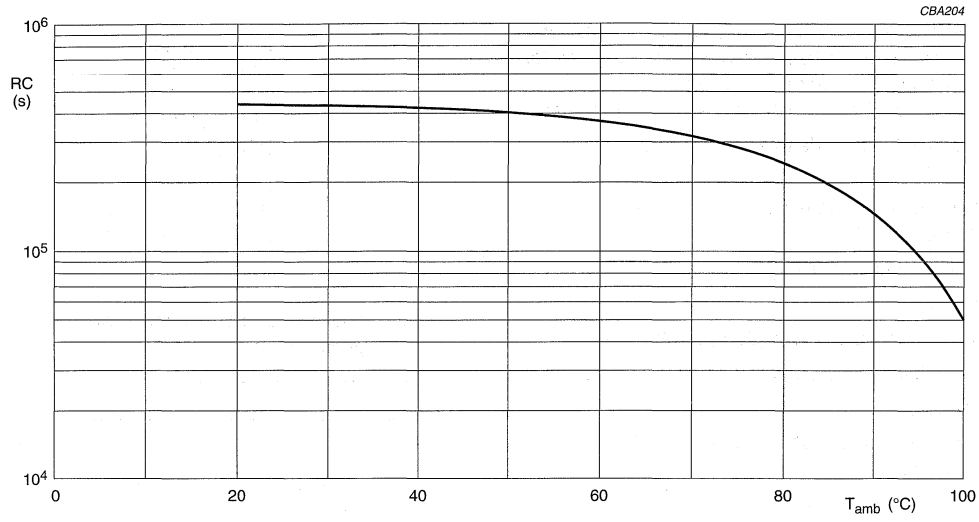


Fig.13 RC product as a function of ambient free air temperature: typical curve.

APPLICATION NOTES

- For X2 electromagnetic interference suppression in across the line applications (50 to 60 Hz) with a maximum mains voltage of 275 V (AC).
- 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.

MARKING

Product marking

The capacitors are marked by laser print; 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 = ±20%; K = ±10%; J = ±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
8. Year and week of manufacture (e.g. 9701) for pitch ≥15 mm
9. Safety approvals: products will be marked with approvals depending on the available marking space per product. Although all approvals remain valid as indicated in the reference data.

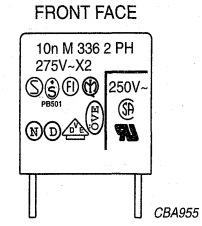


Fig.14 Example of marking for a capacitor with pitch = 10 mm.

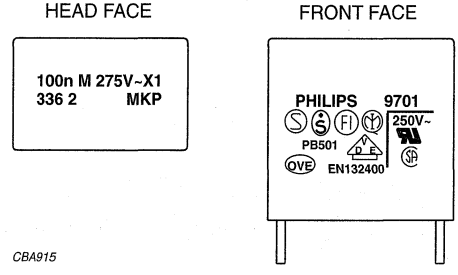


Fig.15 Example of marking for a capacitor with pitch = 15 mm.

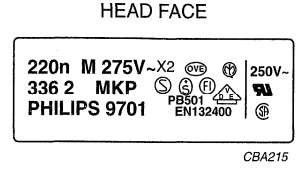
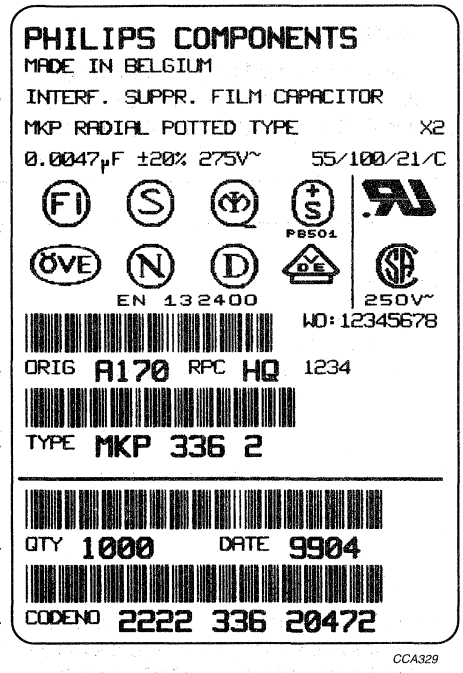


Fig.16 Example of marking for a capacitor with pitch = 22.5 or 27.5 mm.

Package marking

The package containing the capacitors is marked as shown Fig.17.

Please note:
In due time BC COMPONENTS
will replace PHILIPS COMPONENTS



Barcode label marking

LINE	MARKING EXPLANATION
1	Manufacturer's name
2	Country of origin
3	Sub-family
4	Type description and sub class
5	Capacitance value, tolerance, voltage and climatic category *("IEC 60068-1")*
6	Safety approvals
7	Preference origin code: A Country of origin in code: 170 (Belgium) Responsible production centre: HQ Work order: WO Wage number of final inspection (only for capacitors with pitch = 10 mm)
8	Product type description
9	Quantity and production period, year and week code
10	Product code (12NC)

Fig.17 Barcode label.

QUICK REFERENCE TEST REQUIREMENTS (see note 1)

TEST	PROCEDURE (quick reference)	REQUIREMENTS
Robustness of leads		
Tensile strength: *"IEC 60068-2-21"*	load 10 N; 10 s	no visible damage legible marking $\lvert\Delta C/C\rvert \leq 5\%$ $\Delta\tan\delta \leq 100 \times 10^{-4}$ ($C \leq 100$ nF); note 2 $\Delta\tan\delta \leq 200 \times 10^{-4}$ (100 nF $< C \leq$ 470 nF); note 2 $\Delta\tan\delta \leq 70 \times 10^{-4}$ ($C >$ 470 nF); note 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	
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	$\lvert\Delta C/C\rvert \leq 5\%$ $\Delta\tan\delta \leq 100 \times 10^{-4}$ ($C \leq 100$ nF); note 2 $\Delta\tan\delta \leq 200 \times 10^{-4}$ (100 nF $< C \leq$ 470 nF); note 2 $\Delta\tan\delta \leq 70 \times 10^{-4}$ ($C >$ 470 nF); note 2
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	$\lvert\Delta C/C\rvert \leq 5\%$ $\Delta\tan\delta \leq 100 \times 10^{-4}$ ($C \leq 100$ nF); note 2 $\Delta\tan\delta \leq 200 \times 10^{-4}$ (100 nF $< C \leq$ 470 nF); note 2 $\Delta\tan\delta \leq 70 \times 10^{-4}$ ($C >$ 470 nF); note 2 $R_{ins} \geq 50\%$ 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	$\lvert\Delta C/C\rvert \leq 5\%$ $\Delta\tan\delta \leq 70 \times 10^{-4}$ $R_{ins} \geq 50\%$ 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	$\lvert\Delta C/C\rvert \leq 10\%$ $\Delta\tan\delta \leq 100 \times 10^{-4}$ ($C \leq 100$ nF); note 2 $\Delta\tan\delta \leq 200 \times 10^{-4}$ (100 nF $< C \leq$ 470 nF); note 2 $\Delta\tan\delta \leq 70 \times 10^{-4}$ ($C >$ 470 nF); note 2 $R_{ins} \geq 50\%$ of specified value

Interference suppression film capacitors MKP 336 2

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 2 $\Delta\tan\delta \leq 200 \times 10^{-4}$ (100 nF $< C \leq$ 470 nF); note 2 $\Delta\tan\delta \leq 70 \times 10^{-4}$ ($C >$ 470 nF); note 2 $R_{ins} \geq 50\%$ of specified value
Passive flammability: *"IEC 60384-14"*	class C	no burning
Active flammability: *"IEC 60384-14"*	20 × 2.5 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 2 $\Delta\tan\delta \leq 200 \times 10^{-4}$ (100 nF $< C \leq$ 470 nF); note 2 $\Delta\tan\delta \leq 70 \times 10^{-4}$ ($C >$ 470 nF); note 2
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 2 $\Delta\tan\delta \leq 200 \times 10^{-4}$ (100 nF $< C \leq$ 470 nF); note 2 $\Delta\tan\delta \leq 70 \times 10^{-4}$ ($C >$ 470 nF); note 2
Active flammability test	voltage proof up to 4 kV (DC) or until breakdown (100 V/s, current limited 2 mA) failed capacitors connected to a 250 V (AC) power supply during 5 minutes	no burning

Notes

1. For detailed information: see *"Type detail specification HQN-384-14/108"*.
2. Measuring frequency 100 kHz for $C \leq 470$ nF and 10 kHz for $C >$ 470 nF.

Interference suppression film capacitors MKP 335 5

MKP RADIAL POTTED TYPE **PITCH 15/22.5 mm**

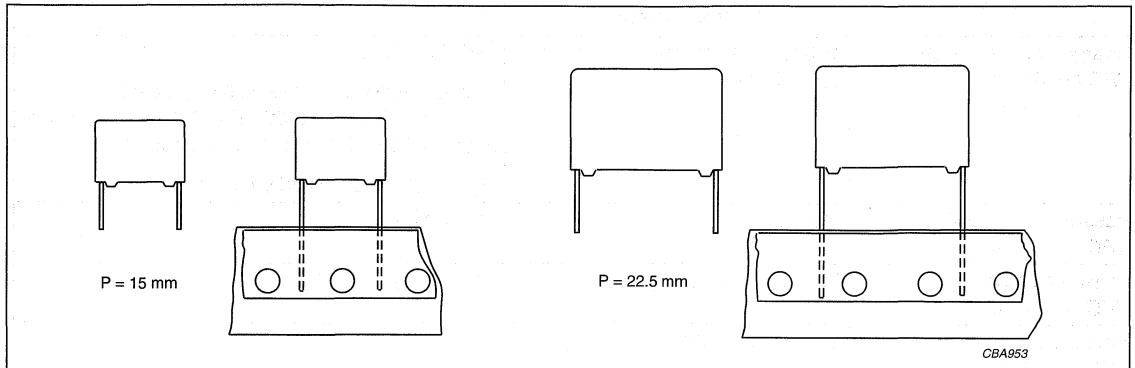


Fig.1 Simplified outlines.

FEATURES

- 15 to 22.5 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 NEW REQUIREMENTS of the new *"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 *"Tentative detail specification HQX-48-300-188"*.

QUICK REFERENCE DATA

DESCRIPTION	VALUE
Capacitance range (E12 series)	10 nF to 0.47 µF
Capacitance tolerance	±20%; ±10%; ±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 2nd edition and EN 132400
Safety approvals: 250 V 275 V	 UL1414; CSA-C22.2 No. 1; note 2 UL1283; CSA-C22.2 No. 8; CCEE; note 1 SEV; VDE; FI; N; D; S; IMQ; ÖVE; note 2
Materials	qualified in accordance with UL94V-O
Safety class	X2

Notes

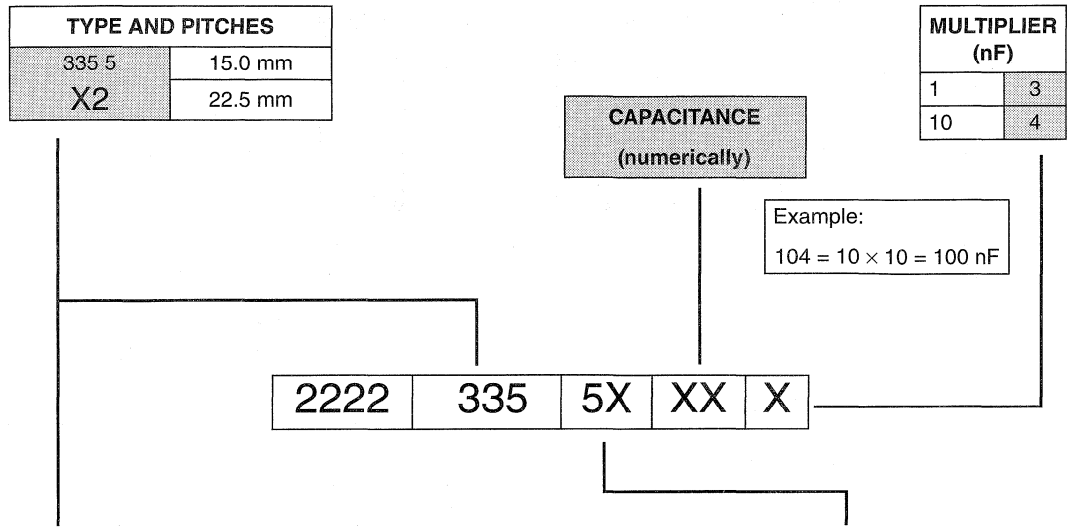
1. Pending.
2. Approved.

SAFETY APPROVALS

SAFETY APPROVALS (X2)		VOLTAGE	VALUE	FILE NUMBERS
	UL1414	250 V (AC)	10 nF to 1.0 µF	E 112471
	UL1283	275 V (AC)	10 nF to 1.5 µF	pending
	CSA-C22.2 No.1	250 V (AC)	10 nF to 1.0 µF	LR94054-16
	CSA-C22.2 No.8	275 V (AC)	10 nF to 1.5 µF	pending
	SEV (EN132400)	275 V (AC)	10 nF to 1.5 µF	99.6 60019.01
	VDE (EN132400)	275 V (AC)	10 nF to 1.5 µF	118878
	FI (EN132400)	275 V (AC)	10 nF to 1.5 µF	FI 12134
	NEMKO (EN132400)	275 V (AC)	10 nF to 1.5 µF	P99100002
	DEMKO (EN132400)	275 V (AC)	10 nF to 1.5 µF	308307
	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	E260-010-00
	CCEE	275 V (AC)	10 nF to 1.5 µF	pending

Interference suppression film capacitors MKP 335 5

COMPOSITION OF CATALOGUE NUMBER



TYPE	PACKAGING(1)	LEAD CONFIGURATION	C-TOL	PREFERRED TYPES
335 5 X2	loose in box	lead length 3.5 mm	±20%	2222 335 50...
		lead length 25.0 mm		2222 335 54...
				ON REQUEST
335 5 X2	loose in box	lead length 3.5 mm	±10%	2222 335 51...
		lead length 5.0 mm	±20%	2222 335 56...
			±10%	2222 335 57...
		lead length 25.0 mm	±10%	2222 335 55...
	taped on reel	H = 18.5 mm; note 2	±20%	2222 335 52...
			±10%	2222 335 53...

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

Interference suppression film capacitors MKP 335 5

MKP 335 5 GENERAL DATA **PITCH 15/22.5 mm**

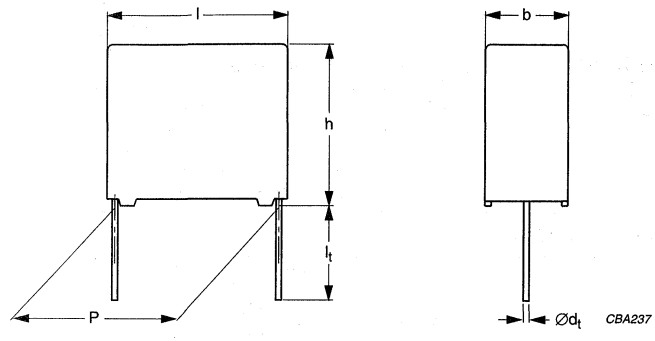


Fig.3 Outline.

Specific reference data for the 275 V AC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
C ≤ 100 nF	$\leq 10 \times 10^{-4}$	$\leq 30 \times 10^{-4}$
100 nF < C ≤ 470 nF	$\leq 20 \times 10^{-4}$	$\leq 70 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 390 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 voltage DC (cut off current 10 mA); rise time 100 V/s	2200 V; 1 minute	
Withstanding voltage AC between leads and case	2050 V; 1 minute	

Interference suppression film capacitors MKP 335 5

U_{Rac} = 275 V (AC) X2; U_{Rdc} = 630 V

C (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER	
			LOOSE IN BOX	
			short leads	long leads
			l_t = 3.5 ±0.5 mm	l_t = 25.0 ±2.0 mm
			C-tol = ±20%	
			catalogue number(1)	last 5 digits(1)
Pitch = 15.0 ±0.4 mm; d_t = 0.80 ±0.08 mm				
0.01	5.0 × 11.0 × 17.5	1.2	2222 335 50**103**	.. 54103
0.015			2222 335 50**153**	.. 54153
0.022			2222 335 50**223**	.. 54223
0.033			2222 335 50**333**	.. 54333
0.047	6.0 × 12.0 × 17.5	1.4	2222 335 50**473**	.. 54473
0.068	7.0 × 13.5 × 17.5	1.9	2222 335 50**683**	.. 54683
0.1	8.5 × 15.0 × 17.5	2.6	2222 335 50**104**	.. 54104
0.15	10.0 × 16.5 × 17.5	3.1	2222 335 50**154**	.. 54154
Pitch = 22.5 ±0.4 mm; d_t = 0.80 ±0.08 mm				
0.22	8.5 × 18.0 × 26.0	4.4	2222 335 50**224**	.. 54224
0.33	10.0 × 19.5 × 26.0	5.5	2222 335 50**334**	.. 54334
0.47	12.0 × 22.0 × 26.0	7.8	2222 335 50**474**	.. 54474

Note

1. The shading indicates preferred types.

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:
  - Copper clad steel wire for pitch = 15 mm
  - Copper wire for pitch = 22.5 mm
- Small stand-off pips allow removal of solder flux etc. during cleaning of the printed-circuit board.

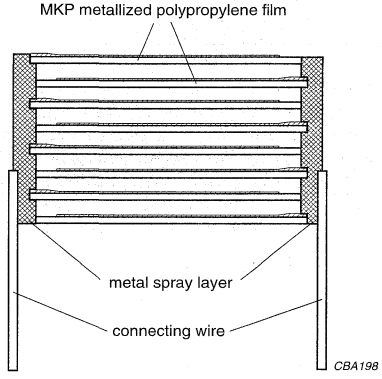


Fig.4 Construction.

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 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.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.

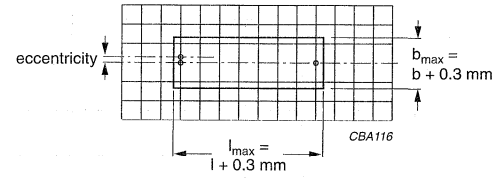


Fig.5 Lay-out.

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%.

CHARACTERISTICS

Capacitance

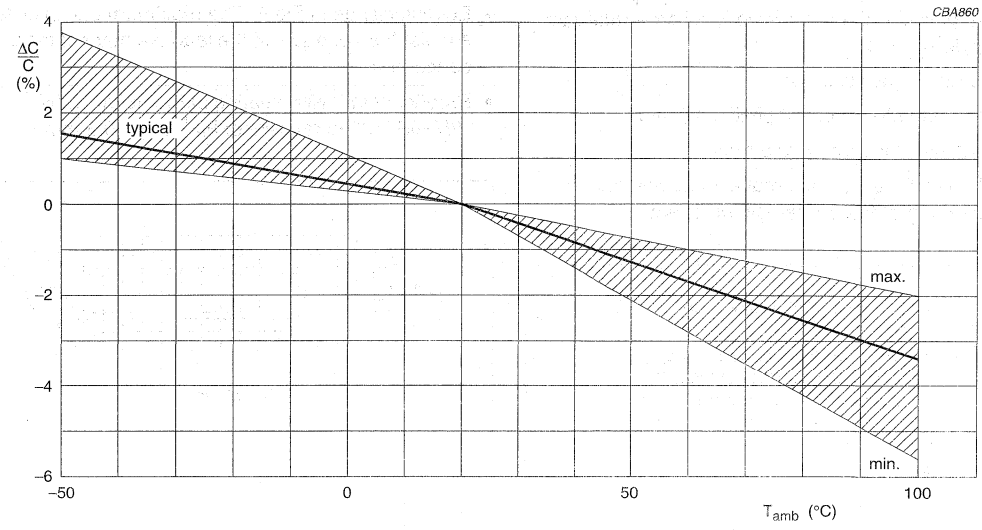


Fig.6 Capacitance change at 1 kHz as a function of temperature.

Tangent of loss angle

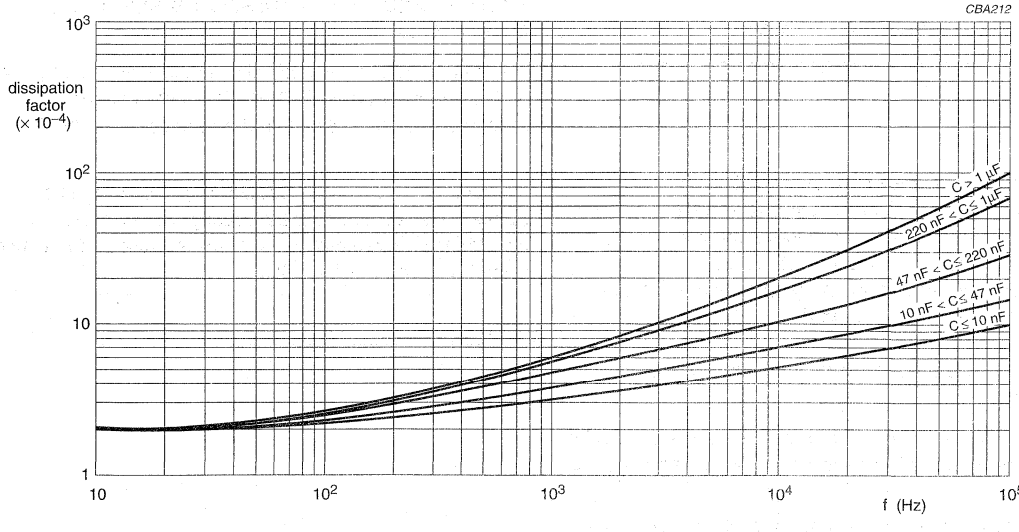


Fig.7 Tangent of loss angle as a function of frequency: typical curves.

Impedance

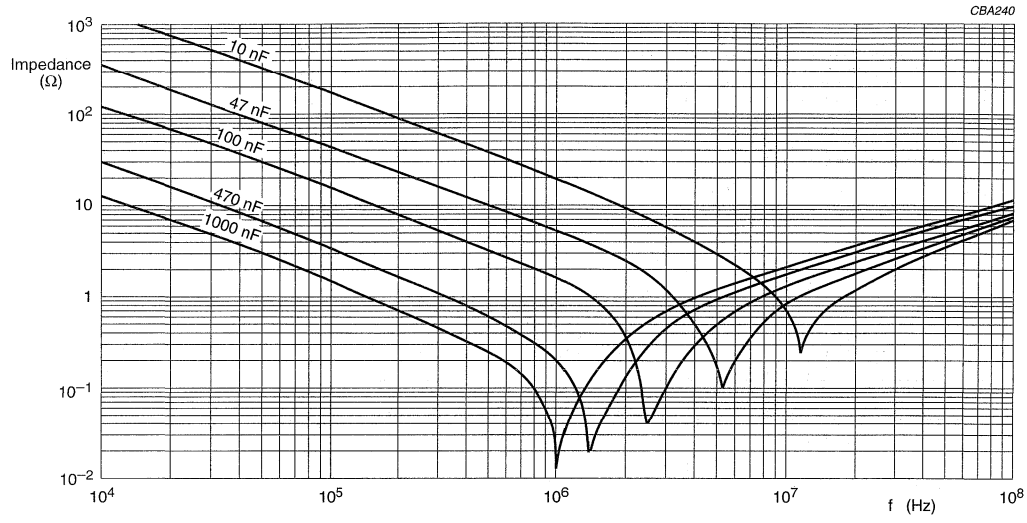


Fig.8 Impedance as a function of frequency: typical curves.

Resonant frequency

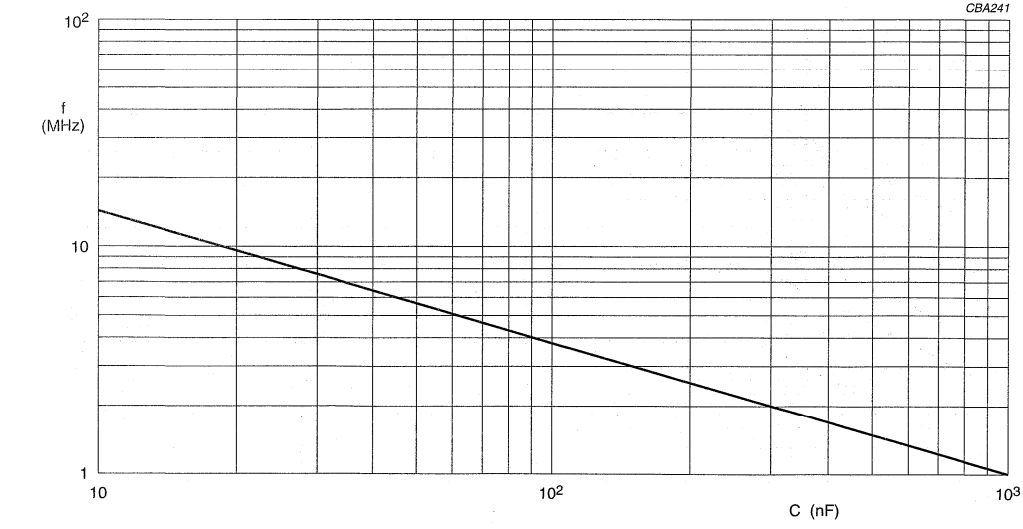


Fig.9 Resonant frequency as a function of capacitance: typical curve.

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

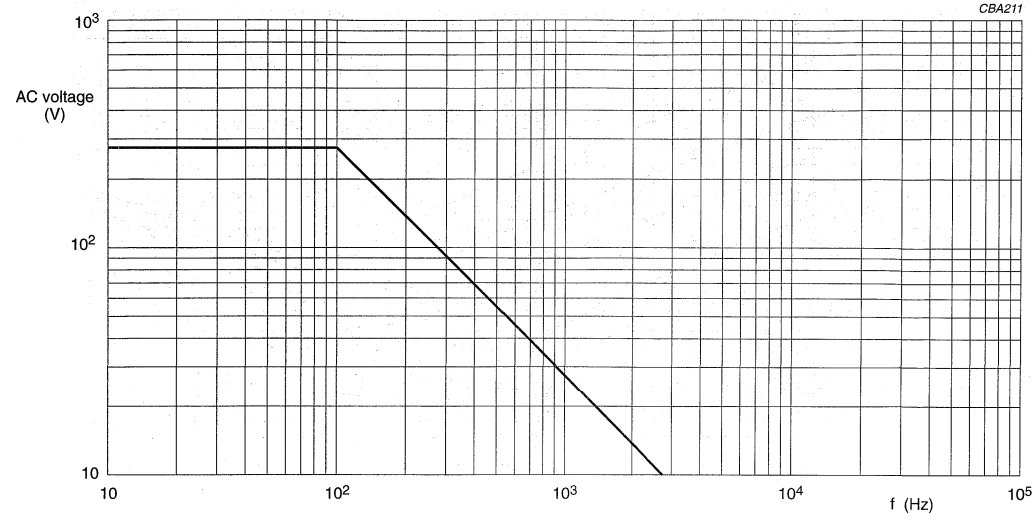


Fig.10 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 100$ °C.

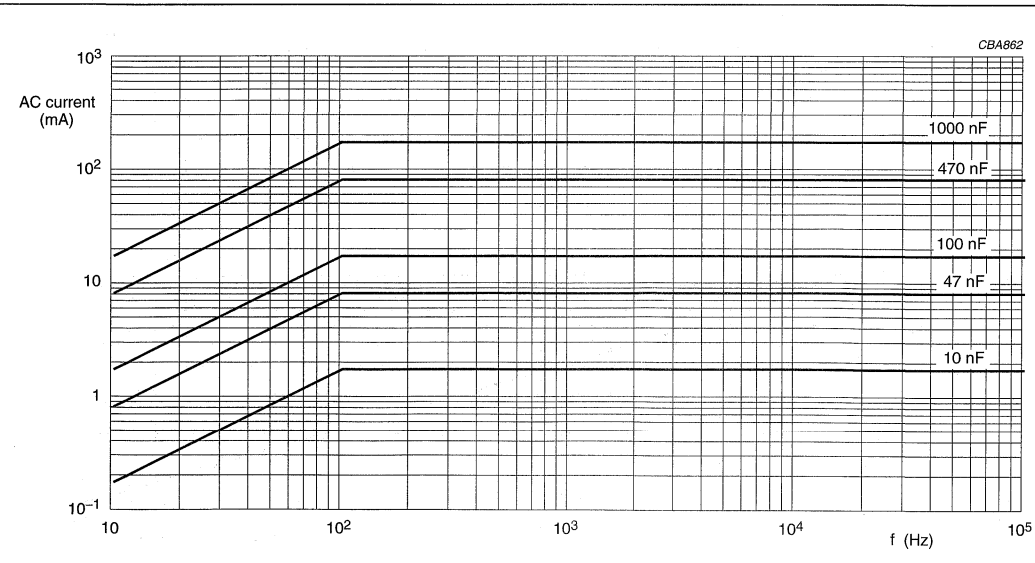


Fig.11 AC current (RMS value) as a function of frequency at $T_{amb} \leq 100$ °C.

Insulation resistance

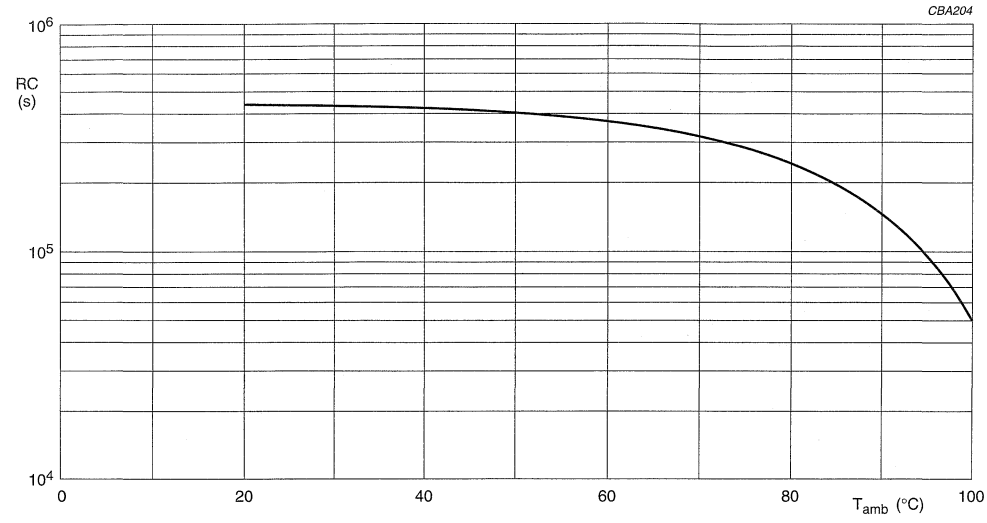


Fig.12 RC product as a function of ambient free air temperature: typical curve.

APPLICATION NOTES

- For X2 electromagnetic interference suppression in across the line applications (50 to 60 Hz) with a maximum mains voltage of 275 V (AC).
- 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.

MARKING

Product marking

The capacitors are marked by laser print; on the top for pitch ≥ 22.5 mm (see Fig.14) or on the top and one side pitch ≤ 15 mm (see Fig.13) 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 (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
8. Year and week of manufacture (e.g. 9840)
9. Safety approvals: products will be marked with approvals depending on the available marking space per product. Although all approvals remain valid as indicated in the reference data.

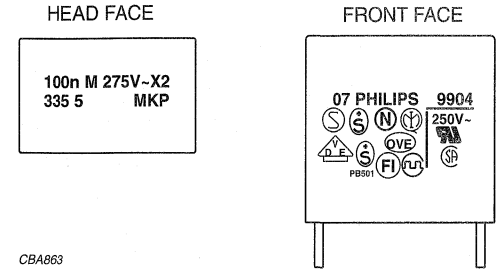


Fig.13 Example of marking for a capacitor with pitch = 15 mm.

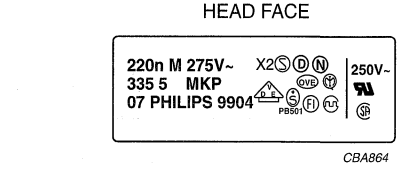
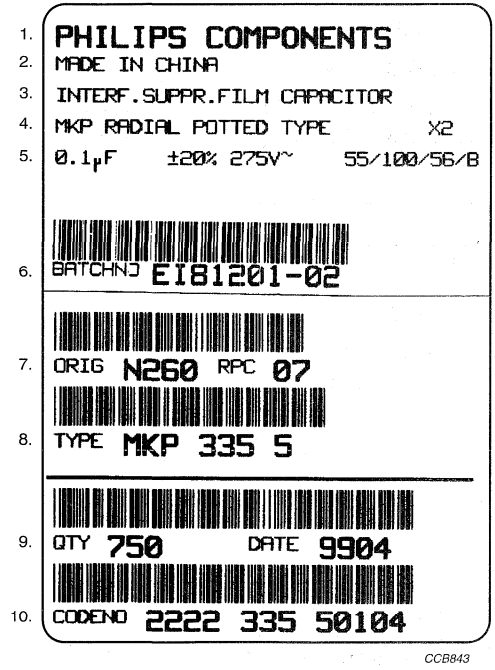


Fig.14 Example of marking for a capacitor with pitch = 22.5 or 27.5 mm.

Package marking

The package containing the capacitors is marked as shown Fig.15.

Please note:
In due time BC COMPONENTS
will replace PHILIPS COMPONENTS



Barcode label marking

LINE	MARKING EXPLANATION
1	Manufacturer's name
2	Country of origin
3	Sub-family
4	Type description and sub class
5	Capacitance value, tolerance, voltage and climatic category (*"IEC 60068-1"*)
6	Batch number
7	Preference origin code: N Country of origin in code: 260 (China) Responsible production centre: 07
8	Product type description
9	Quantity and production period, year and week code
10	Product code (12NC)

Fig.15 Barcode label.

QUICK REFERENCE TEST REQUIREMENTS (see note 1)

TEST	PROCEDURE (quick reference)	REQUIREMENTS
Robustness of leads		
Tensile strength: *"IEC 60068-2-21"*	load 10 N; 10 s	no visible damage legible marking $\lvert\Delta C/C\rvert \leq 5\%$ $\Delta\tan\delta \leq 80 \times 10^{-4}$ ($C \leq 1\ \mu F$); note 2 $\Delta\tan\delta \leq 50 \times 10^{-4}$ ($C > 1\ \mu F$); note 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	
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	$\lvert\Delta C/C\rvert \leq 5\%$ $\Delta\tan\delta \leq 80 \times 10^{-4}$ ($C \leq 1\ \mu F$); note 2 $\Delta\tan\delta \leq 50 \times 10^{-4}$ ($C > 1\ \mu F$); note 2
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	$\lvert\Delta C/C\rvert \leq 5\%$ $\Delta\tan\delta \leq 80 \times 10^{-4}$ ($C \leq 1\ \mu F$); note 2 $\Delta\tan\delta \leq 50 \times 10^{-4}$ ($C > 1\ \mu F$); note 2 $R_{ins} \geq 50\%$ 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"*	56 days; 40 °C; 90 to 95% RH V_p = 1200 V (DC); 1 minute	$\lvert\Delta C/C\rvert \leq 5\%$ $\Delta\tan\delta \leq 80 \times 10^{-4}$ ($C \leq 1\ \mu F$); note 2 $\Delta\tan\delta \leq 50 \times 10^{-4}$ ($C > 1\ \mu F$); note 2 $R_{ins} \geq 50\%$ of specified value
Endurance (AC): *"IEC 60384-14"*	3 × 2.5 kV pulse voltage for X2 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	$\lvert\Delta C/C\rvert \leq 10\%$ $\Delta\tan\delta \leq 80 \times 10^{-4}$ ($C \leq 1\ \mu F$); note 2 $\Delta\tan\delta \leq 50 \times 10^{-4}$ ($C > 1\ \mu F$); note 2 $R_{ins} \geq 50\%$ of specified value

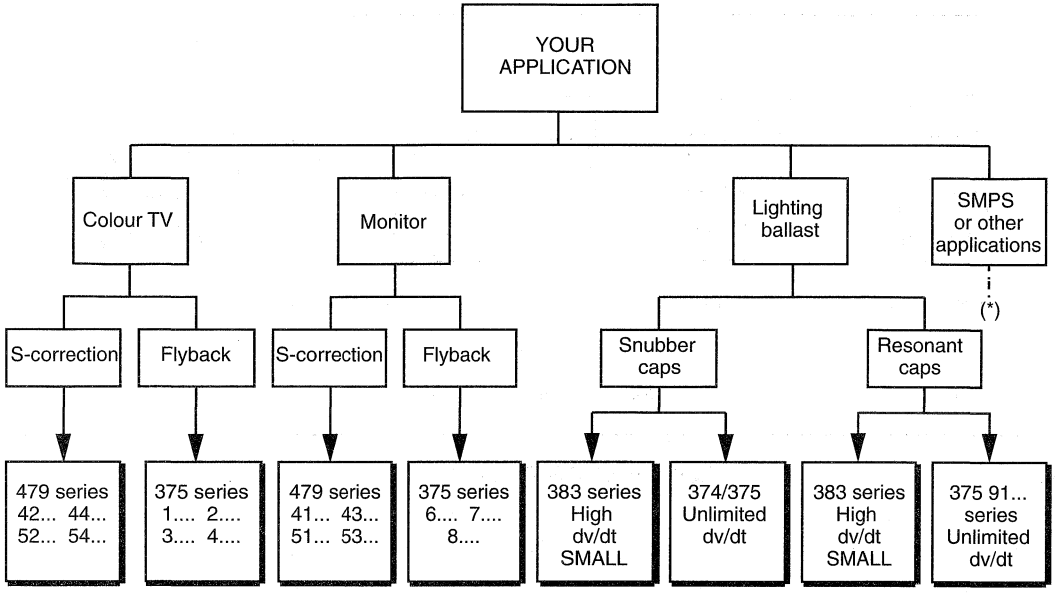
TEST	PROCEDURE (quick reference)	REQUIREMENTS
Charge and discharge: *"IEC 60384-14"*	10000 cycles; 5 ms; 1.5 × dV/dt	$\lvert\Delta C/C\rvert \leq 10\%$ $\Delta\tan\delta \leq 80 \times 10^{-4}$ ($C \leq 1$ µF); note 2 $\Delta\tan\delta \leq 50 \times 10^{-4}$ ($C > 1$ µF); note 2 $R_{ins} \geq 50\%$ of specified value
Passive flammability: *"IEC 60384-14"*	class B	no burning
Active flammability: *"IEC 60384-14"*	20 × 2.5 kV discharge for X2	no burning
Heat storage: *"IEC 60384-14"*	1000 hours; 100 °C	$\lvert\Delta C/C\rvert \leq 5\%$ $\Delta\tan\delta \leq 80 \times 10^{-4}$ ($C \leq 1$ µF); note 2 $\Delta\tan\delta \leq 50 \times 10^{-4}$ ($C > 1$ µF); note 2
Resistance to soldering heat with preheating: *"IEC 60384-14"*	preheating: 100 °C; solder bath: 260 °C; 10 s	$\lvert\Delta C/C\rvert \leq 5\%$ $\Delta\tan\delta \leq 80 \times 10^{-4}$ ($C \leq 1$ µF); note 2 $\Delta\tan\delta \leq 50 \times 10^{-4}$ ($C > 1$ µF); note 2
Active flammability test	voltage proof up to 4 kV (DC) or until breakdown (100 V/s, current limited 2mA) failed capacitors connected to a 250 V (AC) power supply during 5 minutes	no burning

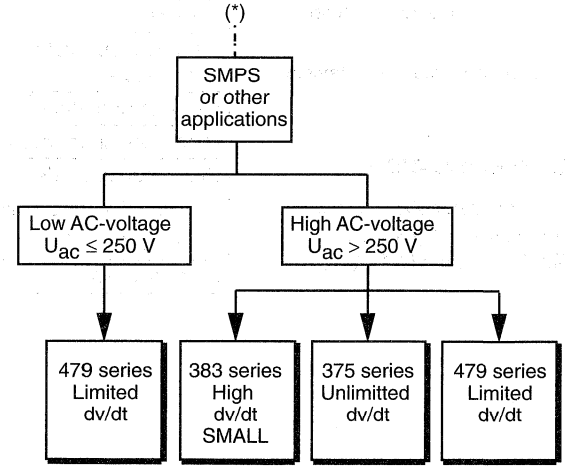
Notes

1. For detailed information: see *"Tentative detail specification HQX-48-300-188"*.
2. Measuring frequency 10 kHz for $C \leq 1$ µF and 1 kHz for $C > 1$ µF.

AC AND PULSE CAPACITORS

HOW TO SELECT





CBA963

AC and pulse metallized polypropylene film

KP/MKP 375

KP/MKP RADIAL LACQUERED TYPE

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

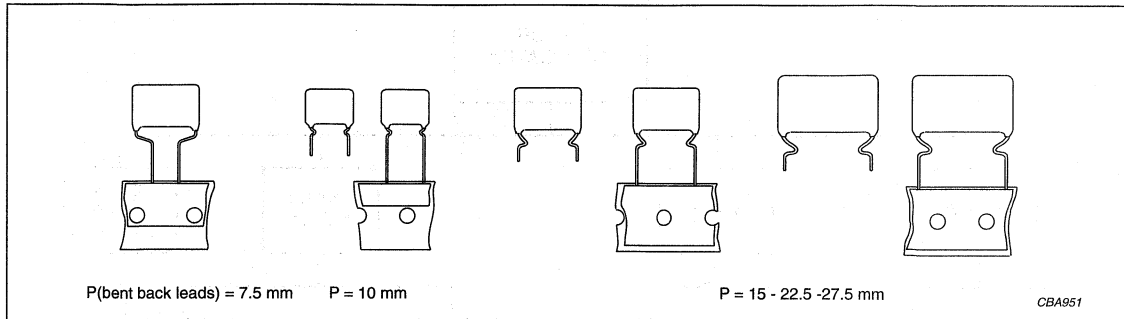


Fig.1 Simplified outline.

FEATURES

- 10 to 27.5 mm lead pitch
- Supplied loose and taped
- Taped products available on request.

APPLICATIONS

- Where high currents and steep pulses occur
- For deflection circuits in television receivers.

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)	100 pF to 270 nF
Capacitance tolerance	±5%; ±3.5%
Rated (DC) voltage	630 V; 1000 V; 1600 V; 2000 V; 2500 V
Rated (AC) voltage	300 V; 400 V; 500 V; 600 V; 880 V
Rated peak-to-peak voltage	850 V; 1100 V; 1400 V; 1700 V; 2500 V
Climatic category	55/105/56
Maximum application temperature	105 °C
Rated temperature	85 °C
Reference specification	IEC 60384-17
Performance grade: for $C > 5.6$ nF and 2500 V for $C \leq 5.6$ nF	 grade 1 (long life) grade 2 (general purpose)
Stability grade	grade 2

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

COMPOSITION OF CATALOGUE NUMBER

TYPE AND PITCHES	
375	15.0/7.5 mm
	10.0 mm
	15.0 mm
	22.5 mm
	27.5 mm

CAPACITANCE (numerically)

MULTIPLIER (nF)	
0.01	1
0.1	2
1	3
10	4

Example:

104 = 10 × 10 = 100 nF

2222	375	XX	XX	X

TYPE	PACKAGING	LEAD CONFIGURATION	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
			±3.5%	15	25	35	65
		lead length 3.5 mm	±5%	10	20	30	60
			±3.5%	11	21	31	61
	taped on reel	H = 16.0 mm; P_0 = 12.7 mm	±5%	12	22	32	62
			±3.5%	13	23	33	63
	taped on reel (bent back)	H = 16.0 mm; P_0 = 15.0 mm	±5%	16	26	36	66
			±3.5%	17	27	37	67

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

TYPE AND PITCHES	
375	15.0/7.5 mm
	10.0 mm
	15.0 mm
	22.5 mm
	27.5 mm

CAPACITANCE (numerically)

MULTIPLIER (nF)	
0.01	1
0.1	2
1	3
10	4

Example:
104 = 10 × 10 = 100 nF

2222	375	XX	XX	X

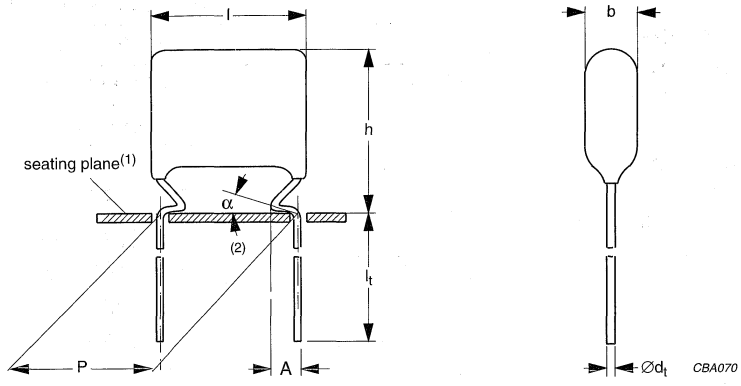
TYPE	PACKAGING	LEAD CONFIGURATION	C-TOL	2000 V	2000 V monitor type	2500 V	2500 V monitor type
375	loose in box	lead length 5.0 mm	±5%	44	74	91	84
			±3.5%	45	75	91	85
		lead length 3.5 mm	±5%	40	70	91	80
			±3.5%	41	71	91	81
	taped on reel	H = 16.0 mm; P_0 = 12.7 mm	±5%	42	72	–	82
			±3.5%	43	73	–	83
	taped on reel (bent back)	H = 16.0 mm; P_0 = 15.0 mm	±5%	46	–	–	–
			±3.5%	47	–	–	–

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

KP/MKP 375 GENERAL DATA

PITCH 10 mm



(1) Hole Ø1.0 for d_t = 0.6 mm.
(2) $0 \leq \alpha < 50°$.

Fig.4 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)	15000 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

PACKAGING(1)	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	l_t = 5.0 ±1.0 mm	±5%	2222 375 14...	preferred
		±3.5%	2222 375 15...	on request
	l_t = 3.5 ±0.5 mm	±5%	2222 375 10...	on request
		±3.5%	2222 375 11...	on request
Taped on reel	H = 16.0 mm; P_0 = 12.7 mm; note 2	±5%	2222 375 12...	on request
		±3.5%	2222 375 13...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

U_{Rdc} = 630 V; U_{Rac} = 300 V/U_{p-p} = 850 V

C (pF)	DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER[1] LOOSE IN BOX l_t = 5.0 ±1.0 mm C-tol = ±5%
Pitch = 10.0 ±0.4 mm; d_t = 0.60 ±0.06 mm; A = 2.0 +1.0/–0.5 mm			
680	5.0 × 13.0 × 14.5	0.65	2222 375 14**681**
750		0.65	2222 375 14**751**
820	5.5 × 13.5 × 14.5	0.70	2222 375 14**821**
910		0.70	2222 375 14**911**
1000		0.70	2222 375 14**102**
1100		0.75	2222 375 14**112**
1200		0.75	2222 375 14**122**
1300		0.75	2222 375 14**132**
1500		0.80	2222 375 14**152**
1600		0.85	2222 375 14**162**
1800	6.0 × 14.0 × 14.5	0.80	2222 375 14**182**
2000		0.85	2222 375 14**202**
2200		0.90	2222 375 14**222**
2400		1.0	2222 375 14**242**
2700	6.5 × 14.5 × 14.5	1.1	2222 375 14**272**

Note

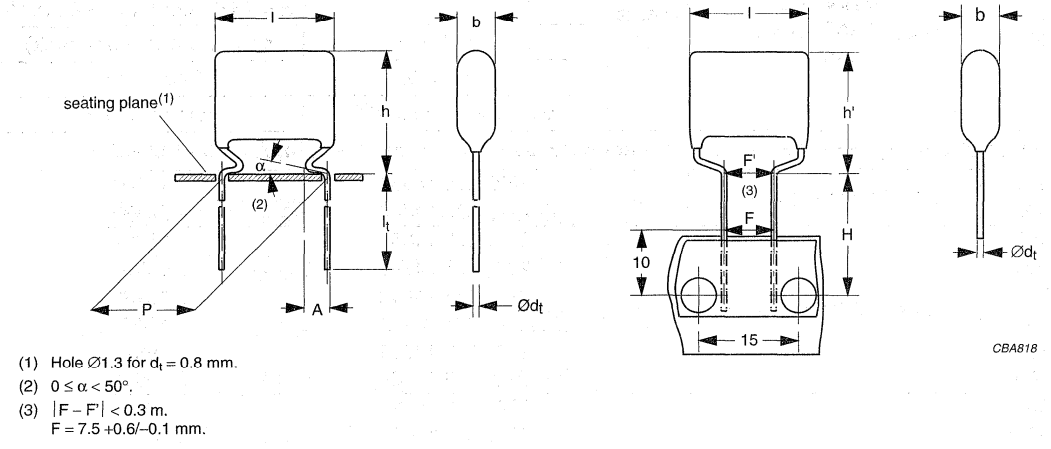
1. The shading indicates preferred types.

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)



(1) Hole Ø1.3 for $d_t = 0.8$ mm.
(2) $0 \leq \alpha < 50°$.
(3) $|F - F'| < 0.3$ m.
$F = 7.5 +0.6/-0.1$ mm.

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/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

PACKAGING(1)	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 5.0 \pm 1.0$ mm	±5%	2222 375 14...	preferred
		±3.5%	2222 375 15...	on request
	$l_t = 3.5 \pm 0.5$ mm	±5%	2222 375 10...	on request
		±3.5%	2222 375 11...	on request
Taped on reel	H = 16.0 mm; P_0 = 12.7 mm; note 2	±5%	2222 375 12...	on request
		±3.5%	2222 375 13...	on request
Taped on reel (bent back)	H = 16.0 mm; P_0 = 15.0 mm; note 2	±5%	2222 375 16...	preferred
		±3.5%	2222 375 17...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

U_{Rdc} = 630 V; U_{Rac} = 300 V/U_{p-p} = 850 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; H = 16.0 mm; P_0 = 15.0 mm[2]
			l_t = 5.0 ±1.0 mm	pitch 7.5 mm (bent back)
			C-tol = ±5%	C-tol = ±5%
			catalogue number[3]	last 5 digits[3]
Pitch = 15.0 ±0.4 mm (pitch = 7.5 ±0.4 mm for bent back leads); d_t = 0.80 ±0.08 mm; A = 2.5 +1.5/−0.5 mm				
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				

Notes

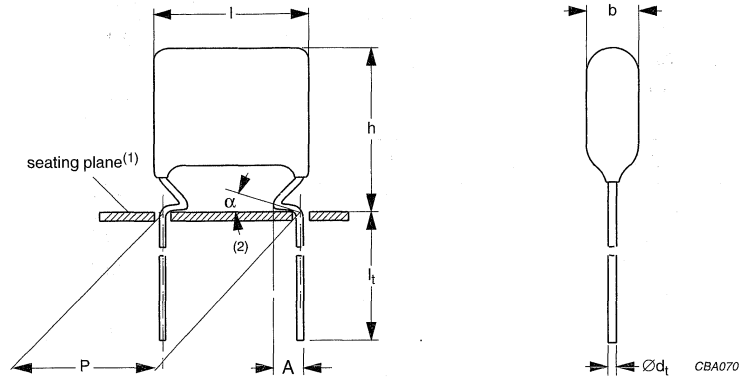
1. Dimensions in brackets for bent back leads.
2. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*:
   a) For pitch = 15.0 mm: H = 16.0 mm and P_0 = 12.7 mm.
   b) For pitch = 15/7.5 mm (bent back): H = 16.0 mm and P_0 = 15.0 mm.
   Standard reel diameter = 500 mm. Small reel diameter = 356 mm is available on request.
3. The shading indicates preferred types.

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

KP/MKP 375 GENERAL DATA

PITCH 22.5/27.5 mm



(1) Hole Ø1.3 for d_t = 0.8 mm.
(2) $0 \leq \alpha < 50°$.

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/µs 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

PACKAGING(1)	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	l_t = 5.0 ±1.0 mm	±5%	2222 375 14...	preferred
		±3.5%	2222 375 15...	on request
	l_t = 3.5 ±0.5 mm	±5%	2222 375 10...	on request
		±3.5%	2222 375 11...	on request
Taped on reel	H = 16.0 mm; P_0 = 12.7 mm; note 2	±5%	2222 375 12...	on request
		±3.5%	2222 375 13...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*; taped on reel pitch = 27.5 mm is not available.
2. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

U_{Rdc} = 630 V; U_{Rac} = 300 V/U_{p-p} = 850 V

C (µF)	DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER[1] LOOSE IN BOX l_t = 5.0 ±1.0 mm C-tol = ±5%
Pitch = 22.5 ±0.4 mm; d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/–0.5 mm			
0.036	7.0 × 20.0 × 26.0	2.7	2222 375 14**363**
0.039			2222 375 14**393**
0.043			2222 375 14**433**
0.047			2222 375 14**473**
0.051			2222 375 14**513**
0.056			2222 375 14**563**
0.062			2222 375 14**623**
0.068	7.5 × 20.5 × 26.0	3.0	2222 375 14**683**
0.075	8.0 × 21.0 × 26.0	3.3	2222 375 14**753**
0.082			2222 375 14**823**
0.091	8.5 × 21.5 × 26.0	3.8	2222 375 14**913**
0.1	9.0 × 22.0 × 26.0	4.0	2222 375 14**104**
0.11	9.5 × 22.5 × 26.0	4.3	2222 375 14**114**
0.12	10.0 × 23.0 × 26.0	4.7	2222 375 14**124**
Pitch = 27.5 ±0.5 mm; d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/–0.5 mm			
0.13	9.5 × 22.5 × 30.0	4.7	2222 375 14**134**
0.15	10.0 × 23.0 × 30.0	5.2	2222 375 14**154**
0.16	10.5 × 23.5 × 30.0	5.5	2222 375 14**164**
0.18	11.0 × 24.0 × 30.0	6.0	2222 375 14**184**
0.2	11.5 × 24.5 × 30.0	6.6	2222 375 14**204**
0.22	12.5 × 25.5 × 30.0	7.1	2222 375 14**224**
0.24	13.0 × 26.0 × 30.0	7.7	2222 375 14**244**
0.27	13.5 × 26.5 × 30.0	8.5	2222 375 14**274**

Note

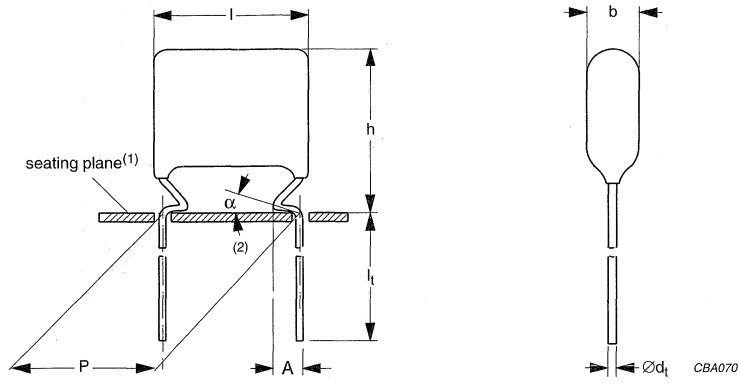
1. The shading indicates preferred types.

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

KP/MKP 375 GENERAL DATA

PITCH 10 mm



(1) Hole Ø1.0 for d_t = 0.6 mm.
(2) $0 \leq \alpha < 50°$

Fig.7 Outline.

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/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	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 = 5.0 ±1.0 mm	±5%	2222 375 24...	preferred
		±3.5%	2222 375 25...	on request
	l_t = 3.5±0.5 mm	±5%	2222 375 20...	on request
		±3.5%	2222 375 21...	on request
Taped on reel	H = 16.0 mm; P_0 = 12.7 mm; note 2	±5%	2222 375 22...	on request
		±3.5%	2222 375 23...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

U_{Rdc} = 1000 V; U_{Rac} = 400 V/U_{p-p} = 1100 V

C (pF)	DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER[1] LOOSE IN BOX l_t = 5.0 ±1.0 mm C-tol = ±5%
Pitch = 10.0 ±0.4 mm; d_t = 0.60 ±0.06 mm; A = 2.0 +1.0/–0.5 mm			
100	5.0 × 13.0 × 14.5	0.50	2222 375 24**101**
110			2222 375 24**111**
120			2222 375 24**121**
130			2222 375 24**131**
150	5.5 × 13.5 × 14.5	0.55	2222 375 24**151**
160		0.55	2222 375 24**161**
180		0.55	2222 375 24**181**
200		0.55	2222 375 24**201**
220		0.60	2222 375 24**221**
240		0.60	2222 375 24**241**
270		0.60	2222 375 24**271**
300		0.60	2222 375 24**301**
330		0.60	2222 375 24**331**
360		0.60	2222 375 24**361**
390		0.65	2222 375 24**391**
430		0.70	2222 375 24**431**
470		0.75	2222 375 24**471**
510		0.75	2222 375 24**511**
560		0.80	2222 375 24**561**
620		0.80	2222 375 24**621**
680		0.80	2222 375 24**681**
750		0.70	2222 375 24**751**
820		0.70	2222 375 24**821**
910		0.70	2222 375 24**911**
1000	6.0 × 14.0 × 14.5	0.75	2222 375 24**102**
1100		0.85	2222 375 24**112**
1200		0.90	2222 375 24**122**
1300		0.85	2222 375 24**132**
1500		0.90	2222 375 24**152**

Note

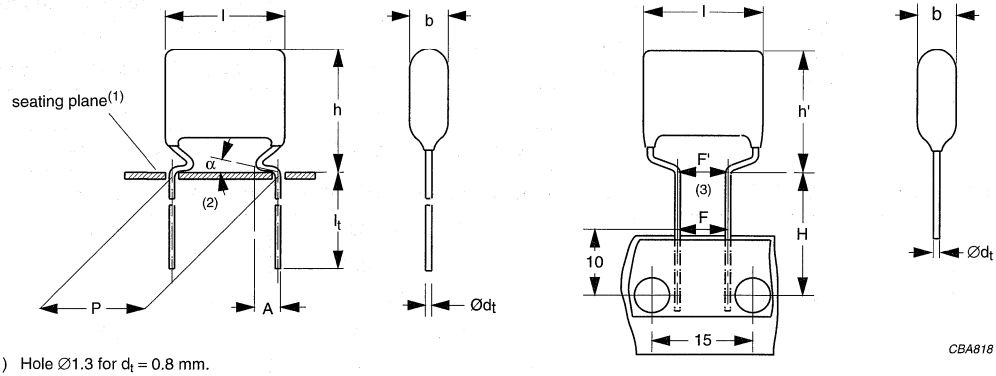
1. The shading indicates preferred types.

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)



(1) Hole ∅1.3 for $d_t = 0.8$ mm.
(2) $0 \leq \alpha < 50°$.
(3) $|F - F'| < 0.3$ mm.
$F = 7.5$ +0.6/–0.1 mm.

Fig.8 Outline.

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/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	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	$l_t = 5.0 \pm 1.0$ mm	±5%	2222 375 24...	preferred
		±3.5%	2222 375 25...	on request
	$l_t = 3.5 \pm 0.5$ mm	±5%	2222 375 20...	on request
		±3.5%	2222 375 21...	on request
Taped on reel	H = 16.0 mm; $P_0 = 12.7$ mm; note 2	±5%	2222 375 22...	on request
		±3.5%	2222 375 23...	on request
Taped on reel (bent back)	H = 16.0 mm; $P_0 = 15.0$ mm; note 2	±5%	2222 375 26...	preferred
		±3.5%	2222 375 27...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

U_{Rdc} = 1000 V; U_{Rac} = 400 V/U_{p-p} = 1100 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; H = 16.0 mm; P_0 = 15.0 mm[2]
			l_t = 5.0 ±1.0 mm	pitch 7.5 mm (bent back)
			C-tol = ±5%	C-tol = ±5%
			catalogue number[3]	last 5 digits[3]
Pitch = 15.0 ±0.4 mm (Pitch = 7.5 0.4 mm for bent back leads); d_t = 0.80 ±0.08 mm; A = 2.5 +1.5/–0.5 mm				
1600	5.5 × 14.5 (16.0) × 18.5	1.1	2222 375 24**162**	.. 26**162**
1800			2222 375 24**182**	.. 26**182**
2000			2222 375 24**202**	.. 26**202**
2200			2222 375 24**222**	.. 26**222**
2400			2222 375 24**242**	.. 26**242**
2700	6.0 × 15.0 (16.5) × 18.5	1.2	2222 375 24**272**	.. 26**272**
3000			2222 375 24**302**	.. 26**302**
3300			2222 375 24**332**	.. 26**332**
3600			2222 375 24**362**	.. 26**362**
3900			2222 375 24**392**	.. 26**392**
4300			2222 375 24**432**	.. 26**432**
4700			2222 375 24**472**	.. 26**472**
5100			2222 375 24**512**	.. 26**512**
5600			2222 375 24**562**	.. 26**562**
6200			2222 375 24**622**	.. 26**622**
6800			2222 375 24**682**	.. 26**682**
7500	7.0 × 16.0 (17.5) × 18.5	1.4	2222 375 24**752**	.. 26**752**
8200			2222 375 24**822**	.. 26**822**
9100			2222 375 24**912**	.. 26**912**
10000	7.5 × 16.5 (18.0) × 18.5	1.6	2222 375 24**103**	.. 26**103**
11000	8.0 × 17.0 (18.5) × 18.5	1.8	2222 375 24**113**	.. 26**113**
12000			2222 375 24**123**	.. 26**123**
13000	8.5 × 17.5 (19.0) × 18.5	1.9	2222 375 24**133**	.. 26**133**
15000	9.0 × 18.0 (19.5) × 18.5	2.1	2222 375 24**153**	.. 26**153**

Notes

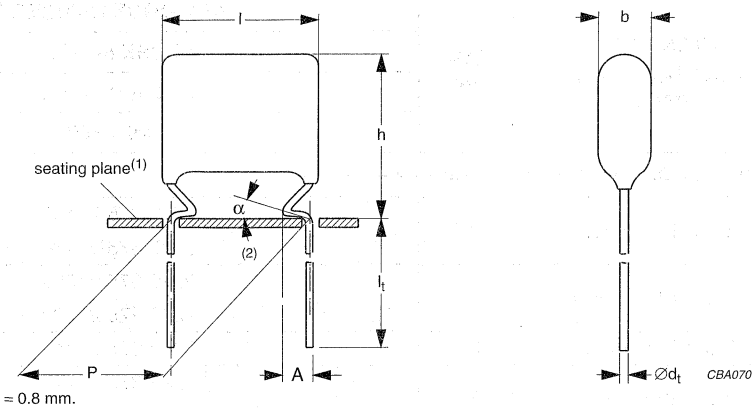
1. Dimensions in brackets for bent back leads.
2. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*:
   a) For pitch = 15.0 mm: H = 16.0 mm and P_0 = 12.7 mm.
   b) For pitch = 15/7.5 mm (bent back): H = 16.0 mm and P_0 = 15.0 mm.
   Standard reel diameter = 500 mm. Small reel diameter = 356 mm is available on request.
3. The shading indicates preferred types.

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

KP/MKP 375 GENERAL DATA

PITCH 22.5/27.5 mm



(1) Hole ∅1.3 for d_t = 0.8 mm.
(2) $0 \leq \alpha < 50°$.

Fig.9 Outline.

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	$\leq 6 \times 10^{-4}$	$\leq 10 \times 10^{-4}$
P = 27.5 mm	$\leq 6 \times 10^{-4}$	$\leq 15 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 1000 V (DC):		
P = 22.5 mm	5000 V/µs	
P = 27.5 mm	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	1600 V; 1 minute	
for C > 47 nF	$[1.6 - (0.0364 \times \sqrt{C - 47})] \times 1000$ 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 ±1.0 mm	±5%	2222 375 24...	preferred
		±3.5%	2222 375 25...	on request
	l_t = 3.5±0.5 mm	±5%	2222 375 20...	on request
		±3.5%	2222 375 21...	on request
Taped on reel	H = 16.0 mm; P_0 = 12.7 mm; note 2	±5%	2222 375 22...	on request
		±3.5%	2222 375 23...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*; taped on reel pitch = 27.5 mm is not available.
2. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

U_{Rdc} = 1000 V; U_{Rac} = 400 V/U_{p-p} = 1100 V

C (µF)	DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER[1] LOOSE IN BOX l_t = 5.0 ±1.0 mm C-tol = ±5%
Pitch = 22.5 ±0.4 mm; d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/–0.5 mm			
0.016	6.0 × 19.0 × 26.0	2.2	2222 375 24**163**
0.018			2222 375 24**183**
0.02	6.5 × 19.5 × 26.0	2.5	2222 375 24**203**
0.022			2222 375 24**223**
0.024	7.0 × 20.0 × 26.0	2.7	2222 375 24**243**
0.027	7.5 × 20.5 × 26.0	3.1	2222 375 24**273**
0.03			2222 375 24**303**
0.033	8.0 × 21.0 × 26.0	3.4	2222 375 24**333**
0.036	8.5 × 21.5 × 26.0	3.7	2222 375 24**363**
0.039			2222 375 24**393**
0.043	9.0 × 22.0 × 26.0	4.1	2222 375 24**433**
Pitch = 27.5 ±0.5 mm; d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/–0.5 mm			
0.047	6.0 × 19.0 × 30.0	3.1	2222 375 24**473**
0.051	7.5 × 20.5 × 30.0	3.4	2222 375 24**513**
0.056			2222 375 24**563**
0.062	8.0 × 21.0 × 30.0	3.8	2222 375 24**623**
0.068	8.5 × 21.5 × 30.0	4.0	2222 375 24**683**
0.075	9.0 × 22.0 × 30.0	4.4	2222 375 24**753**
0.082	9.5 × 22.5 × 30.0	4.7	2222 375 24**823**
0.091	10.0 × 23.0 × 30.0	5.1	2222 375 24**913**
0.1	10.5 × 23.5 × 30.0	5.5	2222 375 24**104**
0.11	11.0 × 24.0 × 30.0	5.9	2222 375 24**114**
0.12	11.5 × 24.5 × 30.0	6.3	2222 375 24**124**
0.13	12.0 × 25.0 × 30.0	6.8	2222 375 24**134**
0.15	12.5 × 25.5 × 30.0	7.6	2222 375 24**154**

Note

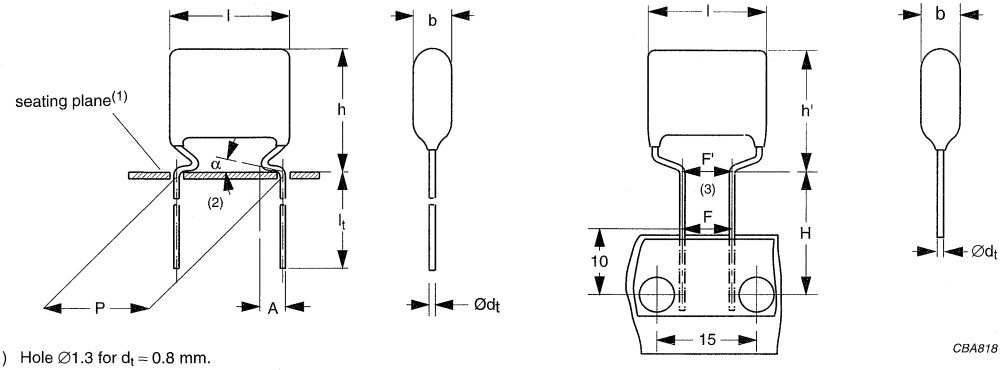
1. The shading indicates preferred types.

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)



(1) Hole Ø1.3 for $d_t = 0.8$ mm.
(2) $0 \leq \alpha < 50°$.
(3) $|F - F'| < 0.3$ m.
$F = 7.5 +0.6/-0.1$ mm.

Fig.10 Outline.

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)	21000 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

PACKAGING(1)	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 5.0 \pm 1.0$ mm	±5%	2222 375 34...	preferred
		±3.5%	2222 375 35...	on request
	$l_t = 3.5 \pm 0.5$ mm	±5%	2222 375 30...	on request
		±3.5%	2222 375 31...	on request
Taped on reel	H = 16.0 mm; $P_0 = 12.7$ mm; note 2	±5%	2222 375 32...	on request
		±3.5%	2222 375 33...	on request
Taped on reel (bent back)	H = 16.0 mm; $P_0 = 15.0$ mm; note 2	±5%	2222 375 36...	preferred
		±3.5%	2222 375 37...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

U_{Rdc} = 1600 V; U_{Rac} = 500 V/U_{p-p} = 1400 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; H = 16.0 mm; P_0 = 15.0 mm[2]
			l_t = 5.0 ±1.0 mm	pitch 7.5 mm (bent back)
			C-tol = ±5%	C-tol = ±5%
			catalogue number[3]	last 5 digits[3]
Pitch = 15.0 ±0.4 mm (pitch = 7.5 ±0.4 mm for bent back leads); d_t = 0.80 ±0.08 mm; A = 2.5 +1.5/–0.5 mm				
680	5.5 × 14.5 (15.0) × 18.5	0.75	2222 375 34**681**	.. 36**681**
750			2222 375 34**751**	.. 36**751**
820			2222 375 34**821**	.. 36**821**
910	6.0 × 15.0 (15.5) × 18.5	0.80	2222 375 34**911**	.. 36**911**
1000		0.85	2222 375 34**102**	.. 36**102**
1100		0.85	2222 375 34**112**	.. 36**112**
1200		0.90	2222 375 34**122**	.. 36**122**
1300		0.95	2222 375 34**132**	.. 36**132**
1500	5.5 × 14.5 (16.0) × 18.5	1.1	2222 375 34**152**	.. 36**152**
1600			2222 375 34**162**	.. 36**162**
1800	6.0 × 15.0 (16.5) × 18.5	1.2	2222 375 34**182**	.. 36**182**
2000	6.5 × 15.5 (17.0) × 18.5	1.3	2222 375 34**202**	.. 36**202**
2200			2222 375 34**222**	.. 36**222**
2400	7.0 × 16.0 (17.5) × 18.5	1.4	2222 375 34**242**	.. 36**242**
2700	7.5 × 16.5 (18.0) × 18.5	1.6	2222 375 34**272**	.. 36**272**
3000			2222 375 34**302**	.. 36**302**
3300	8.0 × 17.0 (18.5) × 18.5	1.7	2222 375 34**332**	.. 36**332**
3600	8.5 × 17.5 (19.0) × 18.5	1.8	2222 375 34**362**	.. 36**362**
3900	9.0 × 18.0 (19.5) × 18.5	2.0	2222 375 34**392**	.. 36**392**
4300			2222 375 34**432**	.. 36**432**

Notes

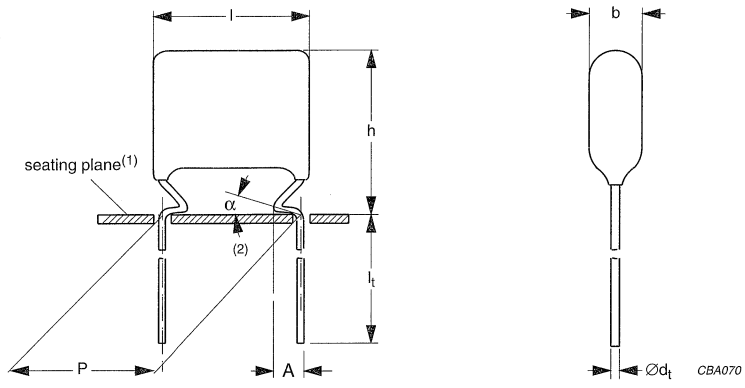
1. Dimensions in brackets for bent back leads.
2. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*:
   a) For pitch = 15.0 mm: H = 16.0 mm and P_0 = 12.7 mm.
   b) For pitch = 15/7.5 mm (bent back): H = 16.0 mm and P_0 = 15.0 mm.
   Standard reel diameter = 500 mm. Small reel diameter = 356 mm is available on request.
3. The shading indicates preferred types.

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

KP/MKP 375 GENERAL DATA

PITCH 22.5/27.5 mm



(1) Hole Ø1.3 for d_t = 0.8 mm.
(2) $0 \leq \alpha < 50°$.

Fig.11 Outline.

Specific reference data for the 1600 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 1600 V (DC): P = 22.5 mm P = 27.5 mm	 7000 V/µs 4700 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

PACKAGING(1)	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	l_t = 5.0 ±1.0 mm	±5%	2222 375 34...	preferred
		±3.5%	2222 375 35...	on request
	l_t = 3.5 ±0.5 mm	±5%	2222 375 30...	on request
		±3.5%	2222 375 31...	on request
Taped on reel	H = 16.0 mm; P_0 = 12.7 mm; note 2	±5%	2222 375 32...	on request
		±3.5%	2222 375 33...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*; taped on reel pitch = 27.5 mm is not available.
2. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

U_{Rdc} = 1600 V; U_{Rac} = 500 V/U_{p-p} = 1400 V

C (μF)	DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER[1] LOOSE IN BOX l_t = 5.0 ±1.0 mm C-tol = ±5%
Pitch = 22.5 ±0.4 mm; d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/–0.5 mm			
0.0047	6.0 × 19.0 × 26.0	2.0	2222 375 34**472**
0.0051			2222 375 34**512**
0.0056			2222 375 34**562**
0.0062	6.5 × 19.5 × 26.0	2.1	2222 375 34**622**
0.0068			2222 375 34**682**
0.0075	7.0 × 20.0 × 26.0	2.3	2222 375 34**752**
0.0082			2222 375 34**822**
0.0091	7.5 × 20.5 × 26.0	2.5	2222 375 34**912**
0.01	8.0 × 21.0 × 26.0	2.6	2222 375 34**103**
0.011	8.5 × 21.5 × 26.0	2.9	2222 375 34**113**
0.012			2222 375 34**123**
0.013	9.0 × 22.0 × 26.0	3.1	2222 375 34**133**
0.015	9.5 × 22.5 × 26.0	3.5	2222 375 34**153**
0.016	10.0 × 23.0 × 26.0	3.6	2222 375 34**163**
0.018	10.5 × 23.5 × 26.0	4.0	2222 375 34**183**
Pitch = 27.5 ±0.5 mm; d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/–0.5 mm			
0.02	9.0 × 22.0 × 30.0	4.2	2222 375 34**203**
0.022	9.5 × 22.5 × 30.0	4.4	2222 375 34**223**
0.024	10.0 × 23.0 × 30.0	4.7	2222 375 34**243**
0.027	10.5 × 23.5 × 30.0	5.2	2222 375 34**273**
0.03	11.0 × 24.0 × 30.0	5.6	2222 375 34**303**
0.033	11.5 × 24.5 × 30.0	6.0	2222 375 34**333**
0.036	12.0 × 25.0 × 30.0	6.5	2222 375 34**363**
0.039	12.5 × 25.5 × 30.0	6.9	2222 375 34**393**

Note

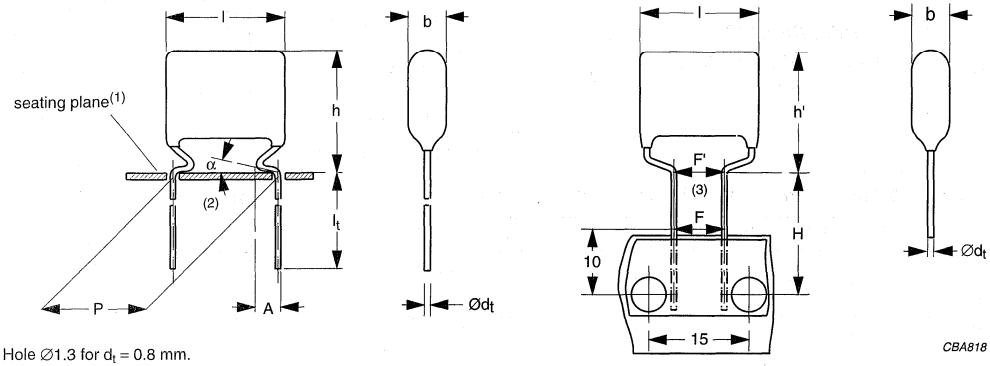
1. The shading indicates preferred types.

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)



(1) Hole Ø1.3 for d_t = 0.8 mm.
(2) $0 \leq \alpha < 50°$.
(3) $|F - F'| < 0.3$ mm.
F = 7.5 +0.6/–0.1 mm.

Fig.12 Outline.

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)	21000 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)

PACKAGING(1)	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	l_t = 5.0 ±1.0 mm	±5%	2222 375 64...	preferred
		±3.5%	2222 375 65...	on request
	l_t = 3.5 ±0.5 mm	±5%	2222 375 60...	on request
		±3.5%	2222 375 61...	on request
Taped on reel	H = 16.0 mm; P_0 = 12.7 mm; note 2	±5%	2222 375 62...	on request
		±3.5%	2222 375 63...	on request
Taped on reel (bent back)	H = 16.0 mm; P_0 = 15.0 mm; note 2	±5%	2222 375 66...	preferred
		±3.5%	2222 375 67...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

U_{Rdc} = 1600 V; U_{Rac} = 500 V/U_{p-p} = 1400 V (monitor type)

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; H = 16.0 mm; P_0 = 15.0 mm[2]
			l_t = 5.0 ±1.0 mm	pitch 7.5 mm (bent back)
			C-tol = ±5%	C-tol = ±5%
			catalogue number[3]	last 5 digits[3]
Pitch = 15.0 ±0.4 mm (pitch = 7.5 ±0.4 mm for bent back leads); d_t = 0.80 ±0.08 mm; A = 2.5 +1.5/–0.5 mm				
1000	7.5 × 16.5 (18.0) × 18.5	1.6	2222 375 64**102**	.. 66**102**
1100	8.0 × 17.0 (18.5) × 18.5	1.7	2222 375 64**112**	.. 66**112**
1200			2222 375 64**122**	.. 66**122**
1300	8.5 × 17.5 (19.0) × 18.5	1.8	2222 375 64**132**	.. 66**132**
1500	9.0 × 18.0 (19.5) × 18.5	2.0	2222 375 64**152**	.. 66**152**
1600	9.5 × 18.5 (20.0) × 18.5	2.3	2222 375 64**162**	.. 66**162**

Notes

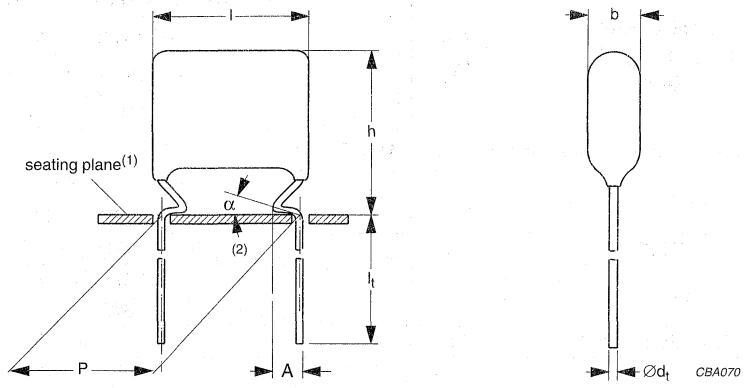
1. Dimensions in brackets for bent back leads.
2. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*:
   a) For pitch = 15.0 mm: H = 16.0 mm and P_0 = 12.7 mm.
   b) For pitch = 15/7.5 mm (bent back): H = 16.0 mm and P_0 = 15.0 mm.
   Standard reel diameter = 500 mm. Small reel diameter = 356 mm is available on request.
3. The shading indicates preferred types.

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

KP/MKP 375 GENERAL DATA

PITCH 22.5/27.5 mm



(1) Hole Ø1.3 for d_t = 0.8 mm.
(2) $0 \leq \alpha < 50°$.

Fig.13 Outline.

Specific reference data for the 1600 V DC capacitors (monitor type)

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/µs	
P = 27.5 mm	4700 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)

PACKAGING(1)	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	l_t = 5.0 ±1.0 mm	±5%	2222 375 64...	preferred
		±3.5%	2222 375 65...	on request
	l_t = 3.5 ±0.5 mm	±5%	2222 375 60...	on request
		±3.5%	2222 375 61...	on request
Taped on reel	H = 16.0 mm; P_0 = 12.7 mm; note 2	±5%	2222 375 62...	on request
		±3.5%	2222 375 63...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*; taped on reel pitch = 27.5 mm is not available.
2. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

U_{Rdc} = 1600 V; U_{Rac} = 500 V/U_{p-p} = 1400 V (monitor type)

C (µF)	DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER[1] LOOSE IN BOX l_t = 5.0 ±1.0 mm C-tol = ±5%
Pitch = 22.5 ±0.4 mm; d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/–0.5 mm			
0.0018	6.0 × 19.0 × 26.0	2.0	2222 375 64**182**
0.002			2222 375 64**202**
0.0022	6.5 × 19.5 × 26.0	2.1	2222 375 64**222**
0.0024	7.0 × 20.0 × 26.0	2.3	2222 375 64**242**
0.0027			2222 375 64**272**
0.003	7.5 × 20.5 × 26.0	2.5	2222 375 64**302**
0.0033	8.0 × 21.0 × 26.0	2.6	2222 375 64**332**
0.0036			2222 375 64**362**
0.0039			2222 375 64**392**
0.0043	8.5 × 21.5 × 26.0	2.9	2222 375 64**432**
0.0047			2222 375 64**472**
0.0051			2222 375 64**512**
0.0056			2222 375 64**562**
0.0062	9.0 × 22.0 × 26.0	3.1	2222 375 64**622**
0.0068	9.5 × 22.5 × 26.0	3.5	2222 375 64**682**
0.0075	10.0 × 23.0 × 26.0	3.6	2222 375 64**752**
0.0082	10.5 × 23.5 × 26.0	4.0	2222 375 64**822**
Pitch = 27.5 ±0.5 mm; d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/–0.5 mm			
0.0091	10.0 × 23.0 × 30.0	4.7	2222 375 64**912**
0.01	10.5 × 23.5 × 30.0	5.2	2222 375 64**103**
0.011	11.0 × 24.0 × 30.0	5.6	2222 375 64**113**
0.012	11.5 × 24.5 × 30.0	6.0	2222 375 64**123**
0.013	12.0 × 25.0 × 30.0	6.5	2222 375 64**133**
0.015	13.0 × 26.0 × 30.0	6.9	2222 375 64**153**
0.016	13.5 × 26.5 × 30.0	7.3	2222 375 64**163**
0.018	14.5 × 27.5 × 30.0	7.8	2222 375 64**183**
0.02	15.0 × 29.0 × 30.0	8.2	2222 375 64**203**
0.022			2222 375 64**223**
0.024			2222 375 64**243**
0.027			2222 375 64**273**
0.03			2222 375 64**303**
0.033			2222 375 64**333**
0.036			2222 375 64**363**
0.039			2222 375 64**393**

Note

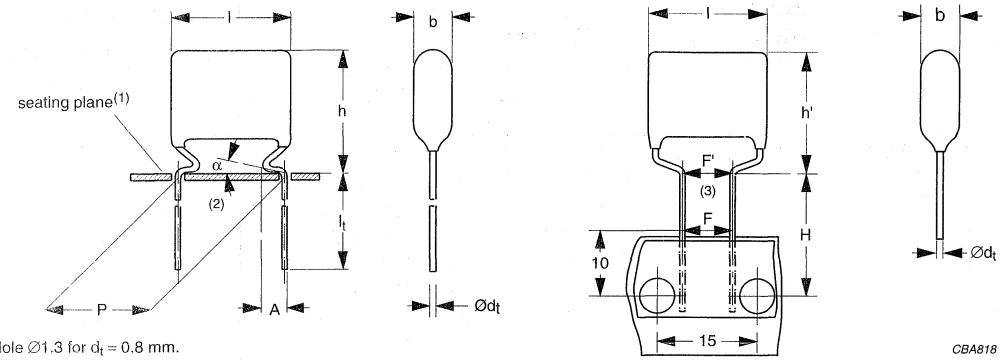
1. The shading indicates preferred types.

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)



(1) Hole Ø1.3 for d_t = 0.8 mm.
(2) $0 \leq \alpha < 50°$.
(3) $|F - F'| < 0.3$ mm.
F = 7.5 +0.6/–0.1 mm.

Fig.14 Outline.

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/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

PACKAGING(1)	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	l_t = 5.0 ±1.0 mm	±5%	2222 375 44...	preferred
		±3.5%	2222 375 45...	on request
	l_t = 3.5 ±0.5 mm	±5%	2222 375 40...	on request
		±3.5%	2222 375 41...	on request
Taped on reel	H = 16.0 mm; P_0 = 12.7 mm; note 2	±5%	2222 375 42...	on request
		±3.5%	2222 375 43...	on request
Taped on reel (bent back)	H = 16.0 mm; P_0 = 15.0 mm; note 2	±5%	2222 375 46...	preferred
		±3.5%	2222 375 47...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

U_{Rdc} = 2000 V; U_{Rac} = 600 V/U_{p-p} = 1700 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; H = 16.0 mm; P_0 = 15.0 mm[2]
			l_t = 5.0 1.0 mm	pitch 7.5 mm (bent back)
			C-tol = ±5%	C-tol = ±5%
			catalogue number[3]	last 5 digits[3]
Pitch = 15.0 ±0.4 mm (pitch = 7.5 ±0.4 mm for bent back leads); d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/–0.5 mm				
100	5.5 × 14.5 (15.0) × 18.5	0.75	2222 375 44**101**	.. 46**101**
110		0.75	2222 375 44**111**	.. 46**111**
120		0.75	2222 375 44**121**	.. 46**121**
130		0.75	2222 375 44**131**	.. 46**131**
150		0.75	2222 375 44**151**	.. 46**151**
160		0.75	2222 375 44**161**	.. 46**161**
180		0.75	2222 375 44**181**	.. 46**181**
200		0.75	2222 375 44**201**	.. 46**201**
220		0.75	2222 375 44**221**	.. 46**221**
240		0.75	2222 375 44**241**	.. 46**241**
270		0.75	2222 375 44**271**	.. 46**271**
300		0.75	2222 375 44**301**	.. 46**301**
330		0.75	2222 375 44**331**	.. 46**331**
360		0.75	2222 375 44**361**	.. 46**361**
390		0.75	2222 375 44**391**	.. 46**391**
430		0.75	2222 375 44**431**	.. 46**431**
470		0.80	2222 375 44**471**	.. 46**471**
510		0.80	2222 375 44**511**	.. 46**511**
560		0.80	2222 375 44**561**	.. 46**561**
620	6.0 × 15.0 (15.5) × 18.5	0.85	2222 375 44**621**	.. 46**621**
680		0.85	2222 375 44**681**	.. 46**681**
750		0.90	2222 375 44**751**	.. 46**751**
820	6.5 × 15.5 (16.0) × 18.5	0.95	2222 375 44**821**	.. 46**821**
910	5.5 × 14.5 (16.0) × 18.5	1.1	2222 375 44**911**	.. 46**911**
1000	6.0 × 15.0 (16.5) × 18.5	1.2	2222 375 44**102**	.. 46**102**
1100			2222 375 44**112**	.. 46**112**
1200			2222 375 44**122**	.. 46**122**
1300	6.5 × 15.5 (17.0) × 18.5	1.3	2222 375 44**132**	.. 46**132**
1500	7.0 × 16.0 (17.5) × 18.5	1.4	2222 375 44**152**	.. 46**152**
1600	7.5 × 16.5 (18.0) × 18.5	1.5	2222 375 44**162**	.. 46**162**
1800			2222 375 44**182**	.. 46**182**
2000	8.0 × 17.0 (18.5) × 18.5	1.6	2222 375 44**202**	.. 46**202**
2200	8.5 × 17.5 (19.0) × 18.5	1.7	2222 375 44**222**	.. 46**222**
2400	9.0 × 18.0 (19.5) × 18.5	1.8	2222 375 44**242**	.. 46**242**
2700	9.5 × 18.5 (20.0) × 18.5	2.0	2222 375 44**272**	.. 46**272**

Notes

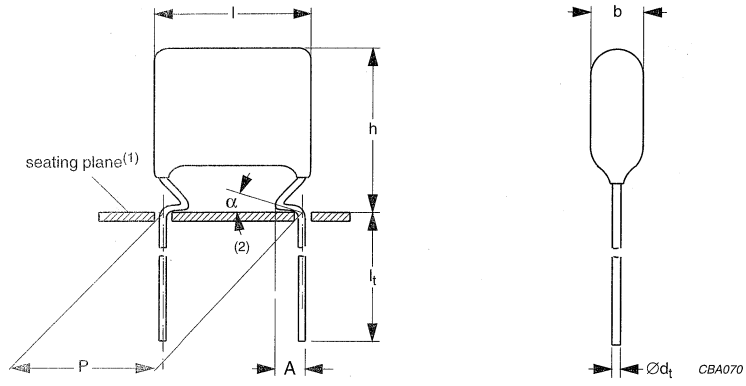
1. Dimensions in brackets for bent back leads.
2. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications see chapter *"Packaging information"*:
   a) For pitch = 15.0 mm: H = 16.0 mm and P_0 = 12.7 mm. b) For pitch = 15/7.5 mm (bent back): H = 16.0 mm and P_0 = 15.0 mm. Standard reel diameter = 500 mm. Small reel diameter = 356 mm is available on request.
3. The shading indicates preferred types.

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

KP/MKP 375 GENERAL DATA

PITCH 22.5/27.5 mm



(1) Hole Ø1.3 for d_t = 0.8 mm.
(2) $0 \leq \alpha < 50°$.

Fig.15 Outline.

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 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

PACKAGING(1)	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	l_t = 5.0 ±1.0 mm	±5%	2222 375 44...	preferred
		±3.5%	2222 375 45...	on request
	l_t = 3.5 ±0.5 mm	±5%	2222 375 40...	on request
		±3.5%	2222 375 41...	on request
Taped on reel	H = 16.0 mm; P_0 = 12.7 mm; note 2	±5%	2222 375 42...	on request
		±3.5%	2222 375 43...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*; taped on reel pitch = 27.5 mm is not available.
2. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

U_{Rdc} = 2000 V; U_{Rac} = 600 V/U_{p-p} = 1700 V

C (µF)	DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER[1] LOOSE IN BOX l_t = 5.0 ±1.0 mm C-tol = ±5%
Pitch = 22.5 ±0.4 mm; d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/–0.5 mm			
0.003	6.0 × 19.0 × 26.0	2.1	2222 375 44**302**
0.0033			2222 375 44**332**
0.0036			2222 375 44**362**
0.0039			2222 375 44**392**
0.0043	6.5 × 19.5 × 26.0	2.3	2222 375 44**432**
0.0047			2222 375 44**472**
0.0051	7.0 × 20.0 × 26.0	2.6	2222 375 44**512**
0.0056			2222 375 44**562**
0.0062	7.5 × 20.5 × 26.0	2.8	2222 375 44**622**
0.0068	8.0 × 21.0 × 26.0	3.0	2222 375 44**682**
0.0075			2222 375 44**752**
0.0082	8.5 × 21.5 × 26.0	3.3	2222 375 44**822**
0.0091	9.0 × 22.0 × 26.0	3.6	2222 375 44**912**
0.01	9.5 × 22.5 × 26.0	3.8	2222 375 44**103**
Pitch = 27.5 ±0.5 mm; d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/–0.5 mm			
0.011	9.0 × 22.0 × 30.0	3.8	2222 375 44**113**
0.012	9.5 × 22.5 × 30.0	4.1	2222 375 44**123**
0.013	10.0 × 23.0 × 30.0	4.4	2222 375 44**133**
0.015	10.5 × 23.5 × 30.0	4.9	2222 375 44**153**
0.016	11.0 × 24.0 × 30.0	5.1	2222 375 44**163**
0.018	11.5 × 24.5 × 30.0	5.6	2222 375 44**183**
0.02	12.5 × 25.5 × 30.0	6.1	2222 375 44**203**
0.022	13.0 × 26.0 × 30.0	6.5	2222 375 44**223**

Note

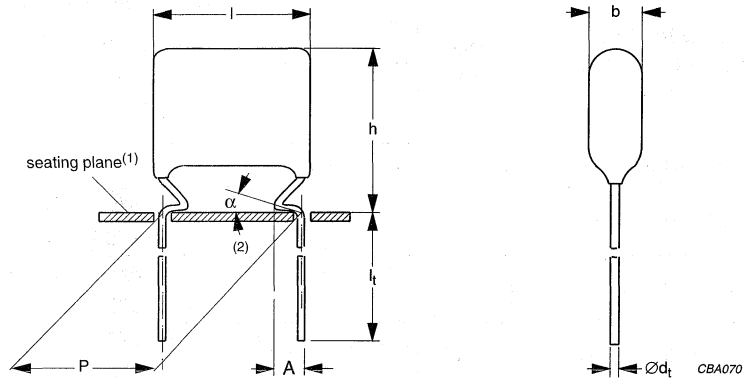
1. The shading indicates preferred types.

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

KP/MKP 375 GENERAL DATA

PITCH 22.5/27.5 mm



(1) Hole Ø1.3 for d_t = 0.8 mm.
(2) $0 \leq \alpha < 50°$.

Fig.16 Outline.

Specific reference data for the 2000 V DC capacitors (monitor type)

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/µs	
P = 27.5 mm	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 (monitor type)

PACKAGING(1)	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	l_t = 5.0 ±1.0 mm	±5%	2222 375 74...	preferred
		±3.5%	2222 375 75...	on request
	l_t = 3.5 ±0.5 mm	±5%	2222 375 70...	on request
		±3.5%	2222 375 71...	on request
Taped on reel	H = 16.0 mm; P_0 = 12.7 mm; note 2	±5%	2222 375 72...	on request
		±3.5%	2222 375 73...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*; taped on reel pitch = 27.5 mm is not available.
2. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

U_{Rdc} = 2000 V; U_{Rac} = 600 V/U_{p-p} = 1700 V (monitor type)

C (µF)	DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER[1] LOOSE IN BOX l_t = 5.0 ±1.0 mm C-tol = ±5%
Pitch = 22.5 ±0.4 mm; d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/–0.5 mm			
0.001	6.0 × 19.0 × 26.0	2.1	2222 375 74102
0.0011			2222 375 74112
0.0012	6.5 × 19.5 × 26.0	2.3	2222 375 74122
0.0013			2222 375 74132
0.0015	7.0 × 20.0 × 26.0	2.6	2222 375 74152
0.0016			2222 375 74162
0.0018	7.5 × 20.5 × 26.0	2.8	2222 375 74182
0.002	8.0 × 21.0 × 26.0	3.0	2222 375 74202
0.0022	8.5 × 21.5 × 26.0	3.3	2222 375 74222
0.0024	9.0 × 22.0 × 26.0	3.6	2222 375 74242
0.0027	9.5 × 22.5 × 26.0	3.8	2222 375 74272
0.003	10.0 × 23.0 × 26.0	4.2	2222 375 74302
0.0033	10.5 × 23.5 × 26.0	4.5	2222 375 74332
0.0036	11.0 × 24.0 × 26.0	4.9	2222 375 74362
0.0039			2222 375 74392
0.0043			2222 375 74432
0.0047	11.5 × 24.5 × 26.0	5.3	2222 375 74472
0.0051			2222 375 74512
Pitch = 27.5 ±0.5 mm; d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/–0.5 mm			
0.0056	11.0 × 24.0 × 30.0	5.1	2222 375 74562
0.0062	11.5 × 24.5 × 30.0	5.6	2222 375 74622
0.0068	12.0 × 25.0 × 30.0	5.8	2222 375 74682
0.0075	12.5 × 25.5 × 30.0	6.1	2222 375 74752
0.0082	13.0 × 26.0 × 30.0	6.5	2222 375 74822
0.0091	14.0 × 27.0 × 30.0	7.0	2222 375 74912
0.01	14.5 × 27.5 × 30.0	7.5	2222 375 74103
0.011	15.5 × 29.5 × 30.0	8.1	2222 375 74113
0.012			2222 375 74123
0.013			2222 375 74133
0.015			2222 375 74153

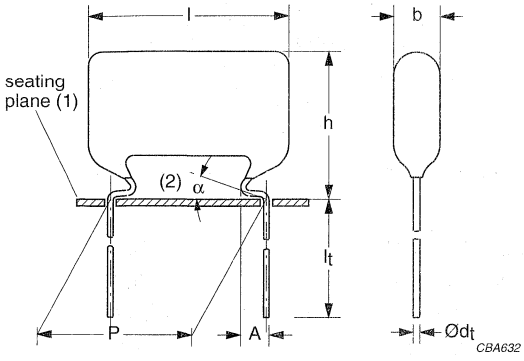
Note

1. The shading indicates preferred types.

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

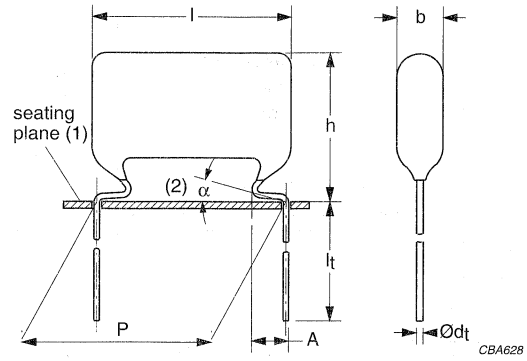
KP/MKP 375 GENERAL DATA



(1) Hole ∅1.3 for d_t = 0.8 mm.
(2) $0 \leq \alpha < 50°$.

Fig.17 Outline for pitch = 22.5 mm (bent back leads).

PITCH 22.5 (bent back leads)/27.5 mm



(1) Hole ∅1.3 for d_t = 0.8 mm.
(2) $0 \leq \alpha < 50°$.

Fig.18 Outline for pitch = 27.5 mm.

Specific reference data for the 2500 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: P = 22.5 mm P = 27.5 mm	 $\leq 6 \times 10^{-4}$ $\leq 6 \times 10^{-4}$	 $\leq 10 \times 10^{-4}$ $\leq 10 \times 10^{-4}$
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	>900 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(1)	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	l_t = 5.0 ±1.0 mm	±5%	2222 375 91...	on request
		±3.5%	2222 375 91...	on request
	l_t = 3.5 ±0.5 mm	±5%	2222 375 91...	on request
		±3.5%	2222 375 91...	on request
Taped on reel	H = 16.0 mm; P_0 = 12.7 mm; note 2	±5%	2222 375	on request
		±3.5%	2222 375	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*; taped on reel pitch = 27.5 mm is not available.
2. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

U_{Rdc} = 2500 V; U_{Rac} = 880 V/U_{p-p} = 2500 V

C (µF)	DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER	
			LOOSE IN BOX; l_t = 3.5 ±0.5 mm	
			P = 22.5 ±0.4 mm(1)	P = 27.5 ±0.4 mm
			C-tol = ±5%	
			catalogue number	last 5 digits
d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/−0.5 mm				
0.001	7.0 × 20.0 × 30.0	2.9	2222 375 91001	.. 91003
0.0011			2222 375 91005	.. 91007
0.0012			2222 375 91011	.. 91013
0.0013			2222 375 91015	.. 91017
0.0015			2222 375 91021	.. 91023
0.0016			2222 375 91025	.. 91027
0.0018			2222 375 91031	.. 91033
0.0020	7.5 × 20.5 × 30.0	2.9	2222 375 91035	.. 91037
0.0022	8.0 × 21.0 × 30.0	3.2	2222 375 91041	.. 91043
0.0024			2222 375 91045	.. 91047
0.0025			2222 375 91051	.. 91053
0.0027	8.5 × 21.5 × 30.0	3.5	2222 375 91055	.. 91057
0.0030	9.0 × 22.0 × 30.0	3.8	2222 375 91061	.. 91063
0.0033	9.5 × 22.5 × 30.0	4.0	2222 375 91065	.. 91067
0.0036	10.0 × 23.0 × 30.0	4.3	2222 375 91071	.. 91073
0.0039	10.5 × 23.5 × 30.0	4.6	2222 375 91075	.. 91077
0.0043	11.0 × 24.0 × 30.0	5.0	2222 375 91081	.. 91083
0.0047	11.5 × 24.5 × 30.0	5.3	2222 375 91085	.. 91087
0.0051	12.0 × 25.0 × 30.0	5.7	2222 375 91091	.. 91093
0.0056	12.5 × 25.5 × 30.0	6.1	2222 375 91095	.. 91097
0.0062	13.5 × 26.5 × 30.0	6.6	2222 375 91101	.. 91103
0.0068	14.0 × 27.5 × 30.0	7.2	2222 375 91105	.. 91107

Note

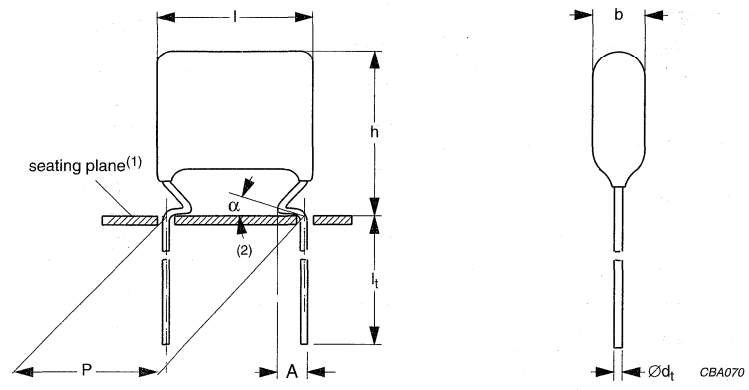
1. Only for bent back leads.

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

KP/MKP 375 GENERAL DATA

PITCH 22.5/27.5 mm



(1) Hole Ø1.3 for d_t = 0.8 mm.
(2) $0 \leq \alpha < 50°$.

Fig.19 Outline.

Specific reference data for the 2500 V DC capacitors (monitor type)

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 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	>900 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(1)	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	l_t = 5.0 ±1.0 mm	±5%	2222 375 84...	preferred
		±3.5%	2222 375 85...	on request
	l_t = 3.5 ±0.5 mm	±5%	2222 375 80...	on request
		±3.5%	2222 375 81...	on request
Taped on reel	H = 16.0 mm; P_0 = 12.7 mm; note 2	±5%	2222 375 82...	on request
		±3.5%	2222 375 83...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*; taped on reel pitch = 27.5 mm is not available.
2. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

U_{Rdc} = 2500 V; U_{Rac} = 600 V/U_{p-p} = 1700 V (monitor type)

C (µF)	DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER[1] LOOSE IN BOX l_t = 5.0 ±1.0 mm C-tol = ±5%
Pitch = 22.5 ±0.4 mm; d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/–0.5 mm			
0.001	7.0 × 20.0 × 26.0	2.6	2222 375 84**102**
0.0011			2222 375 84**112**
0.0012	7.5 × 20.5 × 26.0	2.8	2222 375 84**122**
0.0013			2222 375 84**132**
0.0015	8.5 × 21.5 × 26.0	3.3	2222 375 84**152**
0.0016			2222 375 84**162**
0.0018	9.0 × 22.0 × 26.0	3.6	2222 375 84**182**
0.002	9.5 × 22.5 × 26.0	3.8	2222 375 84**202**
0.0022	10.0 × 23.0 × 26.0	4.1	2222 375 84**222**
0.0024	10.5 × 23.5 × 26.0	4.5	2222 375 84**242**
0.0027	11.0 × 24.0 × 26.0	4.9	2222 375 84**272**
Pitch = 27.5 ±0.5 mm; d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/–0.5 mm			
0.003	11.0 × 24.0 × 30.0	5.1	2222 375 84**302**
0.0033	11.5 × 24.5 × 30.0	5.4	2222 375 84**332**
0.0036	12.0 × 25.0 × 30.0	5.8	2222 375 84**362**
0.0039	12.5 × 25.5 × 30.0	6.1	2222 375 84**392**
0.0043	13.0 × 26.0 × 30.0	6.5	2222 375 84**432**
0.0047	13.5 × 26.5 × 30.0	6.9	2222 375 84**472**
0.0051	14.0 × 27.0 × 30.0	7.3	2222 375 84**512**
0.0056	15.0 × 29.0 × 30.0	7.8	2222 375 84**562**
0.0062	15.5 × 29.5 × 30.0	8.2	2222 375 84**622**
0.0068			2222 375 84**682**
0.0075			2222 375 84**752**
0.0082			2222 375 84**822**
0.0091			2222 375 84**912**

Note

1. The shading indicates preferred types.

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

CONSTRUCTION

Description

- Series-constructed, impregnated polypropylene film, aluminium foil and metallized internal electrode
- Protected by a hard, water-repellent, solvent-resistant epoxy lacquer
- Radial leads, solder-coated:
  - Copper clad steel wire for original pitch = 10 mm
  - Copper wire for original pitch = 15, 22.5 and 27.5 mm.

FOR KP/MKP 630 V - 2000 V AND 2500 V (MONITOR TYPE)

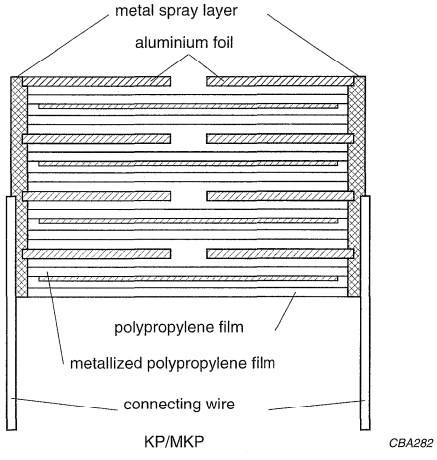


Fig.20 Construction.

FOR KP/MKP 2500 V (2222 375 91...)

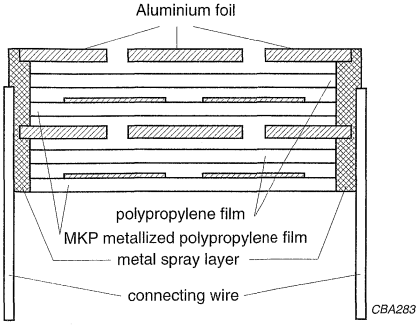


Fig.21 Construction.

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_{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 ±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%.

CHARACTERISTICS

Capacitance

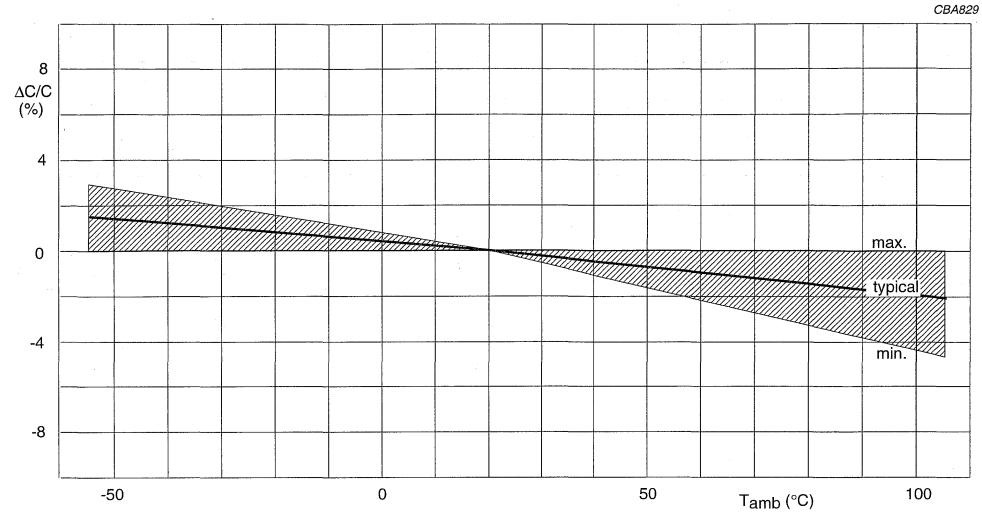


Fig.22 Capacitance change as a function of ambient temperature.

Impedance

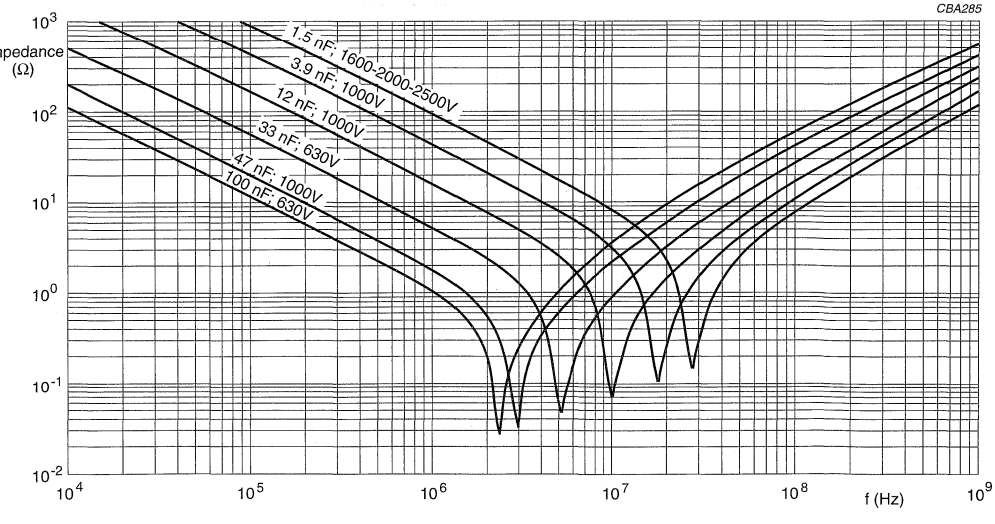


Fig.23 Impedance as a function of frequency: typical curves.

Maximum DC voltage as a function of temperature

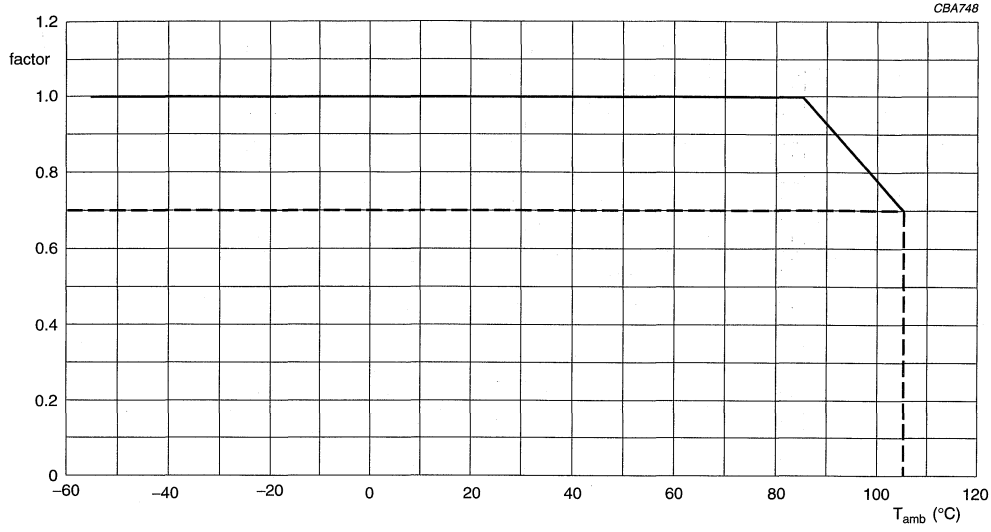


Fig.24 Multiplying factor as a function of temperature.

Maximum RMS voltage (sinewave) as a function of frequency

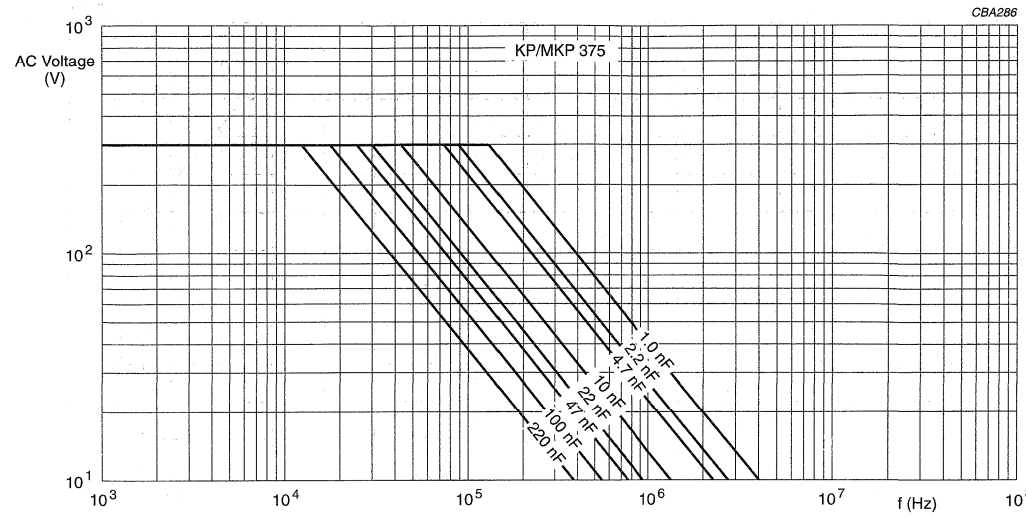


Fig.25 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C for $U_{Rdc} = 630$ V.

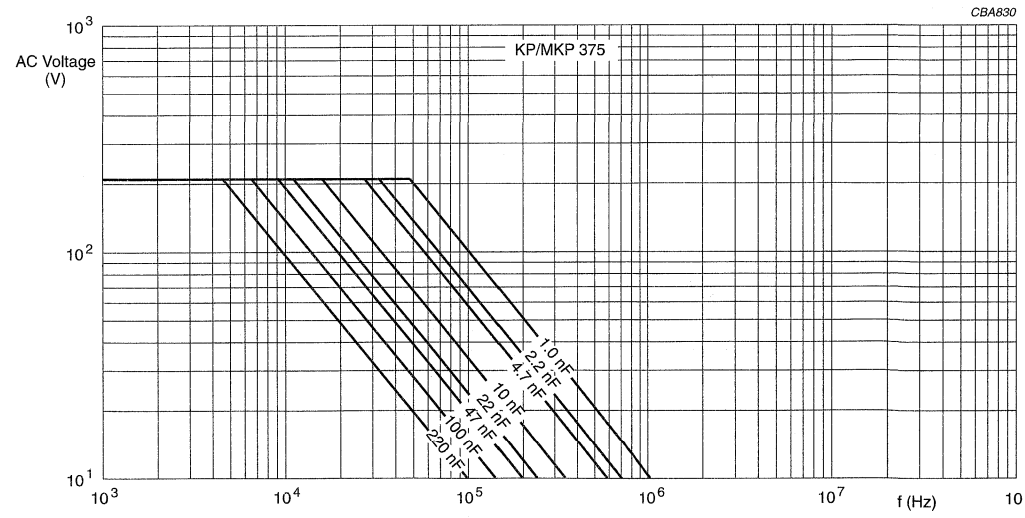


Fig.26 AC voltage (RMS value) as a function of frequency at 85 °C < $T_{amb} \leq 105$ °C for $U_{Rdc} = 630$ V.

AC and pulse metallized polypropylene film capacitors

KP/MKP 375

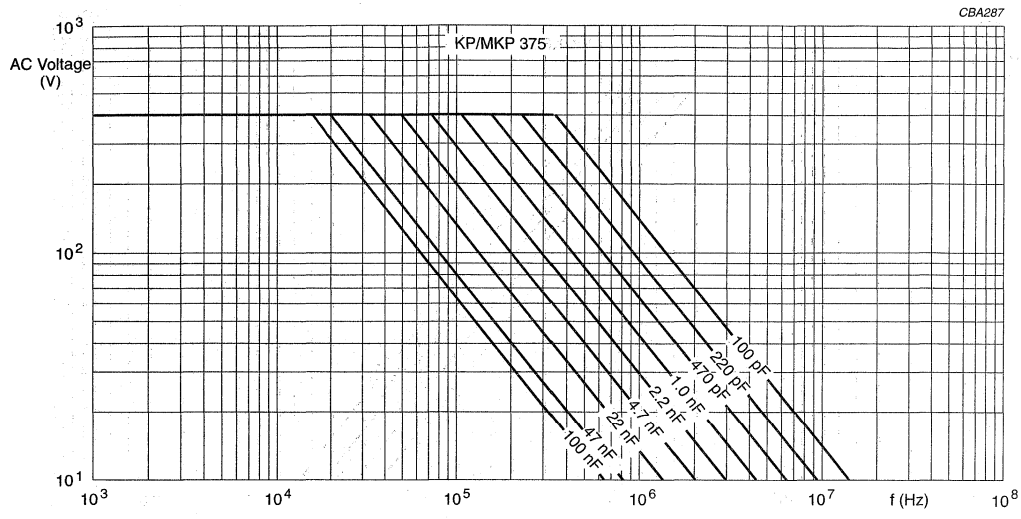


Fig.27 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C for $U_{Rdc} = 1000$ V.

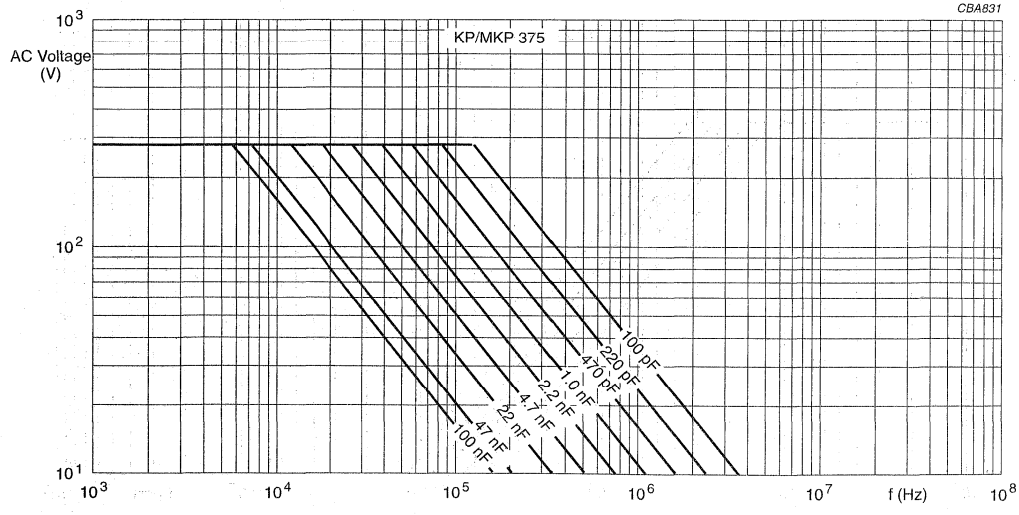


Fig.28 AC voltage (RMS value) as a function of frequency at 85 °C < $T_{amb} \leq 105$ °C for $U_{Rdc} = 1000$ V.

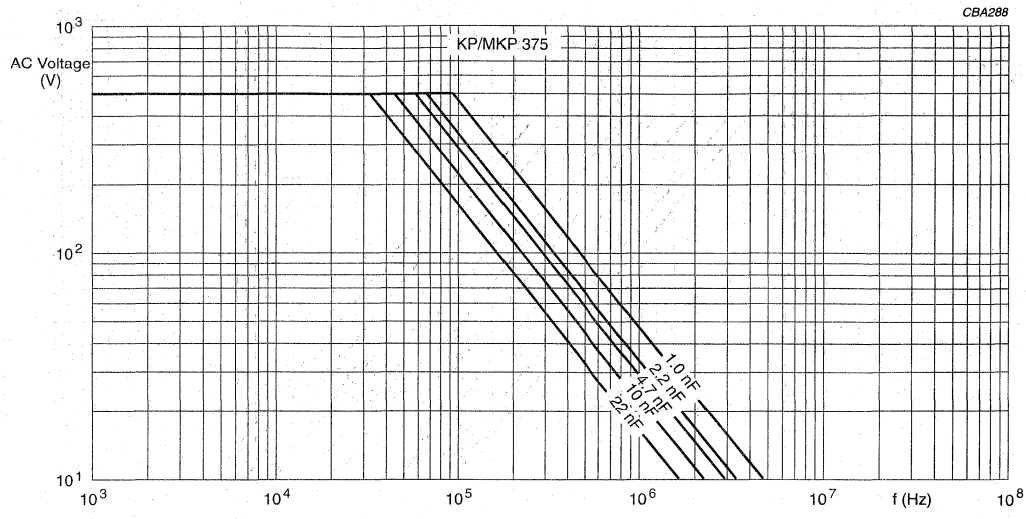


Fig.29 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C for $U_{Rdc} = 1600$ V.

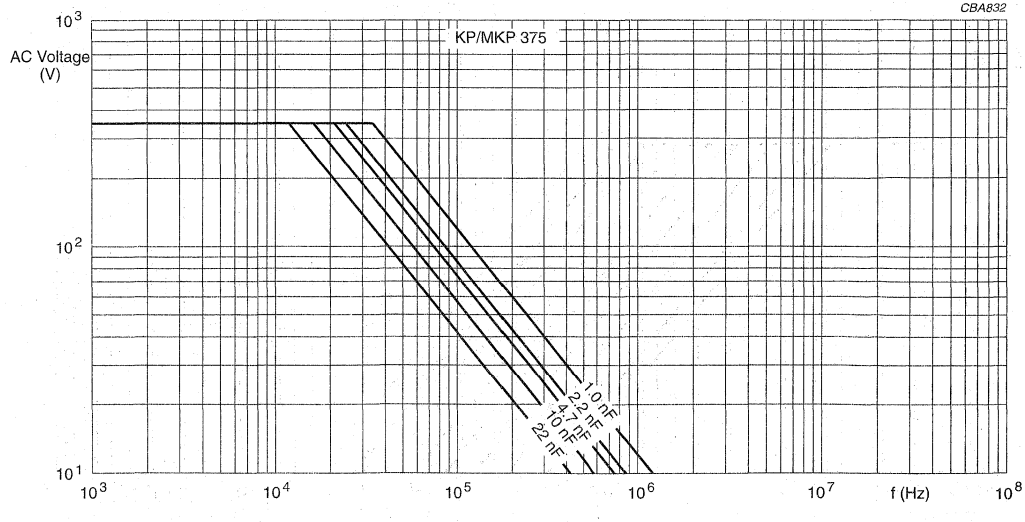


Fig.30 AC voltage (RMS value) as a function of frequency at 85 °C < $T_{amb} \leq 105$ °C for $U_{Rdc} = 1600$ V.

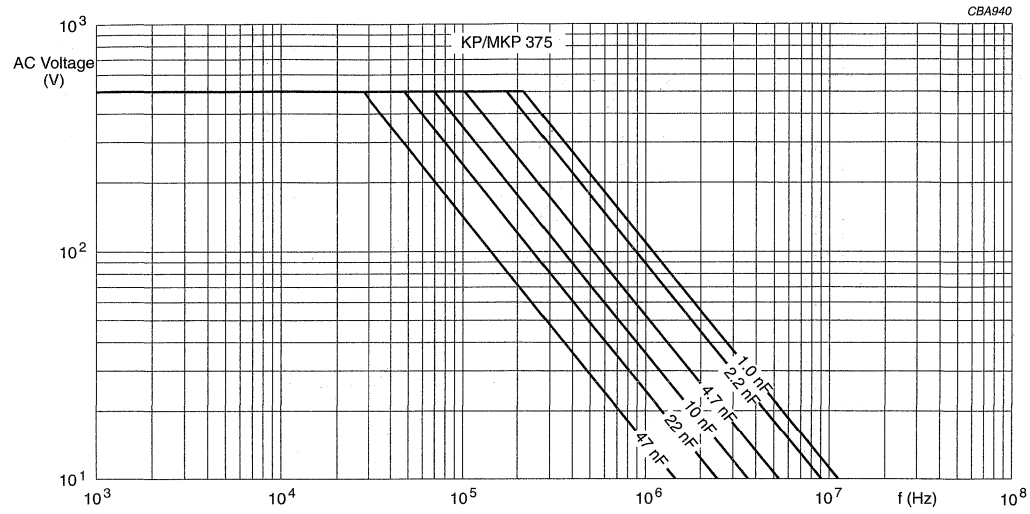


Fig.31 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C for $U_{Rdc} = 1600$ V (monitor type).

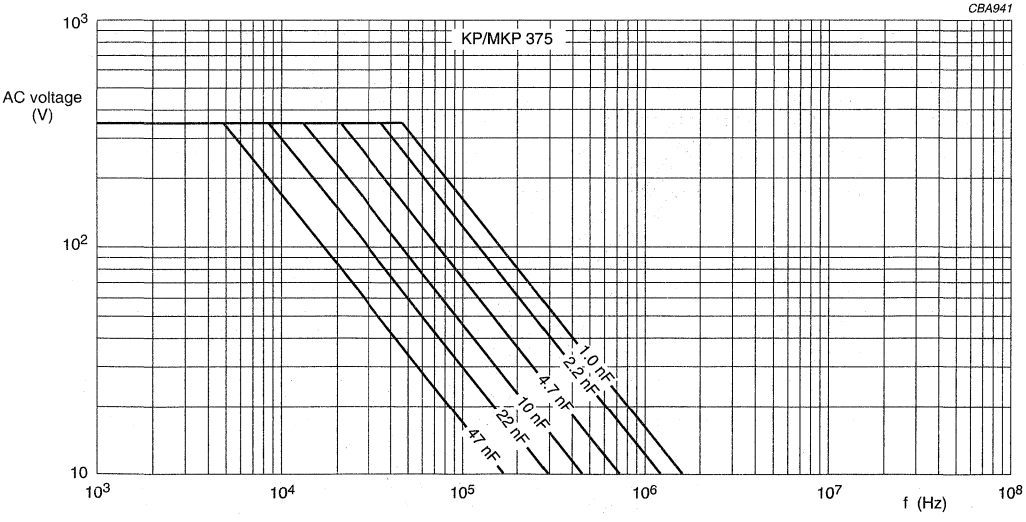


Fig.32 AC voltage (RMS value) as a function of frequency at 85 °C < $T_{amb} \leq 105$ °C for $U_{Rdc} = 1600$ V (monitor type).

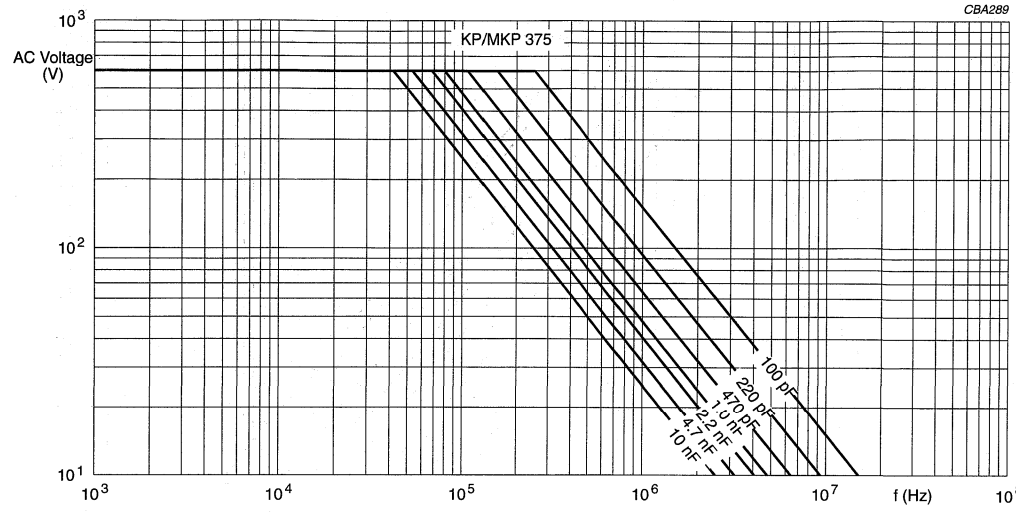


Fig.33 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C for $U_{Rdc} = 2000$ V.

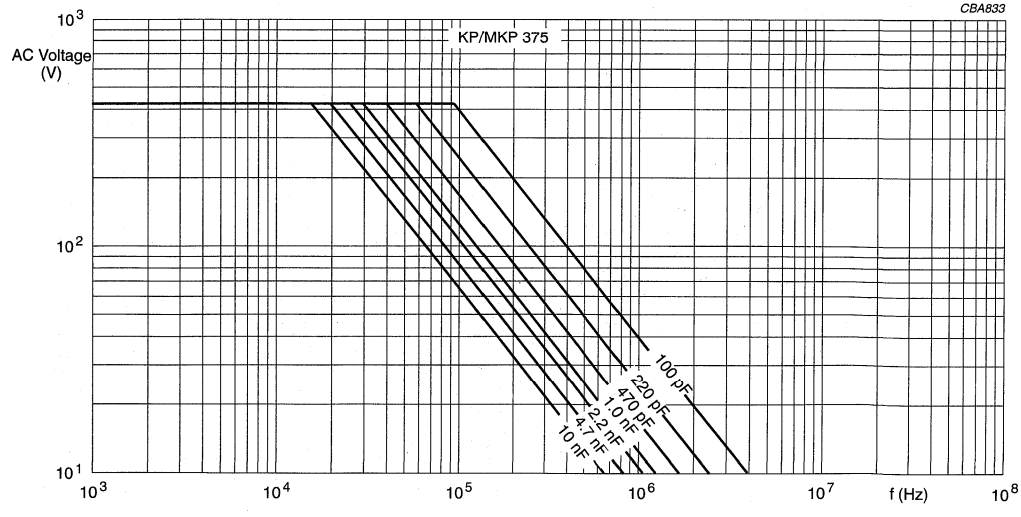


Fig.34 AC voltage (RMS value) as a function of frequency at 85 °C < $T_{amb} \leq 105$ °C for $U_{Rdc} = 2000$ V.

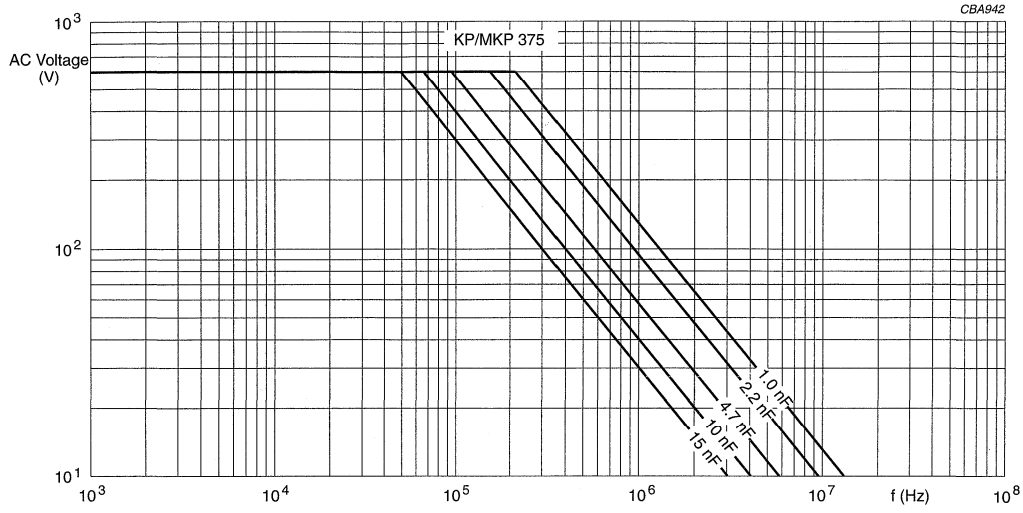


Fig.35 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C for $U_{Rdc} = 2000$ V (monitor type).

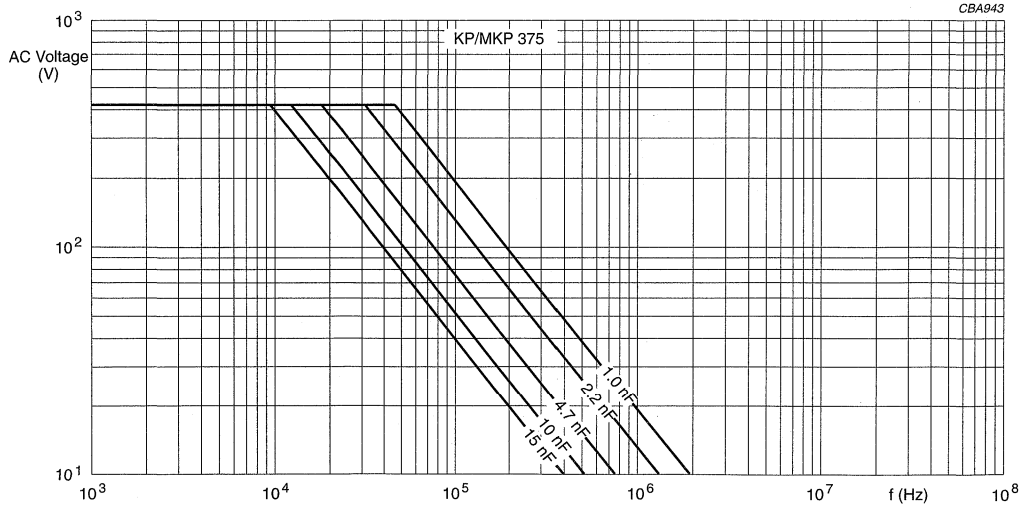


Fig.36 AC voltage (RMS value) as a function of frequency at 85 °C < $T_{amb} \leq 105$ °C for $U_{Rdc} = 2000$ V (monitor type).

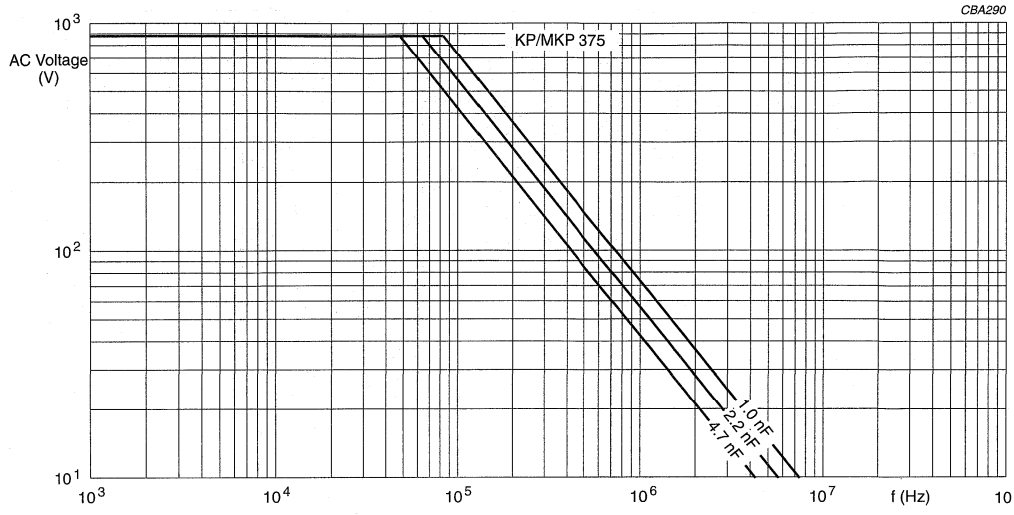


Fig.37 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C for $U_{Rdc} = 2500$ V.

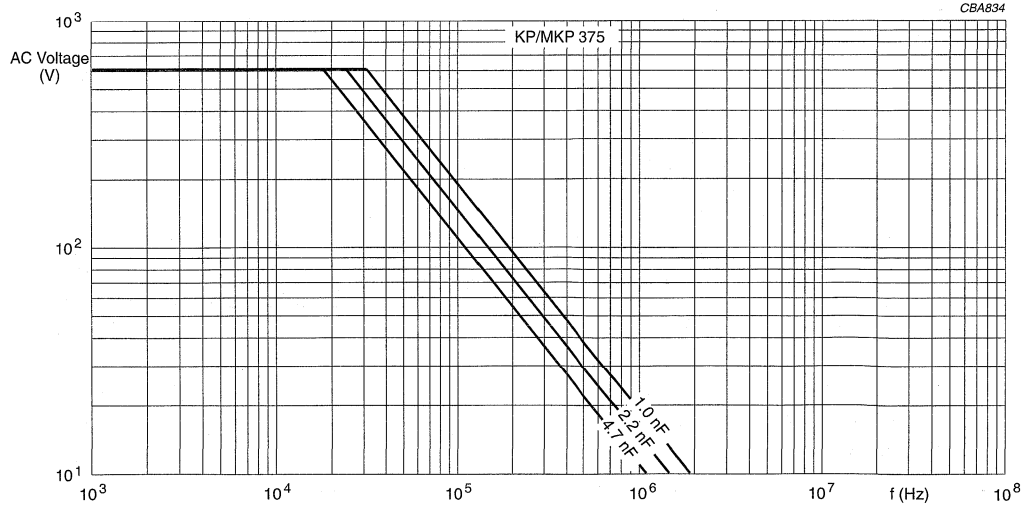


Fig.38 AC voltage (RMS value) as a function of frequency at 85 °C < $T_{amb} \leq 105$ °C for $U_{Rdc} = 2500$ V.

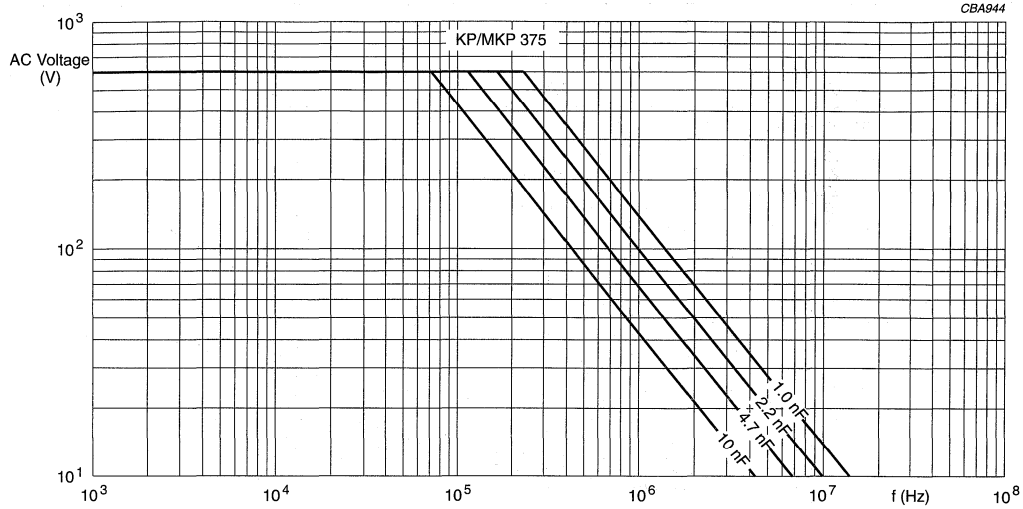


Fig.39 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C for $U_{Rdc} = 2500$ V (monitor type).

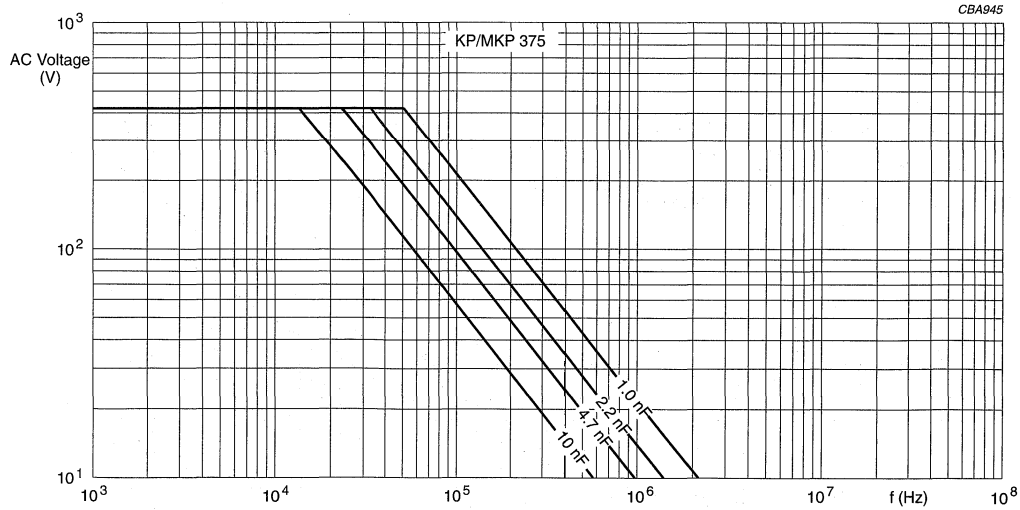


Fig.40 AC voltage (RMS value) as a function of frequency at 85 °C < $T_{amb} \leq 105$ °C for $U_{Rdc} = 2500$ V (monitor type).

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 25 to 40.

Tangent of loss angle

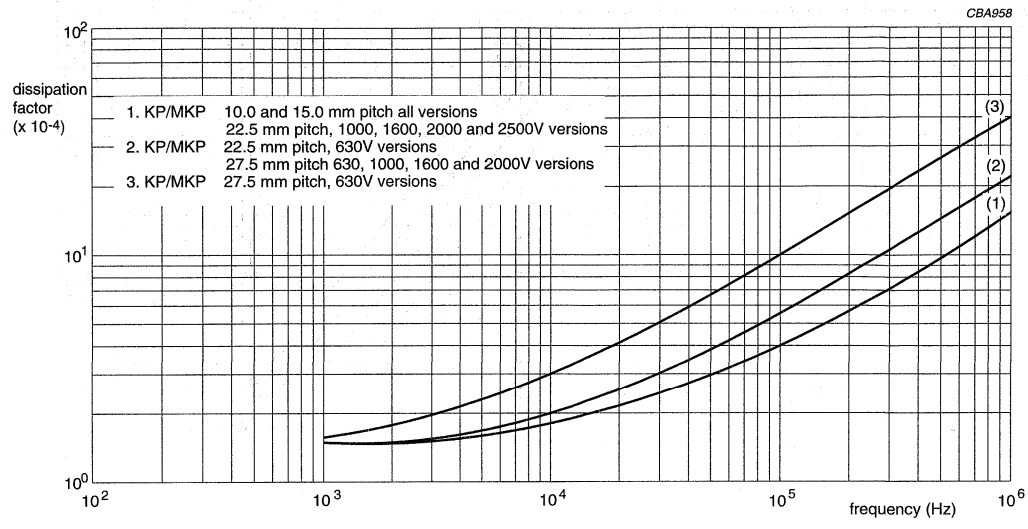


Fig.41 Tangent of loss angle as a function of frequency: typical curves.

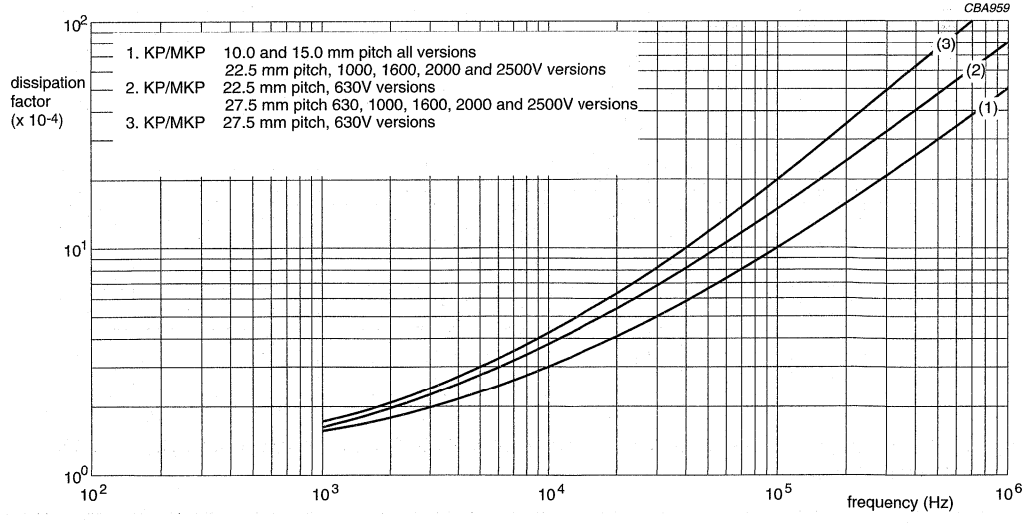


Fig.42 Tangent of loss angle as a function of frequency: maximum curves.

Insulation resistance

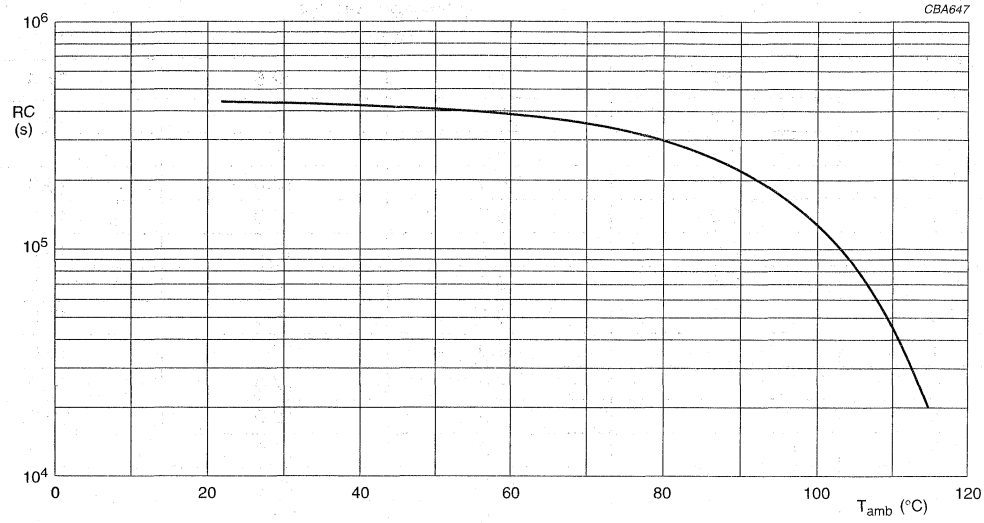


Fig.43 RC product as a function of ambient free air temperature; typical curve.

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

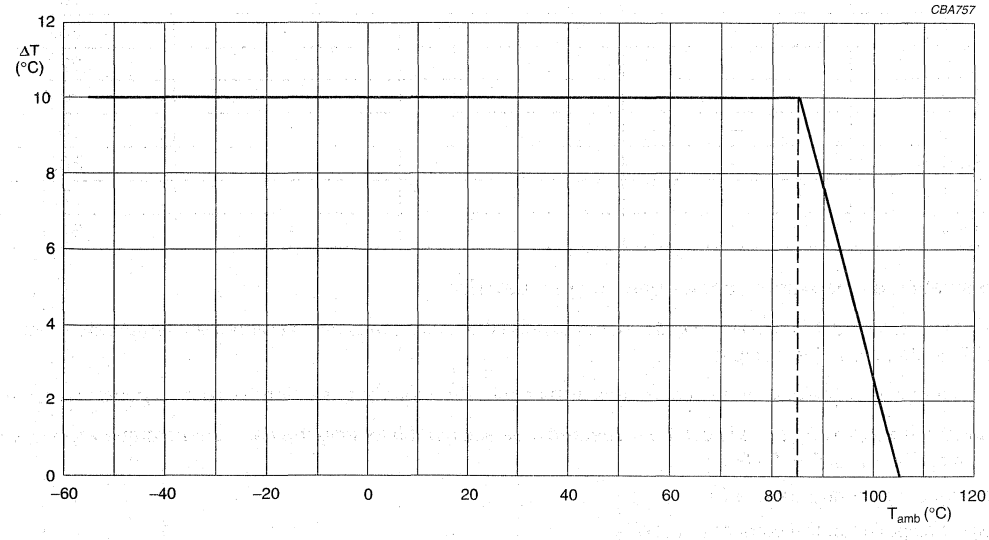


Fig.44 Maximum allowed component temperature rise as a function of the ambient temperature.

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)			
	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.

Power dissipation can be calculated in accordance with 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).

Measuring the component temperature

A thermocouple must be attached to the capacitor body; see Fig.45.

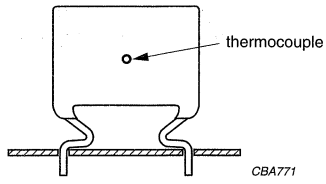


Fig.45 Mounting the thermocouple.

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 ($U_{p\text{-}p}$) shall not be greater than the maximum $U_{p\text{-}p}$ 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.44.

Example

C = 10 nF - 1600 V, KP/MKP.

This is a signal as in Fig.46 with:

$U_{p\text{-}p}$ = 1200 V; U_p = 1100 V; T_1 = 12 µs; T_2 = 64 µs.

The ambient temperature is 50 °C.

Checking the conditions:

1. The peak voltage U_p = 1100 V is lower than 1600 V (DC).
2. The peak-to-peak voltage 1200 V is lower than $2 \times \sqrt{2} \times 500$ V (AC) = 1414 U_{p-p}.
3. The voltage pulse slope: 320 V/µs is much lower than 7000 V/µs.
4. The dissipated power is 170 mW as calculated with Fourier terms.

   This gives a temperature rise of $\frac{170 \text{ mW}}{17 \text{ mW/°C}}$ = 10 °C which is allowed according Fig.44 for an ambient temperature of 50 °C.

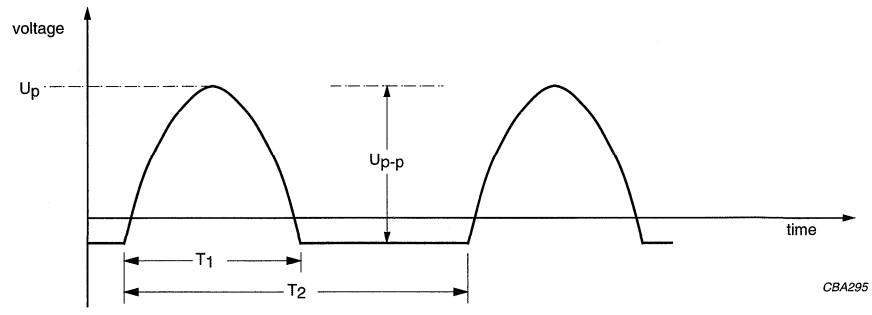


Fig.46 Voltage signal.

MARKING

Product marking

COUNTRY OF ORIGIN: BELGIUM

The capacitors are marked on the top (see Fig.47) with the following information:

1. Capacitance code in accordance with *"IEC 60062"*
2. Capacitance tolerance: J = ±5%; A = 3.5%
3. Rated peak-to-peak voltage (e.g. 1700 V_{p-p})
4. Manufacturer's type designation (375)
5. Code for dielectric material (KP/MKP)
6. Manufacturer's emblem (only for original pitch ≥15 mm)
7. Year and month of manufacturing code (only for original pitch ≥22.5 mm).

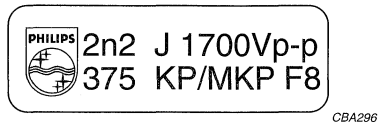


Fig.47 Example of marking.

COUNTRY OF ORIGIN: PRC (PEOPLE'S REPUBLIC OF CHINA)

The capacitors are marked in ink on the front (see Fig.48) with the following information:

1. Capacitance code in accordance with *"IEC 60062"*
2. Capacitance tolerance: J = ±5%; A = 3.5%
3. Rated (DC) voltage (e.g. 2000 V)
4. Manufacturer's type designation (375)
5. Code for dielectric material (KP/MKP)
6. Year and week of manufacturing code.

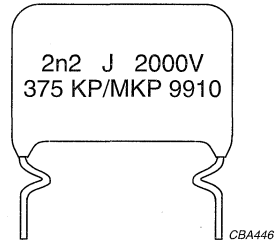


Fig.48 Example of marking.

Package marking

The package containing the capacitors is marked as shown in Fig.49.

Please note:
In due time BC COMPONENTS
will replace PHILIPS COMPONENTS

Barcode label marking

LINE	MARKING EXPLANATION
1	Manufacturer's name
2	Country of origin
3	Sub-family
4	Type description
5	Capacitance value in mF, tolerance, voltage and climatic category *("IEC 60068-1")*
6	Batchnumber (only for capacitors from PRC)
7	• 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.49 Barcode label.

AC and pulse metallized polypropylene film capacitors — KP/MKP 375

QUICK REFERENCE TEST REQUIREMENTS (see note 1)

TEST	PROCEDURE (quick reference)	REQUIREMENTS
Robustness of leads		
Tensile strength: *"IEC 60068-2-21"*	load 10 N; 10 s	no visible damage legible marking $\lvert\Delta C/C\rvert \leq 1\% + 5$ pF $\Delta\tan\delta \leq 5 \times 10^{-4}$
Bending: *"IEC 60068-2-21"*	load 5 N; 4 × 90°	
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	$\lvert\Delta C/C\rvert \leq 2\%$ ($C > 0.0056$ µF) $\lvert\Delta C/C\rvert \leq 3\% + 5$ pF ($C \leq 0.0056$ 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	$\lvert\Delta C/C\rvert \leq 3\% + 5$ pF $\Delta\tan\delta \leq 10 \times 10^{-4}$ $R_{ins} \geq 50\%$ 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"*		
Other applicable tests		
Damp heat, steady state: *"IEC 60068-2-3"*	56 days; 40 °C; 90 to 95% RH	$\lvert\Delta C/C\rvert \leq 1\% + 5$ pF $\Delta\tan\delta \leq 5 \times 10^{-4}$ $R_{ins} \geq 50\%$ of specified value
Endurance (AC): *"IEC 60384-17"*	2000 hours; $1.25 \times U_{Rac}$ (RMS); 50 Hz; 85°C	$\lvert\Delta C/C\rvert \leq 2\%$ ($C > 0.0056$ µF) $\lvert\Delta C/C\rvert \leq 3\% + 5$ pF ($C \leq 0.0056$ µF) $\Delta\tan\delta \leq 10 \times 10^{-4}$ $R_{ins} \geq 50\%$ of specified value
	2000 hours; $0.875 \times U_{Rac}$ (RMS); 50 Hz; 105°C	$\lvert\Delta C/C\rvert \leq 5\% + 5$ pF $\Delta\tan\delta \leq 10 \times 10^{-4}$ $R_{ins} \geq 50\%$ of specified value
Heat storage: *"IEC 60384-17"*	2000 hours; 105 °C	$\lvert\Delta C/C\rvert \leq 3\%$ ($C > 0.0056$ µF) $\lvert\Delta C/C\rvert \leq 5\% + 5$ pF ($C \leq 0.0056$ µF) $\Delta\tan\delta \leq 10 \times 10^{-4}$

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	$\lvert\Delta C/C\rvert \leq 2\% + 5$ 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	$\lvert\Delta C/C\rvert \leq 3\% + 5$ pF $\Delta\tan\delta \leq 10 \times 10^{-4}$ $R_{ins} \geq 50\%$ of specified value

Note

1. For detailed information: see *"Type detail specification HQN-384-17/104"*.

AC and pulse polypropylene film foil capacitors

KP 374

KP RADIAL EPOXY LACQUERED TYPE

PITCH 5 mm (kinked bent back leads)
PITCH 7.5/10 mm

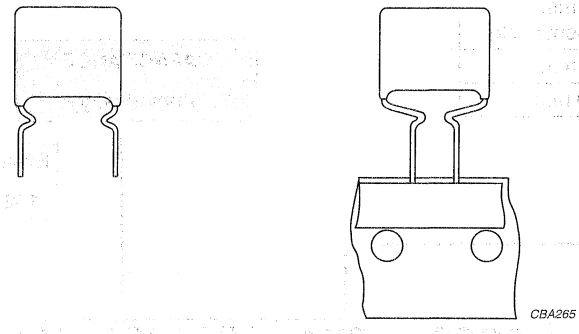


Fig.1 Simplified outline.

FEATURES

- 5 to 10 mm terminal pitch
- Supplied loose in box; taped on reel and ammopack.

APPLICATIONS

- Consumer and industrial
- High currents and/or steep pulses occur.

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 3900 pF
Capacitance tolerance	±10%, ±5%
Rated (DC) voltage	630 V
Rated (AC) voltage	200 V
Rated peak-to-peak voltage	560 V
Climatic category	55/105/56
Rated temperature	85 °C
Maximum application temperature	105 °C
Reference specification	IEC 60384-13

AC and pulse polypropylene film foil capacitors

KP 374

COMPOSITION OF CATALOGUE NUMBER

TYPE AND PITCHES	
374	5.0 mm (kinked bent back)
	7.5 mm
	10.0 mm

MULTIPLIER (nF)	
0.01	1
0.1	2

CAPACITANCE (numerically)

Example:
102 = 10 × 0.1 = 1 nF

2222	374	XX	XX	X

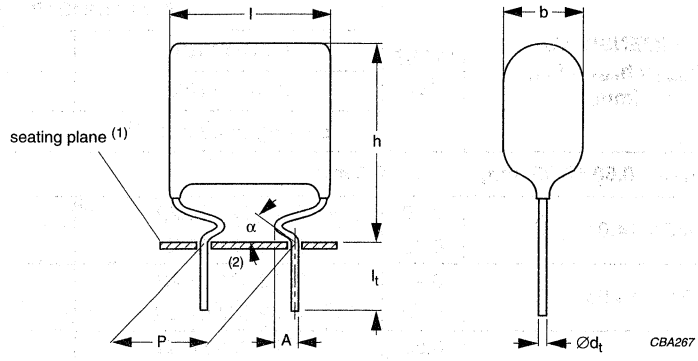
TYPE	PACKAGING	LEAD CONFIGURATION	C-TOL	630 V
374	ammopack (kinked bent back)	H = 16.0 mm; P_0 = 12.7 mm	±10%	62
			±5%	63
	taped on reel (kinked bent back)	H = 16.0 mm; P_0 = 12.7 mm	±10%	66
			±5%	67
	loose in box	lead length 3.5 mm	±10%	60
			±5%	61
	taped on reel	H = 16.0 mm; P_0 = 12.7 mm	±10%	64
			±5%	65

AC and pulse polypropylene film foil capacitors

KP 374

KP 374 GENERAL DATA

PITCH 5 mm (kinked bent back leads)



(1) Hole ∅0.8 for d_t = 0.6 mm.
(2) $0 \leq \alpha < 50°$.

Fig.3 Outline.

Specific reference data for the 630 V DC capacitors

DESCRIPTION	VALUE	
	at 1 kHz	at 100 kHz
Tangent of loss angle: 680 pF < C ≤ 3900 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; at 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(1)	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Ammopack	H = 16.0 mm; note 2	±10%	2222 374 62...	preferred
		±5%	2222 374 63...	on request
Taped on reel	H = 16.0 mm; note 2	±10%	2222 374 66...	preferred
		±5%	2222 374 67...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse polypropylene film foil capacitors

KP 374

U_{Rdc} = 630 V; U_{Rac} = 200 V/U_{p-p} = 560 V

C (pF)	DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER	
			AMMOPACK	REEL
			C-tol = ±10%	C-tol = ±10%
			catalogue number[1]	last 5 digits[1]
Pitch = 5.0 ±0.4 mm; d_t = 0.60 ±0.06 mm; A = 1.7 ±0.3 mm				
680	4.5 × 14.0 × 11.5	0.40	2222 374 62**681**	.. 66**681**
750		0.45	2222 374 62**751**	.. 66**751**
820	5.0 × 14.5 × 11.5	0.45	2222 374 62**821**	.. 66**821**
1000		0.50	2222 374 62**102**	.. 66**102**
1200	5.5 × 15.0 × 11.5	0.50	2222 374 62**122**	.. 66**122**
1500		0.55	2222 374 62**152**	on request
1800		0.60	2222 374 62**182**	
2200	6.0 × 15.5 × 11.5	0.70	2222 374 62**222**	
1500	4.5 × 14.0 × 14.0	0.60	not available	.. 66**152**
1800	5.0 × 14.5 × 14.0	0.70		.. 66**182**
2200	5.5 × 15.0 × 14.0	0.80		.. 66**222**
2700		0.60		.. 66**272**
3300	6.0 × 15.5 × 14.0	0.65		.. 66**332**
3900	6.5 × 16.5 × 14.0	0.70		.. 66**392**

Note

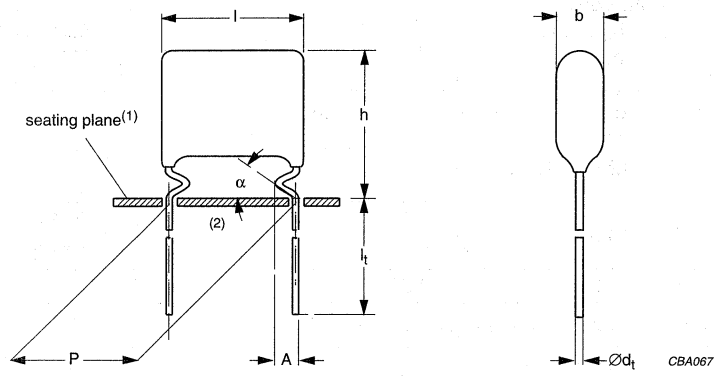
1. The shading indicates preferred types.

AC and pulse polypropylene film foil capacitors

KP 374

KP 374 GENERAL DATA

PITCH 7.5/10 mm



(1) Hole ∅1.0 for $d_t = 0.6$ mm.
(2) $0 \leq \alpha < 50°$.

Fig.4 Outline.

Specific reference data for the 630 V DC capacitors

DESCRIPTION	VALUE	
	at 1 kHz	at 100 kHz
Tangent of loss angle: 680 pF < C ≤ 3900 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; at 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(1)	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 3.5 \pm 0.5$ mm	±10%	2222 374 60...	preferred
		±5%	2222 374 61...	on request

Note

1. For SPQ refer to this handbook, chapter *"Packaging information"*.

AC and pulse polypropylene film foil capacitors

KP 374

U_{Rdc} = 630 V; U_{Rac} = 200 V/U_{p-p} = 560 V

C (pF)	DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER[1] LOOSE IN BOX C-tol = ±10%
Pitch = 7.5 ±0.4 mm; d_t = 0.60 ±0.06 mm; A = 2.0 ±0.5 mm			
680	4.5 × 12.5 × 11.5	0.40	2222 374 60**681**
750		0.45	2222 374 60**751**
820	5.0 × 13.0 × 11.5	0.45	2222 374 60**821**
1000		0.50	2222 374 60**102**
1200	5.5 × 13.5 × 11.5	0.50	2222 374 60**122**
Pitch = 10.0 ±0.4 mm; d_t = 0.60 ±0.06 mm; A = 2.0 +1/–0.5 mm			
1500	4.5 × 12.5 × 14.0	0.60	2222 374 60**152**
1800	5.0 × 13.0 × 14.0	0.70	2222 374 60**182**
2200	5.5 × 13.5 × 14.0	0.80	2222 374 60**222**
2700		0.60	2222 374 60**272**
3300	6.0 × 14.0 × 14.0	0.65	2222 374 60**332**
3900	6.5 × 14.5 × 14.0	0.70	2222 374 60**392**

Note

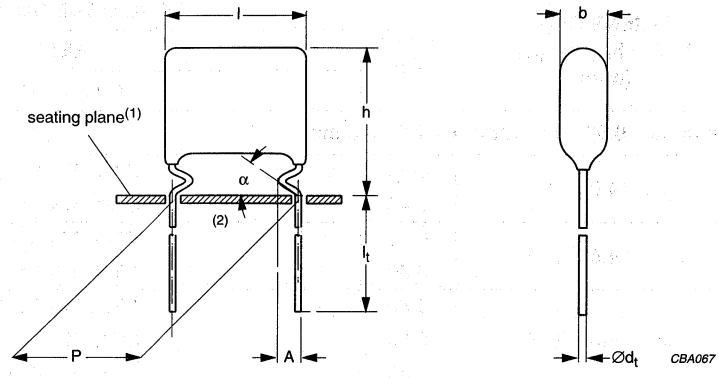
1. The shading indicates preferred types.

AC and pulse polypropylene film foil capacitors

KP 374

KP 374 GENERAL DATA

PITCH 7.5 mm



(1) Hole Ø1.0 for d_t = 0.6 mm.
(2) $0 \leq \alpha < 50°$.

Fig.5 Outline.

Specific reference data for the 630 V DC capacitors

DESCRIPTION	VALUE	
	at 1 kHz	at 100 kHz
Tangent of loss angle: 680 pF < C ≤ 3900 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; at 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(1)	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Taped on reel	H = 16.0 mm; note 2	±10%	2222 374 64...	preferred
		±5%	2222 374 65...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse polypropylene film foil capacitors

KP 374

U_{Rdc} = 630 V; U_{Rac} = 200 V/U_{p-p} = 560 V

C (pF)	DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER[1] REEL C-tol = ±10%
Pitch = 7.5 ±0.4 mm; d_t = 0.60 ±0.06 mm; A = 2.0 ±0.5 mm			
680	4.5 × 14.0 × 11.5	0.40	2222 374 64**681**
750		0.45	2222 374 64**751**
820	5.0 × 14.5 × 11.5	0.45	2222 374 64**821**
1000		0.50	2222 374 64**102**
1200	5.5 × 15.0 × 11.5	0.50	2222 374 64**122**
1500		0.55	2222 374 64**152**
1800		0.60	2222 374 64**182**
2200	6.0 × 15.5 × 11.5	0.70	2222 374 64**222**

Note

1. The shading indicates preferred types.

AC and pulse polypropylene film foil capacitors

CONSTRUCTION

Description

- Low-inductive wound cell of lead tin foil and a polypropylene film
- Protected by a hard, water repellent, solvent resistant epoxy lacquer
- Radial copper clad steel wire leads, solder-coated.

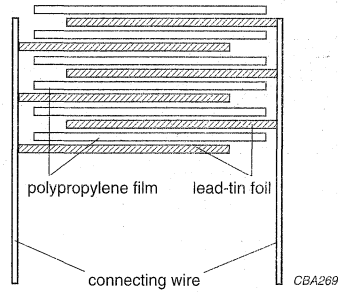


Fig.6 Construction.

Mounting

NORMAL USE

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

SPECIFIC METHOD OF MOUNTING TO WITHSTAND VIBRATION AND SHOCK

Not applicable due to small size.

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 ±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%.

CHARACTERISTICS

Capacitance

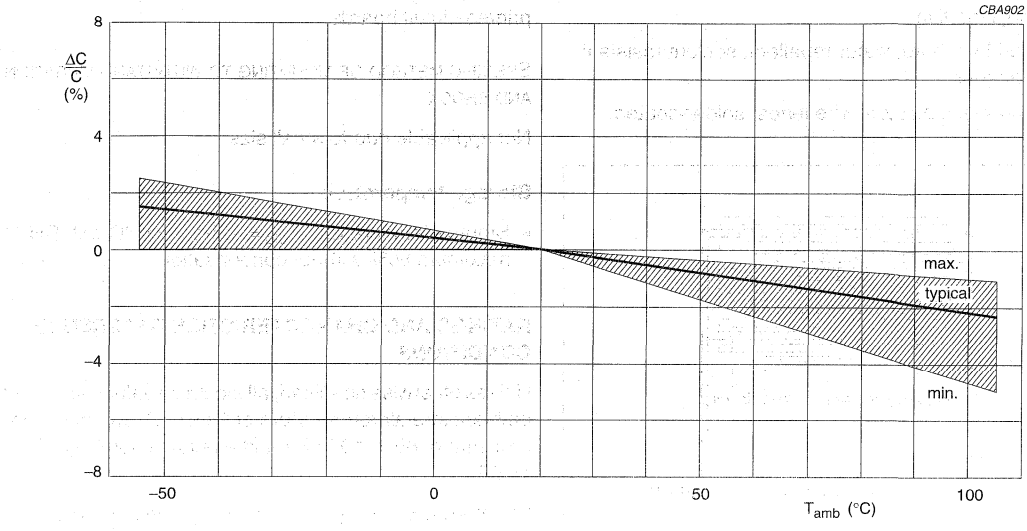


Fig.7 Capacitance change as a function of frequency.

Impedance

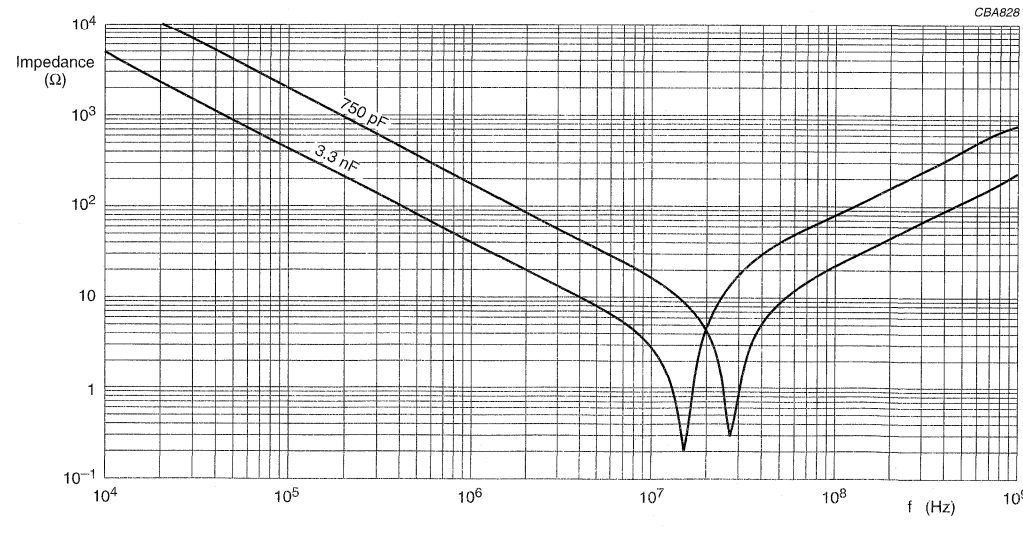


Fig.8 Impedance as a function of frequency; typical curves.

Maximum RMS voltage (sinewave) as a function of frequency

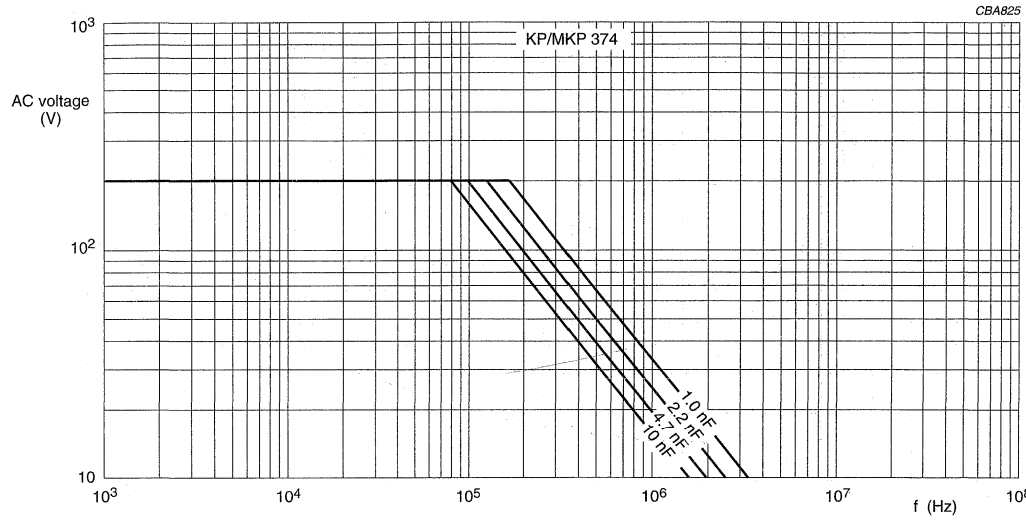


Fig.9 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C for $U_{Rdc} = 630$ V.

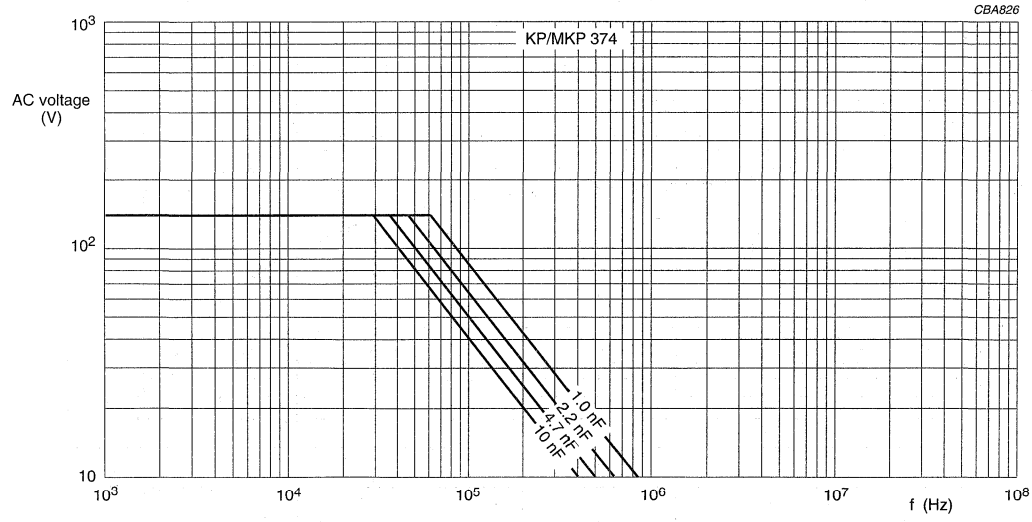


Fig.10 AC voltage (RMS value) as a function of frequency at 85 °C < $T_{amb} \leq 105$ °C for $U_{Rdc} = 630$ V.

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 9 and 10.

Tangent of loss angle

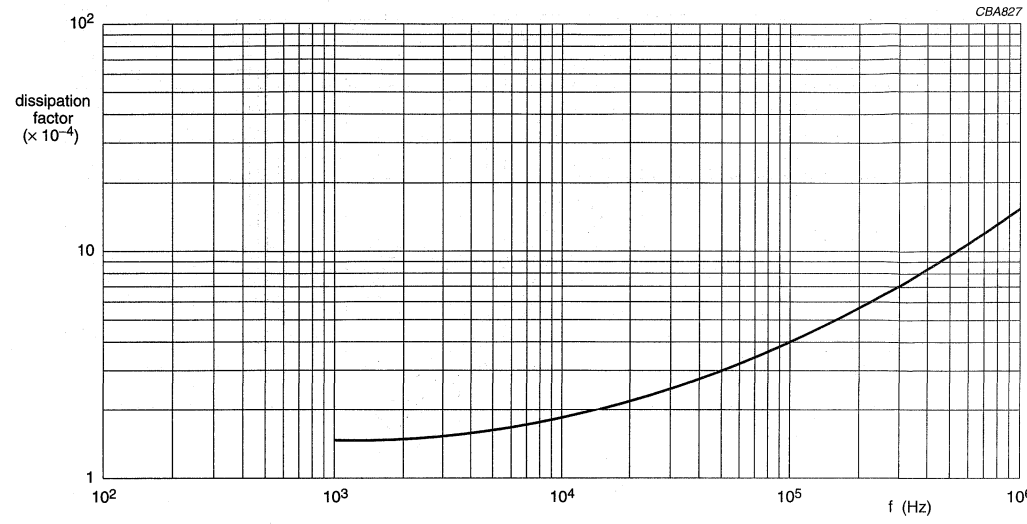


Fig.11 Tangent of loss angle as a function of frequency: typical curve.

Insulation resistance

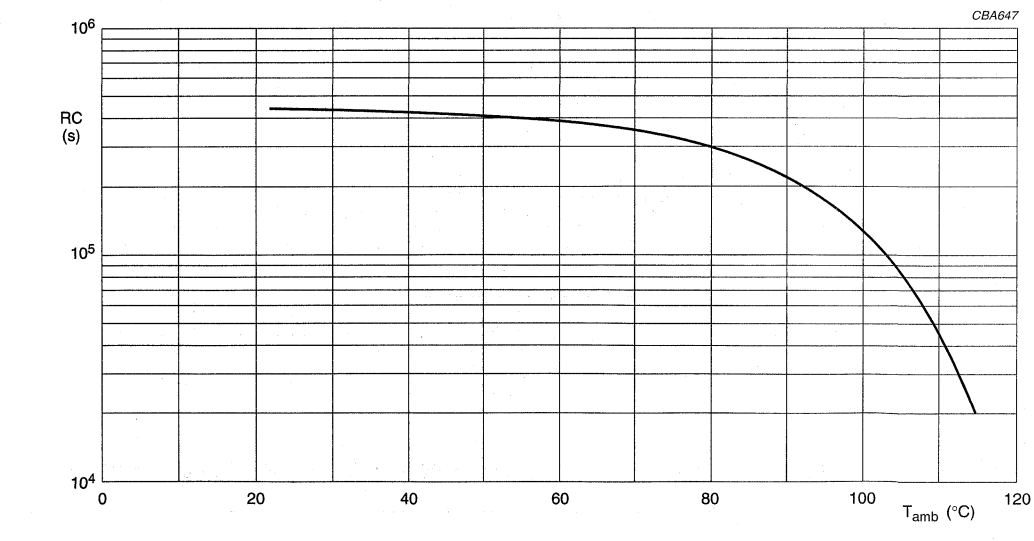


Fig.12 RC-product as a function of ambient free air temperature: typical curve.

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

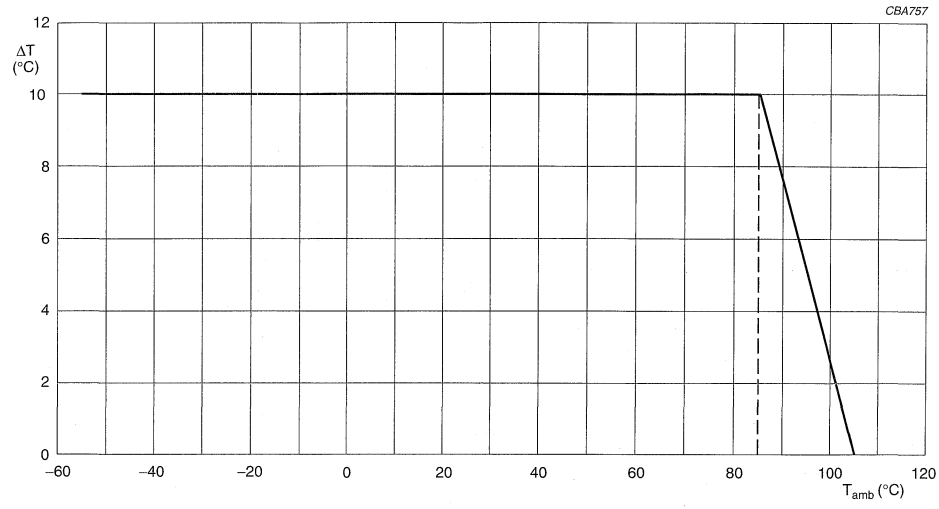


Fig.13 Maximum allowed component temperature rise as a function of the ambient temperature.

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

Table 1 Heat conductivity

b_{max} (mm)	PITCH (mm)		
	5.0	**7.5**	**10**
3.5	1.5	3.0	–
4.0	2.0	3.5	4.0
4.5	2.5	3.5	4.5
5.0	2.5	4.0	5.0
5.5	3.0	4.0	6.0
6.0	3.5	4.5	6.0
6.5	–	5.0	6.5

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.

Power dissipation can be calculated in accordance with 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).

Measuring the component temperature

A thermocouple must be attached to the capacitor body; see Fig.14.

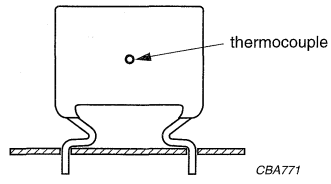


Fig.14 Mounting the thermocouple.

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 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.13.
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 nF - 630 V used for 175 V (AC) sinewave at 125 kHz, at T_{amb} = 70 °C.

Checking the conditions:

1. The peak voltage U_p = 244 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.9. We can verify that this 175 V (AC) at 125 kHz is allowed.
4. This is fulfilled.
5. Not applicable.

MARKING

Product marking

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

1. Rated capacitance code in accordance with *"IEC 60062"*
2. Tolerance on rated capacitance: J = ±5%; K = ±10%
3. Rated (DC) voltage (e.g. 630 V)
4. Manufacturer's type designation (374)
5. Code for dielectric material (KP).

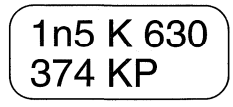


Fig.15 Example of marking

Package marking

The package containing the capacitors is marked as shown in Fig.16.

Please note:
In due time BC COMPONENTS
will replace PHILIPS COMPONENTS

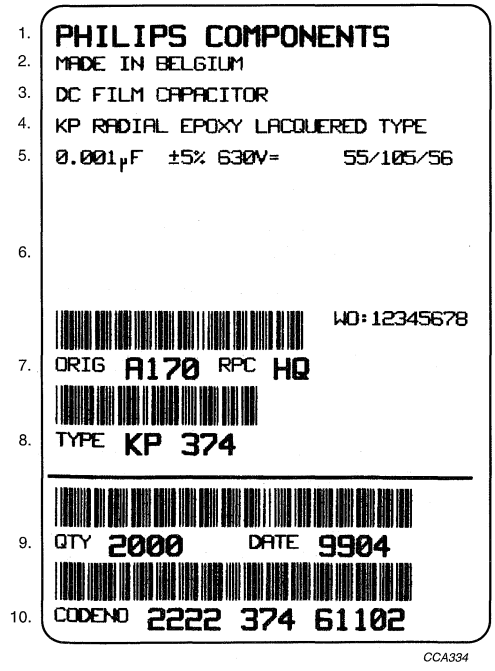


Fig.16 Barcode label.

Barcode label marking

LINE	MARKING EXPLANATION
1	Manufacturer's name
2	Country of origin
3	Sub-family
4	Type description
5	Capacitance value, tolerance and climatic category *("IEC 60068-1")*
6	–
7	Preference origin code: A Country of origin in code: 170 (Belgium) Responsible production centre: HQ Work order: WO
8	Product type description
9	Quantity and production period, year and week code
10	Product code (12NC)

AC and pulse polypropylene film foil capacitors

KP 374

QUICK REFERENCE TEST REQUIREMENTS (see note 1)

TEST	PROCEDURE (quick reference)	REQUIREMENTS
Robustness of leads		
Tensile: *"IEC 60068-2-21"*	load 10 N; 10 s	no visible damage legible marking $\lvert\Delta C/C\rvert \leq 1\%$
Bending: *"IEC 60068-2-21"*	load 5 N; 4 × 90°	
Resistance to soldering heat: *"IEC 60068-2-20"*	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	$\lvert\Delta C/C\rvert \leq 1\%$
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	$\lvert\Delta C/C\rvert \leq 1\%$ $\Delta\tan\delta$: as specified in General data or ≤1.4 times × 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"*		
Other applicable tests		
Damp heat, steady state: *"IEC 60068-2-3"*	56 days; 40°C; 90 to 95% RH	$\lvert\Delta C/C\rvert \leq 1\%$ $\Delta\tan\delta$: as specified in General data or ≤1.4 times × 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	$\lvert\Delta C/C\rvert \leq 2\%$ $\Delta\tan\delta$: as specified in General data or ≤1.4 times × measured initial value
Heat storage: *"IEC 60384-13"*	2000 hours; 105 °C	$\lvert\Delta C/C\rvert \leq 2\%$ $\Delta\tan\delta$: as specified in General data or ≤1.4 times × measured initial value

AC and pulse polypropylene film foil capacitors

KP 374

TEST	PROCEDURE (quick reference)	REQUIREMENTS
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 $\times$ 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 $\times$ 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: 10 s	$\|\Delta C/C\| \leq 2\%$

Note

1. For detailed information: see *"Type detail specification HQN-384-13/104"*.

AC and pulse double sided metallized polypropylene film capacitor

MMKP 383

RADIAL POTTED TYPE

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

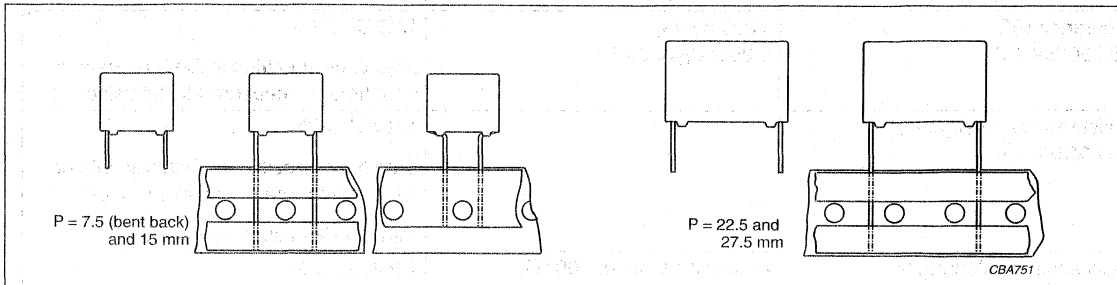


Fig.1 Simplified outlines.

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[1]

- Where steep pulses occur e.g. SMPS (switch mode power supplies)
- Motor control circuits
- S-correction
- Electronic lighting e.g. Ballast
- The 1400 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-384-17/106"*.

QUICK REFERENCE DATA

DESCRIPTION	VALUE
Capacitance range (E24 series)	0.001 to 2.7 μF
Capacitance tolerance	±5%
Rated (DC) voltage	250 V; 400 V; 630 V; 1000 V; 1400 V;1600 V; 2000 V; 2500 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; 1000 V; 1400 V; 1600 V; 2000 V; 2500 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

(1) It is not advised to use other series than the 1400 V series as resonance capacitors in fly-back applications.

AC and pulse double sided metallized polypropylene film capacitor

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 × 10 = 100 nF

2222	383	XX	XX	X

TYPE	PACKAGING	LEAD CONFIGURATION	C-TOL	250 V	400 V	630 V	1000 V
383	loose in box	lead length 3.5 mm	±5%	00	10	20	30
		lead length 5.0 mm	±5%	01	11	21	31
		lead length 25.0 mm	±5%	04	14	24	34
	taped on reel	H = 18.5 mm; P_0 = 12.7 mm	±5%	02	12	22	32
	taped on reel (bent back)	H = 16.0 mm; P_0 = 15.0 mm	±5%	03	13	23	33

AC and pulse double sided metallized polypropylene film capacitor

MMKP 383

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 × 10 = 100 nF

2222	383	XX	XX	X

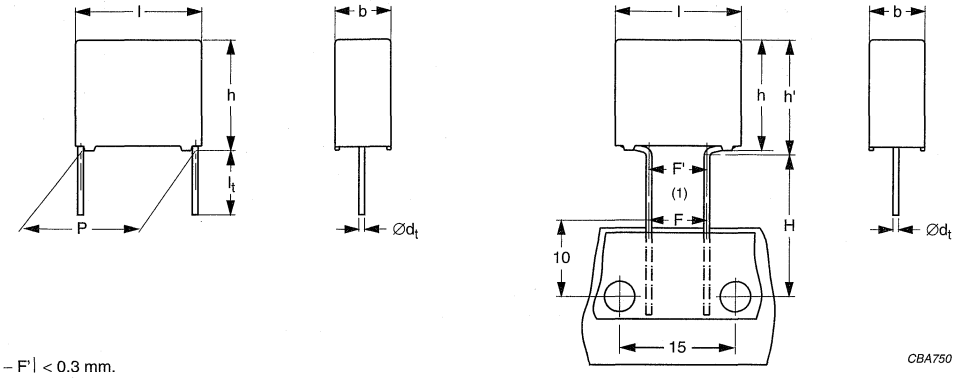
TYPE	PACKAGING	LEAD CONFIGURATION	C-TOL	1400 V	1600 V	2000 V	2500 V
383	loose in box	lead length 3.5 mm	±5%	40	50	60	70
		lead length 5.0 mm	±5%	41	51	61	71
		lead length 25.0 mm	±5%	44	54	64	74
	taped on reel	H = 18.5 mm; P_0 = 12.7 mm	±5%	42	52	62	72
	taped on reel (bent back)	H = 16.0 mm; P_0 = 15.0 mm	±5%	43	53	63	–

AC and pulse double sided metallized polypropylene film capacitor

MMKP 383

MMKP 383 GENERAL DATA

PITCH 15 mm
PITCH 7.5 mm (bent back leads)



(1) $|F - F'| < 0.3$ mm.
F = 7.5 +0.6/–0.1 mm.

Fig.4 Outline.

Specific reference data for the 250 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
$C \leq 0.15$ µF	$\leq 5 \times 10^{-4}$	$\leq 20 \times 10^{-4}$
0.15 µF < C ≤ 0.39 µF	$\leq 5 \times 10^{-4}$	$\leq 25 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 250 V (DC)	300 V/µs	
R between leads, for C ≤ 1 µF at 100 V; 1 minute	>100000 MΩ	
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	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	$l_t = 3.5 \pm 0.3$ mm	±5%	2222 383 00...	preferred
	$l_t = 5.0 \pm 1.0$ mm	±5%	2222 383 01...	on request
	$l_t = 25.0 \pm 2.0$ mm	±5%	2222 383 04...	on request
Taped on reel	H = 18.5 mm; P_0 = 12.7 mm; note 2	±5%	2222 383 02...	on request
Taped on reel (bent back)	H = 16.0 mm; P_0 = 15.0 mm; note 2	±5%	2222 383 03...	preferred

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; P_0= sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse double sided metallized polypropylene film capacitor

MMKP 383

U_{Rdc} = 250 V; U_{Rac} = 125 V/U_{p-p} = 350 V

C (µF)	DIMENSIONS[1] b × h (h') × l (mm)	MASS (g)	CATALOGUE NUMBER	
			LOOSE IN BOX	REEL DIAMETER = 500 mm; H = 16.0 mm; P_0 = 15.0 mm[2]
			l_t = 3.5 ±0.3 mm	pitch 7.5 mm (bent back)
			C-tol = ±5%	C-tol = ±5%
			catalogue number[3]	last 5 digits[3]
Pitch = 15.0 ±0.4 mm; (pitch = 7.5 ±0.4 mm for bent back leads); d_t = 0.80 ±0.08 mm				
0.082	5.0 × 11.0 (13.0) × 17.5	1.2	2222 383 00**823**	.. 03**823**
0.091			2222 383 00**913**	.. 03**913**
0.1			2222 383 00**104**	.. 03**104**
0.11	6.0 × 12.0 (14.0) × 17.5	1.5	2222 383 00**114**	.. 03**114**
0.12			2222 383 00**124**	.. 03**124**
0.13			2222 383 00**134**	.. 03**134**
0.15			2222 383 00**154**	.. 03**154**
0.16	7.0 × 13.5 (15.5) × 17.5	2.0	2222 383 00**164**	.. 03**164**
0.18			2222 383 00**184**	.. 03**184**
0.2			2222 383 00**204**	.. 03**204**
0.22	8.5 × 15.0 (17.0) × 17.5	2.7	2222 383 00**224**	.. 03**224**
0.24			2222 383 00**244**	.. 03**244**
0.27			2222 383 00**274**	.. 03**274**
0.3			2222 383 00**304**	.. 03**304**
0.33	10.0 × 16.5 (18.5) × 17.5	3.3	2222 383 00**334**	.. 03**334**
0.36			2222 383 00**364**	.. 03**364**
0.39			2222 383 00**394**	.. 03**394**

Notes

1. Dimensions in brackets for bent back leads.
2. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*:
   a) For pitch = 15.0 mm: H = 18.5 mm and P_0 = 12.7 mm.
   b) For pitch = 15/7.5 mm (bent back): H = 16.0 mm and P_0 = 15.0 mm.
   Standard reel diameter = 500 mm. Small reel diameter = 356 mm is available on request.
3. The shading indicates preferred types.

AC and pulse double sided metallized polypropylene film capacitor

MMKP 383

MMKP 383 GENERAL DATA

PITCH 22.5/27.5 mm

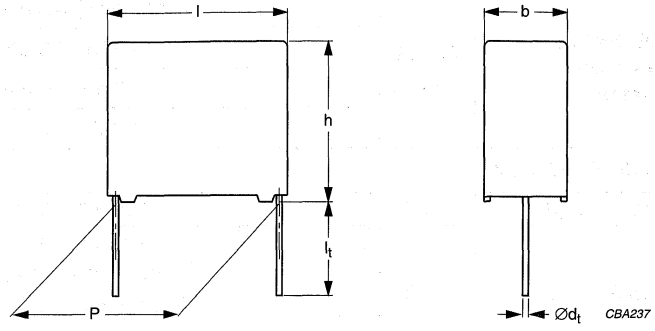


Fig.5 Outline.

Specific reference data for the 250 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
0.39 µF < C ≤ 0.56 µF	$\leq 10 \times 10^{-4}$	$\leq 45 \times 10^{-4}$
0.56 µF < C ≤ 0.82 µF	$\leq 10 \times 10^{-4}$	$\leq 50 \times 10^{-4}$
0.82 µF < C ≤ 1.2 µF	$\leq 10 \times 10^{-4}$	$\leq 65 \times 10^{-4}$
1.2 µF < C ≤ 1.8 µF	$\leq 15 \times 10^{-4}$	$\leq 75 \times 10^{-4}$
1.8 µF < C ≤ 2.2 µF	$\leq 15 \times 10^{-4}$	$\leq 85 \times 10^{-4}$
2.2 µF < C ≤ 2.7 µF	$\leq 15 \times 10^{-4}$	$\leq 95 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 250 V (DC):		
P = 22.5 mm	200 V/µs	
P = 27.5 mm (b < 15 mm)	120 V/µs	
P = 27.5 mm (b ≥ 15 mm)	60 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	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 ±0.3 mm	±5%	2222 383 00...	preferred
	l_t = 5.0 ±1.0 mm	±5%	2222 383 01...	on request
	l_t = 25.0 ±2.0 mm	±5%	2222 383 04...	on request
Taped on reel	H = 18.5 mm; P_0 = 12.7 mm; note 2	±5%	2222 383 02...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*; taped on reel pitch = 27.5 mm is not available.
2. H = in-tape height; P_0= sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse double sided metallized polypropylene film capacitor

MMKP 383

U_{Rdc} = 250 V; U_{Rac} = 125 V/U_{p-p} = 350 V

C (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER(1) LOOSE IN BOX l_t = 3.5 ±0.3 mm C-tol = ±5%
Pitch = 22.5 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.43	7.0 × 16.5 × 26.0	3.5	2222 383 00**434**
0.47	8.5 × 18.0 × 26.0	4.8	2222 383 00**474**
0.51			2222 383 00**514**
0.56			2222 383 00**564**
0.62			2222 383 00**624**
0.68	10.0 × 19.5 × 26.0	6.0	2222 383 00**684**
0.75			2222 383 00**754**
0.82			2222 383 00**824**
Pitch = 27.5 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.91	11.0 × 21.0 × 31.0	8.4	2222 383 00**914**
1.0			2222 383 00**105**
1.1			2222 383 00**115**
1.2			2222 383 00**125**
1.3	13.0 × 23.0 × 31.0	11.0	2222 383 00**135**
1.5			2222 383 00**155**
1.6			2222 383 00**165**
1.8	15.0 × 25.0 × 31.0	13.6	2222 383 00**185**
2.0			2222 383 00**205**
2.2	18.0 × 28.0 × 31.0	18.5	2222 383 00**225**
2.4			2222 383 00**245**
2.7			2222 383 00**275**

Note

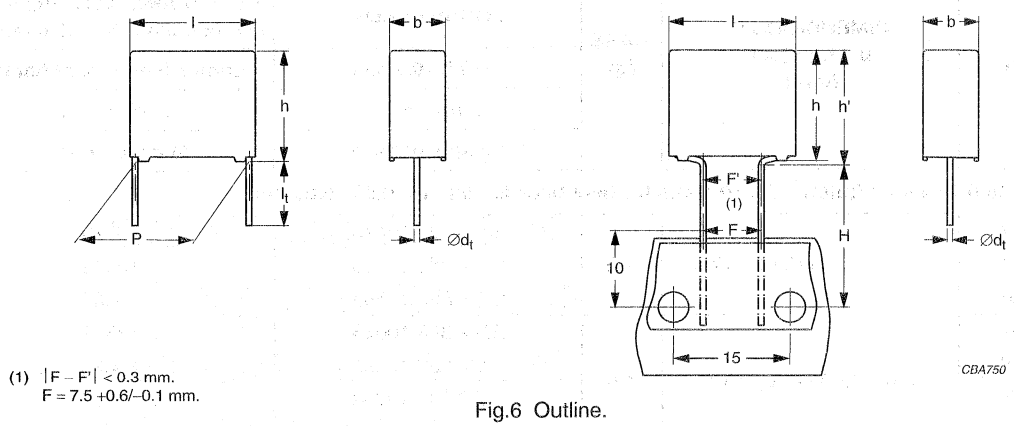
1. The shading indicates preferred types.

AC and pulse double sided metallized polypropylene film capacitor

MMKP 383

MMKP 383 GENERAL DATA

PITCH 15 mm
PITCH 7.5 mm (bent back leads)



(1) $|F - F'| < 0.3$ mm.
$F = 7.5\ ^{+0.6}_{-0.1}$ mm.

Fig.6 Outline.

Specific reference data for the 400 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: $C \leq 0.22\ \mu F$	$\leq 5 \times 10^{-4}$	$\leq 20 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 400 V (DC)	420 V/µs	
R between leads, for $C \leq 1\ \mu F$ at 100 V; 1 minute	>100000 MΩ	
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	560 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	$l_t = 3.5 \pm 0.3$ mm	±5%	2222 383 10...	preferred
	$l_t = 5.0 \pm 1.0$ mm	±5%	2222 383 11...	on request
	$l_t = 25.0 \pm 2.0$ mm	±5%	2222 383 14...	on request
Taped on reel	H = 18.5 mm; P_0 = 12.7 mm; note 2	±5%	2222 383 12...	on request
Taped on reel (bent back)	H = 16.0 mm; P_0 = 15.0 mm; note 2	±5%	2222 383 13...	preferred

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse double sided metallized polypropylene film capacitor

MMKP 383

U_{Rdc} = 400 V; U_{Rac} = 200 V/U_{p-p} = 560 V

C (µF)	DIMENSIONS[1] b × h (h') × l (mm)	MASS (g)	CATALOGUE NUMBER	
			LOOSE IN BOX	REEL DIAMETER = 500 mm; H = 16.0 mm; P_0 = 15.0 mm[2]
			l_t = 3.5 ±0.3 mm	pitch 7.5 mm (bent back)
			C-tol = ±5%	C-tol = ±5%
			catalogue number[3]	last 5 digits[3]
Pitch = 15.0 ±0.4 mm; (pitch = 7.5 ±0.4 mm for bent back leads); d_t = 0.80 ±0.08 mm				
0.047	5.0 × 11.0 (13.0) × 17.5	1.2	2222 383 10**473**	.. 13**473**
0.051			2222 383 10**513**	.. 13**513**
0.056			2222 383 10**563**	.. 13**563**
0.062	6.0 × 12.0 (14.0) × 17.5	1.5	2222 383 10**623**	.. 13**623**
0.068			2222 383 10**683**	.. 13**683**
0.075			2222 383 10**753**	.. 13**753**
0.082			2222 383 10**823**	.. 13**823**
0.091	7.0 × 13.5 (15.5) × 17.5	2.0	2222 383 10**913**	.. 13**913**
0.1			2222 383 10**104**	.. 13**104**
0.11			2222 383 10**114**	.. 13**114**
0.12	8.5 × 15.0 (17.0) × 17.5	2.7	2222 383 10**124**	.. 13**124**
0.13			2222 383 10**134**	.. 13**134**
0.15			2222 383 10**154**	.. 13**154**
0.16			2222 383 10**164**	.. 13**164**
0.18	10.0 × 16.5 (18.5) × 17.5	3.3	2222 383 10**184**	.. 13**184**
0.2			2222 383 10**204**	.. 13**204**
0.22			2222 383 10**224**	.. 13**224**

Notes

1. Dimensions in brackets for bent back leads.
2. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*.
   a) For pitch = 15.0 mm: H = 18.5 mm and P_0 = 12.7 mm.
   b) For pitch = 15/7.5 mm (bent back): H = 16.0 mm and P_0 = 15.0 mm.
   Standard reel diameter = 500 mm. Small reel diameter = 356 mm is available on request.
3. The shading indicates preferred types.

AC and pulse double sided metallized polypropylene film capacitor

MMKP 383

MMKP 383 GENERAL DATA

PITCH 22.5/27.5 mm

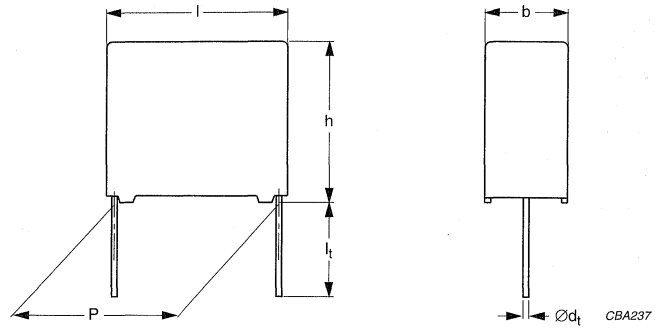


Fig.7 Outline.

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	$\leq 10 \times 10^{-4}$	$\leq 35 \times 10^{-4}$
0.33 µF < C ≤ 0.43 µF	$\leq 10 \times 10^{-4}$	$\leq 40 \times 10^{-4}$
0.43 µF < C ≤ 0.68 µF	$\leq 10 \times 10^{-4}$	$\leq 50 \times 10^{-4}$
0.68 µF < C ≤ 0.82 µF	$\leq 10 \times 10^{-4}$	$\leq 55 \times 10^{-4}$
0.82 µF < C ≤ 1.2 µF	$\leq 10 \times 10^{-4}$	$\leq 60 \times 10^{-4}$
1.2 µF < C ≤ 1.5 µF	$\leq 10 \times 10^{-4}$	$\leq 65 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 400 V (DC):		
P = 22.5 mm	280 V/µs	
P = 27.5 mm (b < 15 mm)	180 V/µs	
P = 27.5 mm (b ≥ 15 mm)	90 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	560 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; note 2	±5%	2222 383 12...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*; taped on reel pitch = 27.5 mm is not available.
2. H = in-tape height; P_0= sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse double sided metallized polypropylene film capacitor

MMKP 383

U_{Rdc} = 400 V; U_{Rac} = 200 V/U_{p-p} = 560 V

C (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER(1) LOOSE IN BOX l_t = 3.5 ±0.3 mm C-tol = ±5%
Pitch = 22.5 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.24	7.0 × 16.5 × 26.0	3.5	2222 383 10**244**
0.27	8.5 × 18.0 × 26.0	4.8	2222 383 10**274**
0.3			2222 383 10**304**
0.33			2222 383 10**334**
0.36	10.0 × 19.5 × 26.0	6.0	2222 383 10**364**
0.39			2222 383 10**394**
0.43			2222 383 10**434**
Pitch = 27.5 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.47	11.0 × 21.0 × 31.0	8.4	2222 383 10**474**
0.51			2222 383 10**514**
0.56			2222 383 10**564**
0.62			2222 383 10**624**
0.68	13.0 × 23.0 × 31.0	11.0	2222 383 10**684**
0.75			2222 383 10**754**
0.82			2222 383 10**824**
0.91	15.0 × 25.0 × 31.0	13.6	2222 383 10**914**
1			2222 383 10**105**
1.1			2222 383 10**115**
1.2	18.0 × 28.0 × 31.0	18.5	2222 383 10**125**
1.3			2222 383 10**135**
1.5			2222 383 10**155**

Note

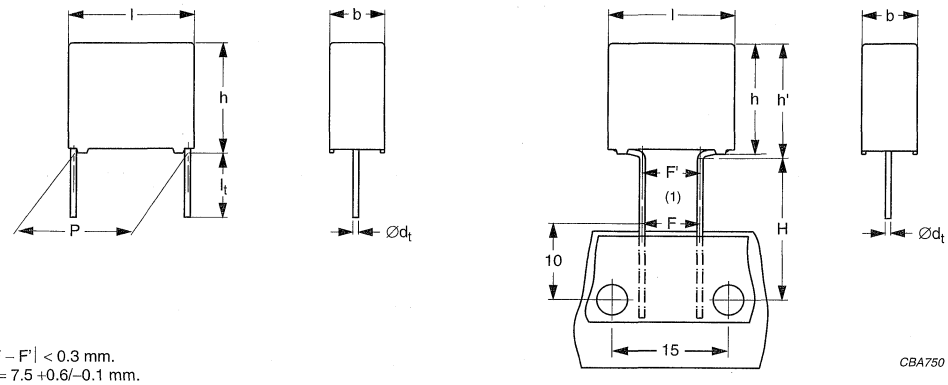
1. The shading indicates preferred types.

AC and pulse double sided metallized polypropylene film capacitor

MMKP 383

MMKP 383 GENERAL DATA

PITCH 15 mm
PITCH 7.5 mm (bent back leads)



(1) $|F - F'| < 0.3$ mm.
$F = 7.5 +0.6/-0.1$ mm.

Fig.8 Outline.

Specific reference data for the 630 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: $C \leq 0.15$ µF	$\leq 5 \times 10^{-4}$	$\leq 15 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 630 V (DC)	480 V/µs	
R between leads, for $C \leq 1$ 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 50 pC peak discharge	>250 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(1)	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 3.5 \pm 0.3$ mm	±5%	2222 383 20...	preferred
	$l_t = 5.0 \pm 1.0$ mm	±5%	2222 383 21...	on request
	$l_t = 25.0 \pm 2.0$ mm	±5%	2222 383 24...	on request
Taped on reel	H = 18.5 mm; $P_0 = 12.7$ mm; note 2	±5%	2222 383 22...	on request
Taped on reel (bent back)	H = 16.0 mm; $P_0 = 15.0$ mm; note 2	±5%	2222 383 23...	preferred

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse double sided metallized polypropylene film capacitor

MMKP 383

U_{Rdc} = 630 V; U_{Rac} = 220 V/U_{p-p} = 630 V

C (µF)	DIMENSIONS[1] b × h (h') × l (mm)	MASS (g)	CATALOGUE NUMBER	
			LOOSE IN BOX	REEL DIAMETER = 500 mm; H = 16.0 mm; P_0 = 15.0 mm[2]
			l_t = 3.5 ±0.3 mm	pitch 7.5 mm (bent back)
			C-tol = ±5%	C-tol = ±5%
			catalogue number[3]	last 5 digits[3]
Pitch = 15.0 ±0.4 mm; (pitch = 7.5 ±0.4 mm for bent back leads); d_t = 0.80 ±0.08 mm				
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

Notes

1. Dimensions in brackets for bent back leads.
2. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*:
   a) For pitch = 15.0 mm: H = 18.5 mm and P_0 = 12.7 mm.
   b) For pitch = 15/7.5 mm (bent back): H = 16.0 mm and P_0 = 15.0 mm.
   Standard reel diameter = 500 mm. Small reel diameter = 356 mm is available on request.
3. The shading indicates preferred types.

AC and pulse double sided metallized polypropylene film capacitor

MMKP 383

MMKP 383 GENERAL DATA

PITCH 22.5/27.5 mm

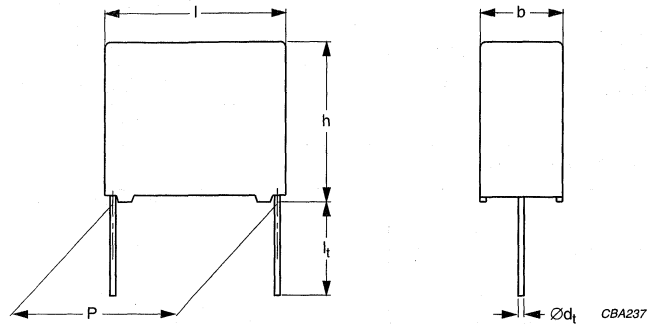


Fig.9 Outline.

Specific reference data for the 630 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
0.15 µF < C ≤ 0.22 µF	$\leq 8 \times 10^{-4}$	$\leq 25 \times 10^{-4}$
0.22 µF < C ≤ 0.3 µF	$\leq 8 \times 10^{-4}$	$\leq 30 \times 10^{-4}$
0.3 µF < C ≤ 0.47 µF	$\leq 10 \times 10^{-4}$	$\leq 40 \times 10^{-4}$
0.47 µF < C ≤ 0.68 µF	$\leq 10 \times 10^{-4}$	$\leq 45 \times 10^{-4}$
0.68 µF < C ≤ 1.0 µF	$\leq 10 \times 10^{-4}$	$\leq 50 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 630 V (DC):		
P = 22.5 mm	310 V/µs	
P = 27.5 mm (b < 15 mm)	200 V/µs	
P = 27.5 mm (b ≥ 15 mm)	100 V/µs (b ≥ 15 mm)	
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 50 pC peak discharge	>250 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(1)	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	l_t = 3.5 ±0.3 mm	±5%	2222 383 20...	preferred
	l_t = 5.0 ±1.0 mm	±5%	2222 383 21...	on request
	l_t = 25.0 ±2.0 mm	±5%	2222 383 24...	on request
Taped on reel	H = 18.5 mm; P_0 = 12.7 mm; note 2	±5%	2222 383 22...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*; taped on reel pitch = 27.5 mm is not available.
2. H = in-tape height; P_0= sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse double sided metallized polypropylene film capacitor

MMKP 383

U_{Rdc} = 630 V; U_{Rac} = 220 V/U_{p-p} = 630 V

C (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER(1) LOOSE IN BOX l_t = 3.5 ±0.3 mm C-tol = ±5%
Pitch = 22.5 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.16	8.5 × 18.0 × 26.0	4.8	2222 383 20**164**
0.18			2222 383 20**184**
0.2			2222 383 20**204**
0.22			2222 383 20**224**
0.24	10.0 × 19.5 × 26.0	6.0	2222 383 20**244**
0.27			2222 383 20**274**
0.3			2222 383 20**304**
Pitch = 27.5 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.33	11.0 × 21.0 × 31.0	8.4	2222 383 20**334**
0.36			2222 383 20**364**
0.39			2222 383 20**394**
0.43			2222 383 20**434**
0.47	13.0 × 23.0 × 31.0	11.0	2222 383 20**474**
0.51			2222 383 20**514**
0.56			2222 383 20**564**
0.62	15.0 × 25.0 × 31.0	13.6	2222 383 20**624**
0.68			2222 383 20**684**
0.75			2222 383 20**754**
0.82	18.0 × 28.0 × 31.0	18.5	2222 383 20**824**
0.91			2222 383 20**914**
1			2222 383 20**105**

Note

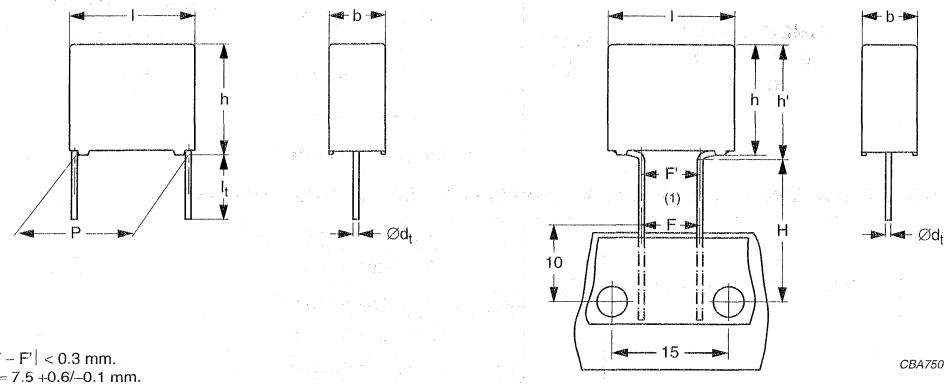
1. The shading indicates preferred types.

AC and pulse double sided metallized polypropylene film capacitor

MMKP 383

MMKP 383 GENERAL DATA

PITCH 15 mm
PITCH 7.5 mm (bent back leads)



(1) $|F - F'| < 0.3$ mm.
$F = 7.5 +0.6/-0.1$ mm.

Fig.10 Outline.

Specific reference data for the 1000 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: $C \leq 0.062$ µF	$\leq 5 \times 10^{-4}$	$\leq 15 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 1000 V (DC)	1700 V/µs	
R between leads, for $C \leq 1$ 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 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	$l_t = 3.5 \pm 0.3$ 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; note 2	±5%	2222 383 32...	on request
Taped on reel (bent back)	H = 16.0 mm; $P_0 = 15.0$ mm; note 2	±5%	2222 383 33...	preferred

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse double sided metallized polypropylene film capacitor

MMKP 383

U_{Rdc} = 1000 V; U_{Rac} = 350 V/U_{p-p} = 1000 V

C (µF)	DIMENSIONS[1] b × h (h') × l (mm)	MASS (g)	CATALOGUE NUMBER	
			LOOSE IN BOX	REEL DIAMETER = 500 mm; H = 16.0 mm; P_0 = 15.0 mm[2]
			l_t = 3.5 ±0.3 mm	pitch 7.5 mm (bent back)
			C-tol = ±5%	C-tol = ±5%
			catalogue number[3]	last 5 digits[3]
Pitch = 15.0 ±0.4 mm; (pitch = 7.5 ±0.4 mm for bent back leads); d_t = 0.80 ±0.08 mm				
0.012	5.0 × 11.0 (13.0) × 17.5	1.2	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	2222 383 30183	.. 33183
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

Notes

1. Dimensions in brackets for bent back leads.
2. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*:
   a) For pitch = 15.0 mm: H = 18.5 mm and P_0 = 12.7 mm.
   b) For pitch = 15/7.5 mm (bent back): H = 16.0 mm and P_0 = 15.0 mm.
   Standard reel diameter = 500 mm. Small reel diameter = 356 mm is available on request.
3. The shading indicates preferred types.

AC and pulse double sided metallized polypropylene film capacitor

MMKP 383

MMKP 383 GENERAL DATA

PITCH 22.5/27.5 mm

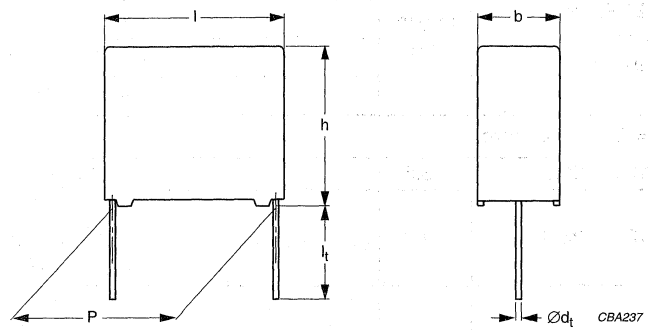


Fig.11 Outline.

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 ≤ 0.13 µF	$\leq 6 \times 10^{-4}$	$\leq 20 \times 10^{-4}$
0.13 µF < C ≤ 0.22 µF	$\leq 8 \times 10^{-4}$	$\leq 25 \times 10^{-4}$
0.22 µF < C ≤ 0.33 µF	$\leq 8 \times 10^{-4}$	$\leq 30 \times 10^{-4}$
0.33 µF < C ≤ 0.47 µF	$\leq 8 \times 10^{-4}$	$\leq 35 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 1000 V (DC):		
P = 22.5 mm	1200 V/µs	
P = 27.5 mm (b < 15 mm)	600 V/µs	
P = 27.5 mm (b ≥ 15 mm)	300 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 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 ±0.3 mm	±5%	2222 383 30...	preferred
	l_t = 5.0 ±1.0 mm	±5%	2222 383 31...	on request
	l_t = 25.0 ±2.0 mm	±5%	2222 383 34...	on request
Taped on reel	H = 18.5 mm; P_0 = 12.7 mm; note 2	±5%	2222 383 32...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*; taped on reel pitch = 27.5 mm is not available.
2. H = in-tape height; P_0= sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse double sided metallized polypropylene film capacitor

MMKP 383

U_{Rdc} = 1000 V; U_{Rac} = 350 V/U_{p-p} = 1000 V

C (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER[1] LOOSE IN BOX l_t = 3.5 ±0.3 mm C-tol = ±5%
Pitch = 22.5 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.068	7.0 × 16.5 × 26.0	3.5	2222 383 30**683**
0.075	8.5 × 18.0 × 26.0	4.8	2222 383 30**753**
0.082			2222 383 30**823**
0.091			2222 383 30**913**
0.1	10.0 × 19.5 × 26.0	6.0	2222 383 30**104**
0.11			2222 383 30**114**
0.12			2222 383 30**124**
0.13			2222 383 30**134**
Pitch = 27.5 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.15	11.0 × 21.0 × 31.0	8.4	2222 383 30**154**
0.16			2222 383 30**164**
0.18			2222 383 30**184**
0.2	13.0 × 23.0 × 31.0	11.0	2222 383 30**204**
0.22			2222 383 30**224**
0.24			2222 383 30**244**
0.27	15.0 × 25.0 × 31.0	13.6	2222 383 30**274**
0.3			2222 383 30**304**
0.33			2222 383 30**334**
0.36	18.0 × 28.0 × 31.0	18.5	2222 383 30**364**
0.39			2222 383 30**394**
0.43			2222 383 30**434**
0.47			2222 383 30**474**

Note

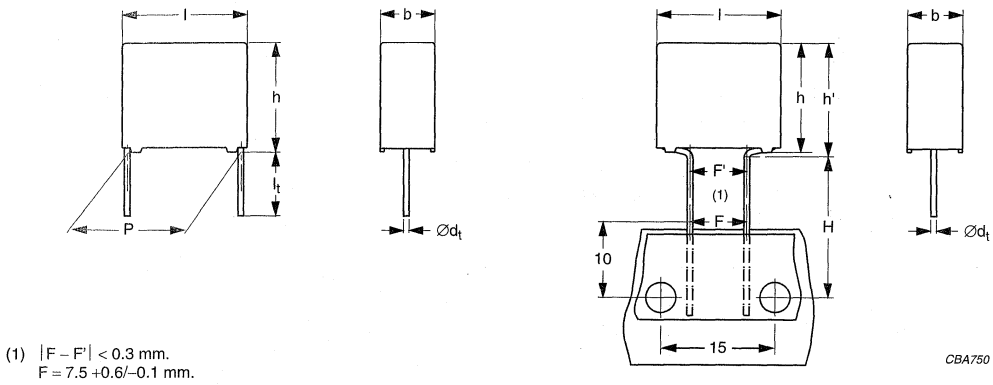
1. The shading indicates preferred types.

AC and pulse double sided metallized polypropylene film capacitor

MMKP 383

MMKP 383 GENERAL DATA

PITCH 15 mm
PITCH 7.5 mm (bent back leads)



(1) $|F - F'| < 0.3$ mm.
$F = 7.5 +0.6/-0.1$ mm.

Fig.12 Outline.

Specific reference data for the 1400 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: C ≤ 0.016 μF	$\leq 5 \times 10^{-4}$	$\leq 10 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 1400 V (DC)	8000 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	>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	$l_t = 3.5 \pm 0.3$ mm	±5%	2222 383 40...	preferred
	$l_t = 5.0 \pm 1.0$ mm	±5%	2222 383 41...	on request
	$l_t = 25.0 \pm 2.0$ mm	±5%	2222 383 44...	on request
Taped on reel	H = 18.5 mm; for $P_0 = 12.7$ mm; note 2	±5%	2222 383 42...	on request
Taped on reel (bent back)	H = 16.0 mm; for $P_0 = 15.0$ mm; note 2	±5%	2222 383 43...	preferred

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse double sided metallized polypropylene film capacitor

MMKP 383

U_{Rdc} = 1400 V; U_{Rac} = 500 V/U_{p-p} = 1400 V

C (µF)	DIMENSIONS[1] b × h (h') × l (mm)	MASS (g)	CATALOGUE NUMBER	
			LOOSE IN BOX	REEL DIAMETER = 500 mm; H = 16.0 mm; P_0 = 15.0 mm[2]
			l_t = 3.5 ±0.3 mm	pitch 7.5 mm (bent back)
			C-tol = ±5%	C-tol = ±5%
			catalogue number[3]	last 5 digits[3]
Pitch = 15.0 ±0.4 mm; (pitch = 7.5 ±0.4 mm for bent back leads); d_t = 0.80 ±0.08 mm				
0.0022	5.0 × 11.0 (13.0) × 17.5	1.2	2222 383 40**222**	.. 43**222**
0.0024			2222 383 40**242**	.. 43**242**
0.0027			2222 383 40**272**	.. 43**272**
0.003			2222 383 40**302**	.. 43**302**
0.0033			2222 383 40**332**	.. 43**332**
0.0036			2222 383 40**362**	.. 43**362**
0.0039			2222 383 40**392**	.. 43**392**
0.0043	6.0 × 12.0 (14.0) × 17.5	1.5	2222 383 40**432**	.. 43**432**
0.0047			2222 383 40**472**	.. 43**472**
0.0051			2222 383 40**512**	.. 43**512**
0.0056			2222 383 40**562**	.. 43**562**
0.0062	7.0 × 13.5 (15.5) × 17.5	2.0	2222 383 40**622**	.. 43**622**
0.0068			2222 383 40**682**	.. 43**682**
0.0075			2222 383 40**752**	.. 43**752**
0.0082			2222 383 40**822**	.. 43**822**
0.0091	8.5 × 15.0 (17.0) × 17.5	2.7	2222 383 40**912**	.. 43**912**
0.01			2222 383 40**103**	.. 43**103**
0.011			2222 383 40**113**	.. 43**113**
0.012			2222 383 40**123**	.. 43**123**
0.013	10.0 × 16.5 (18.5) × 17.5	3.3	2222 383 40**133**	.. 43**133**
0.015			2222 383 40**153**	.. 43**153**
0.016			2222 383 40**163**	.. 43**163**

Notes

1. Dimensions in brackets for bent back leads.
2. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*:
   a) For pitch = 15.0 mm: H = 18.5 mm and P_0 = 12.7 mm.
   b) For pitch = 15/7.5 mm (bent back): H = 16.0 mm and P_0 = 15.0 mm.
   Standard reel diameter = 500 mm. Small reel diameter = 356 mm is available on request.
3. The shading indicates preferred types.

AC and pulse double sided metallized polypropylene film capacitor

MMKP 383

MMKP 383 GENERAL DATA

PITCH 22.5/27.5 mm

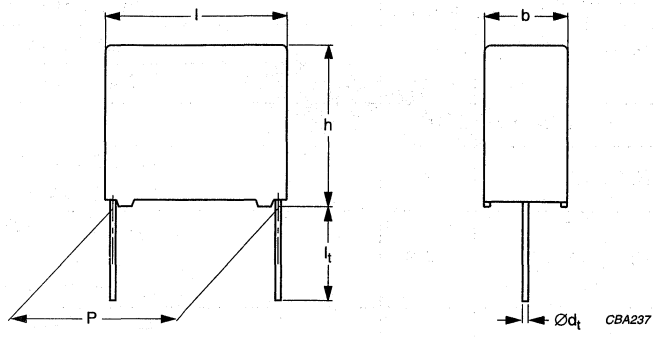


Fig.13 Outline.

Specific reference data for the 1400 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
0.016 µF < C ≤ 0.039 µF	$\leq 5 \times 10^{-4}$	$\leq 15 \times 10^{-4}$
0.039 µF < C ≤ 0.13 µF	$\leq 5 \times 10^{-4}$	$\leq 20 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 1400 V (DC):		
P = 22.5 mm	4000 V/µs	
P = 27.5 mm (b < 15 mm)	2100 V/µs	
P = 27.5 mm (b ≥ 15 mm)	1100 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	>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 ±0.3 mm	±5%	2222 383 40...	preferred
	l_t = 5.0 ±1.0 mm	±5%	2222 383 41...	on request
	l_t = 25.0 ±2.0 mm	±5%	2222 383 44...	on request
Taped on reel	H = 18.5 mm; P_0 = 12.7 mm; note 2	±5%	2222 383 42...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*; taped on reel pitch = 27.5 mm is not available.
2. H = in-tape height; P_0= sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse double sided metallized polypropylene film capacitor

MMKP 383

U_{Rdc} = 1400 V; U_{Rac} = 500 V/U_{p-p} = 1400 V

C (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER[1] LOOSE IN BOX l_t = 3.5 ±0.3 mm C-tol = ±5%
Pitch = 22.5 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.018	7.0 × 16.5 × 26.0	3.5	2222 383 40**183**
0.02			2222 383 40**203**
0.022	8.5 × 18.0 × 26.0	4.8	2222 383 40**223**
0.024			2222 383 40**243**
0.027			2222 383 40**273**
0.03	10.0 × 19.5 × 26.0	6.0	2222 383 40**303**
0.033			2222 383 40**333**
0.036			2222 383 40**363**
0.039			2222 383 40**393**
Pitch = 27.5 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.043	11.0 × 21.0 × 31.0	8.4	2222 383 40**433**
0.047			2222 383 40**473**
0.051			2222 383 40**513**
0.056			2222 383 40**563**
0.062	13.0 × 23.0 × 31.0	11.0	2222 383 40**623**
0.068			2222 383 40**683**
0.075			2222 383 40**753**
0.082	15.0 × 25.0 × 31.0	13.6	2222 383 40**823**
0.091			2222 383 40**913**
0.1			2222 383 40**104**
0.11	18.0 × 28.0 × 31.0	11.0	2222 383 40**114**
0.12			2222 383 40**124**
0.13			2222 383 40**134**

Note

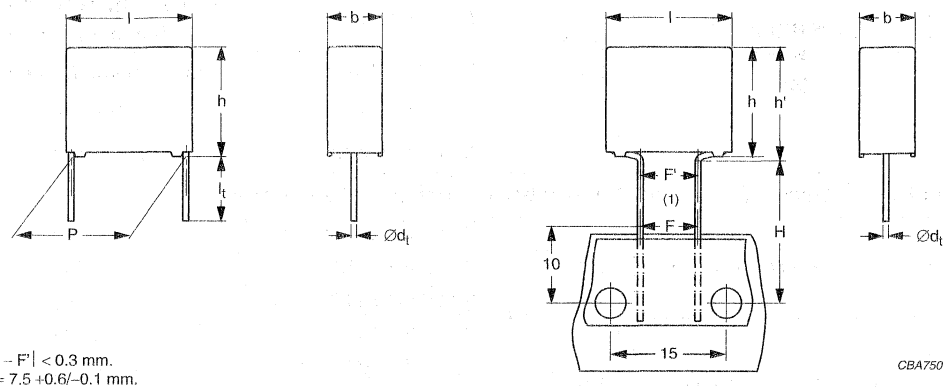
1. The shading indicates preferred types.

AC and pulse double sided metallized polypropylene film capacitor

MMKP 383

MMKP 383 GENERAL DATA

PITCH 15 mm
PITCH 7.5 mm (bent back leads)



(1) $|F - F'| < 0.3$ mm.
F = 7.5 +0.6/–0.1 mm.

Fig.14 Outline.

Specific reference data for the 1600 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: $C \leq 0.015$ µF	$\leq 5 \times 10^{-4}$	$\leq 15 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 1600 V (DC)	8000 V/µs	
R between leads, for $C \leq 1$ 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	>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	$l_t = 3.5 \pm 0.3$ mm	±5%	2222 383 50...	preferred
	$l_t = 5.0 \pm 1.0$ mm	±5%	2222 383 51...	on request
	$l_t = 25.0 \pm 2.0$ mm	±5%	2222 383 54...	on request
Taped on reel	H = 18.5 mm; P_0 = 12.7 mm; note 2	±5%	2222 383 52...	on request
Taped on reel (bent back)	H = 16.0 mm; P_0 = 15.0 mm; note 2	±5%	2222 383 53...	preferred

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse double sided metallized polypropylene film capacitor

MMKP 383

U_{Rdc} = 1600 V; U_{Rac} = 550 V/U_{p-p} = 1600 V

C (µF)	DIMENSIONS[1] b × h (h') × l (mm)	MASS (g)	CATALOGUE NUMBER	
			LOOSE IN BOX	REEL DIAMETER = 500 mm; H = 16.0 mm; P_0 = 15.0 mm[2]
			l_t = 3.5 ±0.3 mm	pitch 7.5 mm (bent back)
			C-tol = ±5%	C-tol = ±5%
			catalogue number[3]	last 5 digits[3]
Pitch = 15.0 ±0.4 mm; (pitch = 7.5 ±0.4 mm for bent back leads); d_t = 0.80 ±0.08 mm				
0.0033	5.0 × 11.0 (13.0) × 17.5	1.2	2222 383 50332	.. 53332
0.0036			2222 383 50362	.. 53362
0.0039			2222 383 50392	.. 53392
0.0043	6.0 × 12.0 (14.0) × 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 × 13.5 (15.5) × 17.5	2.0	2222 383 50622	.. 53622
0.0068			2222 383 50682	.. 53682
0.0075			2222 383 50752	.. 53752
0.0082	8.5 × 15.0 (17.0) × 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 × 16.5 (18.5) × 17.5	3.3	2222 383 50123	.. 53123
0.013			2222 383 50133	.. 53133
0.015			2222 383 50153	.. 53153

Notes

1. Dimensions in brackets for bent back leads.
2. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*:
   a) For pitch = 15.0 mm: H = 18.5 mm and P_0 = 12.7 mm.
   b) For pitch = 15/7.5 mm (bent back): H = 16.0 mm and P_0 = 15.0 mm.
   Standard reel diameter = 500 mm. Small reel diameter = 356 mm is available on request.
3. The shading indicates preferred types.

AC and pulse double sided metallized polypropylene film capacitor

MMKP 383

MMKP 383 GENERAL DATA

PITCH 22.5/27.5 mm

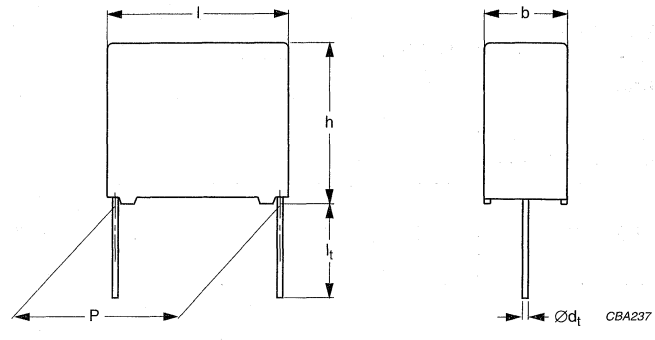


Fig.15 Outline.

Specific reference data for the 1600 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: 0.015 µF < C ≤ 0.15 µF	$\leq 5 \times 10^{-4}$	$\leq 20 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 1600 V (DC): P = 22.5 mm P = 27.5 mm (b < 15 mm) P = 27.5 mm (b ≥ 15 mm)	 3100 V/µs 1800 V/µs 900 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	>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 ±0.3 mm	±5%	2222 383 50...	preferred
	l_t = 5.0 ±1.0 mm	±5%	2222 383 51...	on request
	l_t = 25.0 ±2.0 mm	±5%	2222 383 54...	on request
Taped on reel	H = 18.5 mm; P_0 = 12.7 mm; note 2	±5%	2222 383 52...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*; taped on reel pitch = 27.5 mm is not available.
2. H = in-tape height; P_0= sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse double sided metallized polypropylene film capacitor

MMKP 383

U_{Rdc} = 1600 V; U_{Rac} = 550 V/U_{p-p} = 1600 V

C (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER[1] LOOSE IN BOX l_t = 3.5 ±0.3 mm C-tol = ±5%
Pitch = 22.5 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.016	7.0 × 16.5 × 26.0	3.5	2222 383 50**163**
0.018			2222 383 50**183**
0.02			2222 383 50**203**
0.022	8.5 × 18.0 × 26.0	4.8	2222 383 50**223**
0.024			2222 383 50**243**
0.027			2222 383 50**273**
0.03			2222 383 50**303**
0.033	10.0 × 19.5 × 26.0	6.0	2222 383 50**333**
0.036			2222 383 50**363**
0.039			2222 383 50**393**
Pitch = 27.5 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.043	11.0 × 21.0 × 31.0	8.4	2222 383 50**433**
0.047			2222 383 50**473**
0.051			2222 383 50**513**
0.056			2222 383 50**563**
0.062	13.0 × 23.0 × 31.0	11.0	2222 383 50**623**
0.068			2222 383 50**683**
0.075			2222 383 50**753**
0.082	15.0 × 25.0 × 31.0	13.6	2222 383 50**823**
0.091			2222 383 50**913**
0.1			2222 383 50**104**
0.11	18.0 × 28.0 × 31.0	18.5	2222 383 50**114**
0.12			2222 383 50**124**
0.13			2222 383 50**134**
0.15			2222 383 50**154**

Note

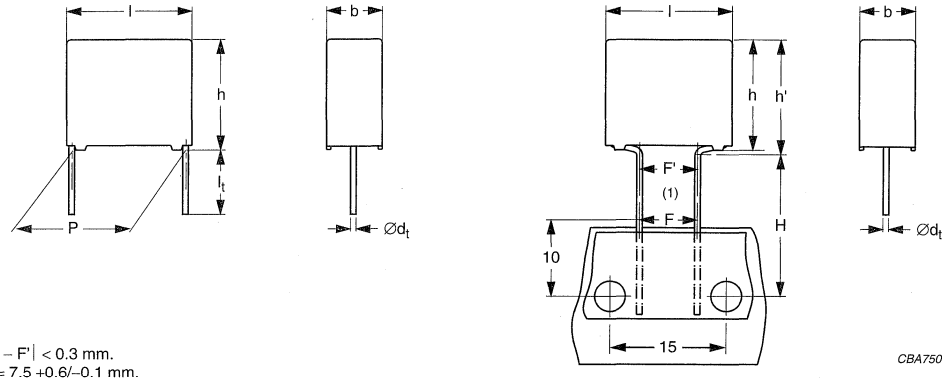
1. The shading indicates preferred types.

AC and pulse double sided metallized polypropylene film capacitor

MMKP 383

MMKP 383 GENERAL DATA

PITCH 15 mm
PITCH 7.5 mm (bent back leads)



(1) $|F - F'| < 0.3$ mm.
F = 7.5 +0.6/−0.1 mm.

Fig.16 Outline.

Specific reference data for the 2000 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: $C \leq 0.01\ \mu F$	$\leq 5 \times 10^{-4}$	$\leq 15 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 2000 V (DC)	11000 V/µs	
R between leads, for $C \leq 1\ \mu F$ at 500 V; 1 minute	>100000 MΩ	
R between leads and case; 500 V; 1 minute	>30000 MΩ	
Ionization (AC) voltage (typical value) at 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	$l_t = 3.5 \pm 0.3$ mm	±5%	2222 383 60...	preferred
	$l_t = 5.0 \pm 1.0$ mm	±5%	2222 383 61...	on request
	$l_t = 25.0 \pm 2.0$ mm	±5%	2222 383 64...	on request
Taped on reel	H = 18.5 mm; P_0 = 12.7 mm; note 2	+5%	2222 383 62...	on request
Taped on reel (bent back)	H = 16.0 mm; P_0 = 15.0 mm; note 2	±5%	2222 383 63...	preferred

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse double sided metallized polypropylene film capacitor

MMKP 383

U_{Rdc} = 2000 V; U_{Rac} = 700 V/U_{p-p} = 2000 V

C (µF)	DIMENSIONS[1] b × h (h') × l (mm)	MASS (g)	CATALOGUE NUMBER	
			LOOSE IN BOX	REEL DIAMETER = 500 mm; H = 16.0 mm; P_0 = 15.0 mm[2]
			l_t = 3.5 ±0.3 mm	pitch 7.5 mm (bent back)
			C-tol = ±5%	C-tol = ±5%
			catalogue number[3]	last 5 digits[3]
Pitch = 15.0 ±0.4 mm; (pitch = 7.5 ±0.4 mm for bent back leads); d_t = 0.80 ±0.08 mm				
0.001	5.0 × 11.0 (13.0) × 17.5	1.2	2222 383 60**102**	.. 63**102**
0.0011			2222 383 60**112**	.. 63**112**
0.0012			2222 383 60**122**	.. 63**122**
0.0013			2222 383 60**132**	.. 63**132**
0.0015			2222 383 60**152**	.. 63**152**
0.0016			2222 383 60**162**	.. 63**162**
0.0018			2222 383 60**182**	.. 63**182**
0.002			2222 383 60**202**	.. 63**202**
0.0022			2222 383 60**222**	.. 63**222**
0.0024			2222 383 60**242**	.. 63**242**
0.0027	6.0 × 12.0 (14.0) × 17.5	1.5	2222 383 60**272**	.. 63**272**
0.003			2222 383 60**302**	.. 63**302**
0.0033			2222 383 60**332**	.. 63**332**
0.0036			2222 383 60**362**	.. 63**362**
0.0039	7.0 × 13.5 (15.5) × 17.5	2.0	2222 383 60**392**	.. 63**392**
0.0043			2222 383 60**432**	.. 63**432**
0.0047			2222 383 60**472**	.. 63**472**
0.0051	8.5 × 15.0 (17.0) × 17.5	2.7	2222 383 60**512**	.. 63**512**
0.0056			2222 383 60**562**	.. 63**562**
0.0062			2222 383 60**622**	.. 63**622**
0.0068			2222 383 60**682**	.. 63**682**
0.0075	10.0 × 16.5 (18.5) × 17.5	3.3	2222 383 60**752**	.. 63**752**
0.0082			2222 383 60**822**	.. 63**822**
0.0091			2222 383 60**912**	.. 63**912**
0.01			2222 383 60**103**	.. 63**103**

Notes

1. Dimensions in brackets for bent back leads.
2. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*:
   a) For pitch = 15.0 mm: H = 18.5 mm and P_0 = 12.7 mm.
   b) For pitch = 15/7.5 mm (bent back): H = 16.0 mm and P_0 = 15.0 mm.
   Standard reel diameter = 500 mm. Small reel diameter = 356 mm is available on request.
3. The shading indicates preferred types.

AC and pulse double sided metallized polypropylene film capacitor

MMKP 383

MMKP 383 GENERAL DATA

PITCH 22.5/27.5 mm

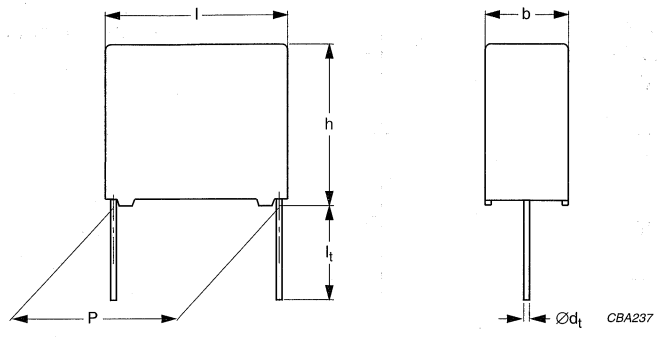


Fig.17 Outline.

Specific reference data for the 2000 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: 0.01 µF < C ≤ 0.1 µF	$\leq 5 \times 10^{-4}$	$\leq 18 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 2000 V (DC): P = 22.5 mm P = 27.5 mm (b < 15 mm) P = 27.5 mm (b ≥ 15 mm)	 4400 V/µs 2500 V/µs 1200 V/µs (b ≥ 15 mm)	
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	>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 ±0.3 mm	±5%	2222 383 60...	preferred
	l_t = 5.0 ±1.0 mm	±5%	2222 383 61...	on request
	l_t = 25.0 ±2.0 mm	±5%	2222 383 64...	on request
Taped on reel	H = 18.5 mm; P_0 = 12.7 mm; note 2	±5%	2222 383 62...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*; taped on reel pitch = 27.5 mm is not available.
2. H = in-tape height; P_0= sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse double sided metallized polypropylene film capacitor

MMKP 383

U_{Rdc} = 2000 V; U_{Rac} = 700 V/U_{p-p} = 2000 V

C (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER[1] LOOSE IN BOX l_t = 3.5 ±0.3 mm C-tol = ±5%
Pitch = 22.5 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.011	7.0 × 16.5 × 26.0	3.5	2222 383 60**113**
0.012			2222 383 60**123**
0.013			2222 383 60**133**
0.015	8.5 × 18.0 × 26.0	4.8	2222 383 60**153**
0.016			2222 383 60**163**
0.018			2222 383 60**183**
0.02	10.0 × 19.5 × 26.0	6.0	2222 383 60**203**
0.022			2222 383 60**223**
0.024			2222 383 60**243**
Pitch = 27.5 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.027	11.0 × 21.0 × 31.0	8.4	2222 383 60**273**
0.03			2222 383 60**303**
0.033			2222 383 60**333**
0.036			2222 383 60**363**
0.039			2222 383 60**393**
0.043	13.0 × 23.0 × 31.0	11.0	2222 383 60**433**
0.047			2222 383 60**473**
0.051			2222 383 60**513**
0.056	15.0 × 25.0 × 31.0	13.6	2222 383 60**563**
0.062			2222 383 60**623**
0.068			2222 383 60**683**
0.075	18.0 × 28.0 × 31.0	18.5	2222 383 60**753**
0.082			2222 383 60**823**
0.091			2222 383 60**913**
0.1			2222 383 60**104**

Note

1. The shading indicates preferred types.

AC and pulse double sided metallized polypropylene film capacitor

MMKP 383

MMKP 383 GENERAL DATA

PITCH 22.5 mm

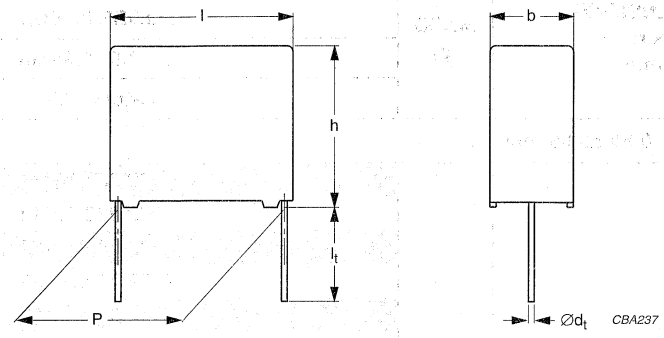


Fig.18 Outline.

Specific reference data for the 2500 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: C ≤ 0.015 µF	$\leq 5 \times 10^{-4}$	$\leq 10 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 2500 V (DC)	13000 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	>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(1)	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	l_t = 3.5 ±0.3 mm	±5%	2222 383 70...	preferred
	l_t = 5.0 ±1.0 mm	±5%	2222 383 71...	on request
	l_t = 25.0 ±2.0 mm	±5%	2222 383 74...	on request
Taped on reel	H = 18.5 mm; P_0 = 12.7 mm; note 2	±5%	2222 383 72...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; P_0= sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse double sided metallized polypropylene film capacitor

MMKP 383

U_{Rdc} = 2500 V; U_{Rac} = 900 V/U_{p-p} = 2500 V

C (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER(1) LOOSE IN BOX l_t = 3.5 ±0.3 mm C-tol = ±5%
Pitch = 22.5 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.001	6.0 × 15.5 × 26.0	3.0	2222 383 70**102**
0.0011			2222 383 70**112**
0.0012			2222 383 70**122**
0.0013			2222 383 70**132**
0.0015			2222 383 70**152**
0.0016			2222 383 70**162**
0.0018			2222 383 70**182**
0.002			2222 383 70**202**
0.0022			2222 383 70**222**
0.0024			2222 383 70**242**
0.0027			2222 383 70**272**
0.003			2222 383 70**302**
0.0033			2222 383 70**332**
0.0036			2222 383 70**362**
0.0039			2222 383 70**392**
0.0043			2222 383 70**432**
0.0047			2222 383 70**472**
0.0051			2222 383 70**512**
0.0056			2222 383 70**562**
0.0062	7.0 × 16.5 × 26.0	3.5	2222 383 70**622**
0.0068			2222 383 70**682**
0.0075			2222 383 70**752**
0.0082	8.5 × 18.0 × 26.0	4.8	2222 383 70**822**
0.0091			2222 383 70**912**
0.01			2222 383 70**103**
0.011			2222 383 70**113**
0.012	10.0 × 19.5 × 26.0	6.0	2222 383 70**123**
0.013			2222 383 70**133**
0.015			2222 383 70**153**

Note

1. The shading indicates preferred types.

AC and pulse double sided metallized polypropylene film capacitor

MMKP 383

MMKP 383 GENERAL DATA

PITCH 27.5 mm

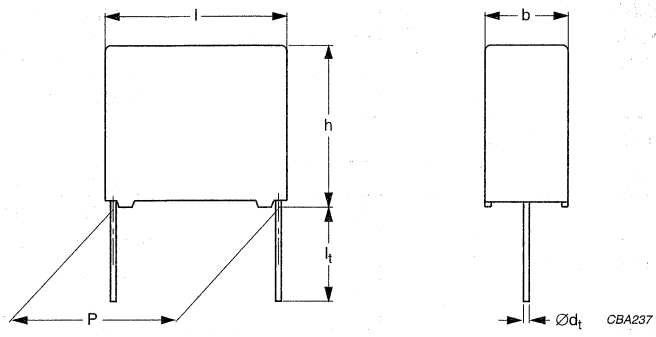


Fig.19 Outline.

Specific reference data for the 2500 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: 0.015 µF < C ≤ 0.056 µF	$\leq 5 \times 10^{-4}$	$\leq 15 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 2000 V (DC): P = 27.5 mm (b < 15 mm) P = 27.5 mm (b ≥ 15 mm)	 6000 V/µs 3000 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	>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(1)	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	l_t = 3.5 ±0.3 mm	±5%	2222 383 70...	preferred
	l_t = 5.0 ±1.0 mm	±5%	2222 383 71...	on request
	l_t = 25.0 ±2.0 mm	±5%	2222 383 74...	on request

Note

1. For SPQ refer to this handbook, chapter *"Packaging information"*.

AC and pulse double sided metallized polypropylene film capacitor

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U_{Rdc} = 2500 V; U_{Rac} = 900 V/U_{p-p} = 2500 V

C (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER(1)
			LOOSE IN BOX
			l_t = 3.5 ±0.3 mm
			C-tol = ±5%
Pitch = 27.5 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.016	9.0 × 19.0 × 31.0	6.0	2222 383 70**163**
0.018	11.0 × 21.0 × 31.0	8.4	2222 383 70**183**
0.02			2222 383 70**203**
0.022			2222 383 70**223**
0.024			2222 383 70**243**
0.027	13.0 × 23.0 × 31.0	11.0	2222 383 70**273**
0.03			2222 383 70**303**
0.033			2222 383 70**333**
0.036	15.0 × 25.0 × 31.0	13.6	2222 383 70**363**
0.039			2222 383 70**393**
0.043			2222 383 70**433**
0.047	18.0 × 28.0 × 31.0	18.5	2222 383 70**473**
0.051			2222 383 70**513**
0.056			2222 383 70**563**

Note

1. The shading indicates preferred types.

AC and pulse double sided metallized polypropylene film capacitor

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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:
  - Copper clad steel wire (original pitch = 15 mm)
  - Copper wire (original pitch = 22.5 and 27.5 mm)
- Small stand-off pips allow removal of solder flux etc. during cleaning of the printed-circuit board.

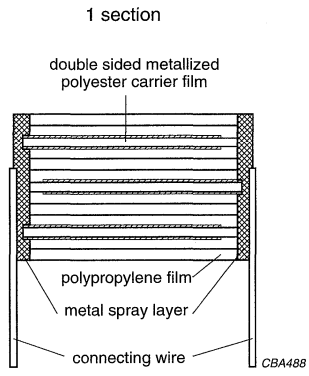

Fig.20 Construction: 250-400-630 V versions.

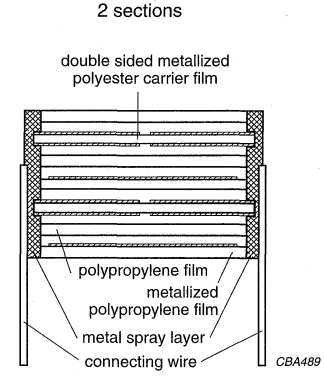

Fig.21 Construction: 1000 V-1400 V versions.

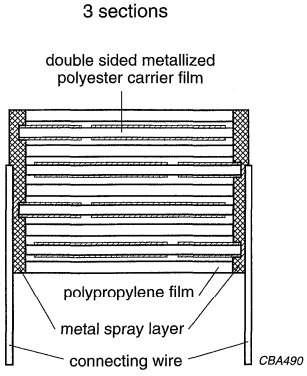

Fig.22 Construction: 1600 V-2000 V versions.

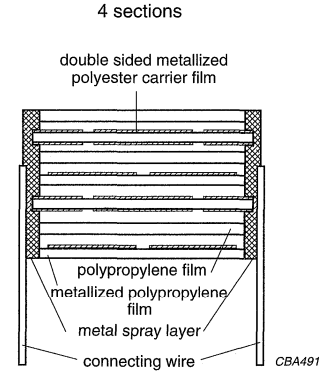

Fig.23 Construction: 2500 V version.

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.24:

- Eccentricity as in Fig.24. 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.

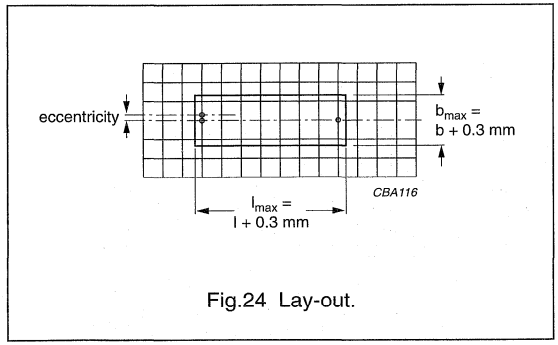

Fig.24 Lay-out.

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 ±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%.

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CHARACTERISTICS

Capacitance

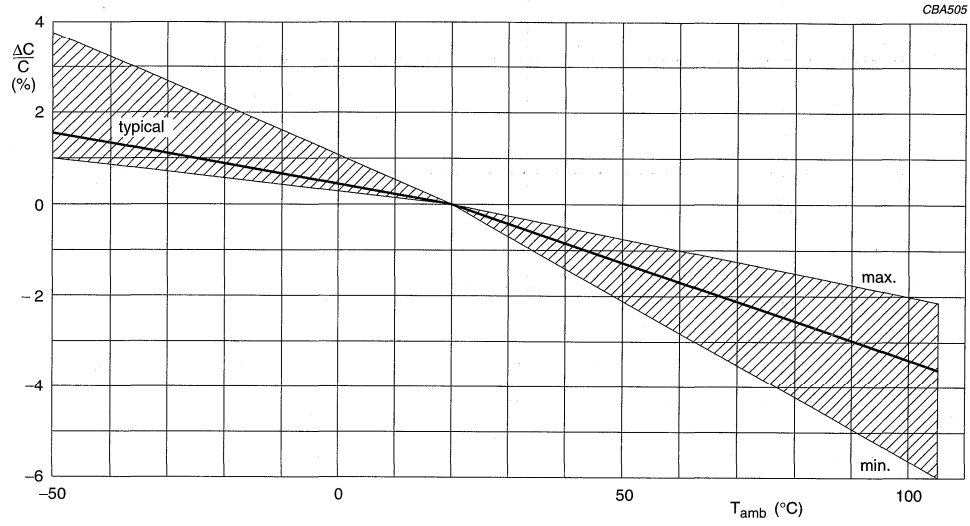

Fig.25 Capacitance change at 1 kHz as a function of ambient temperature.

Impedance

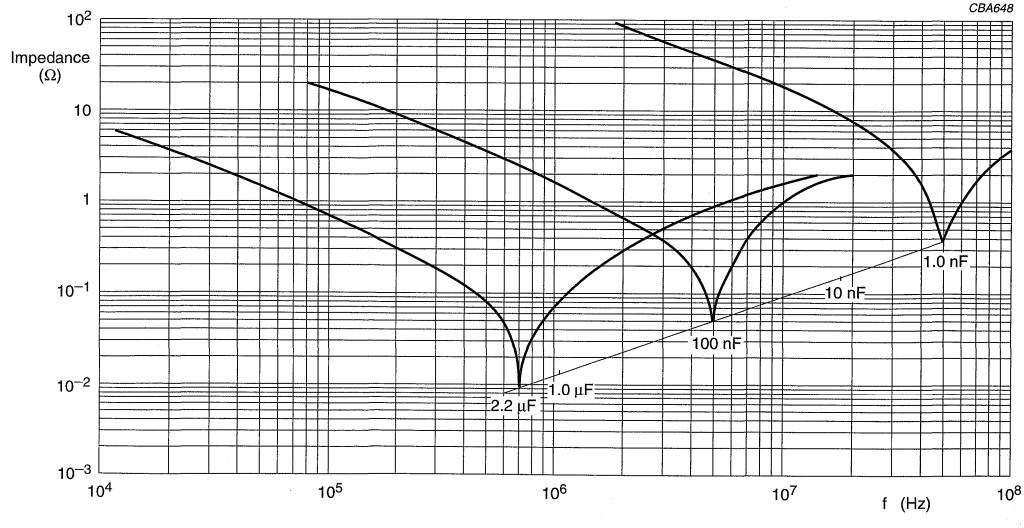

Fig.26 Impedance as a function of frequency: typical curves.

Maximum DC voltage as a function of temperature

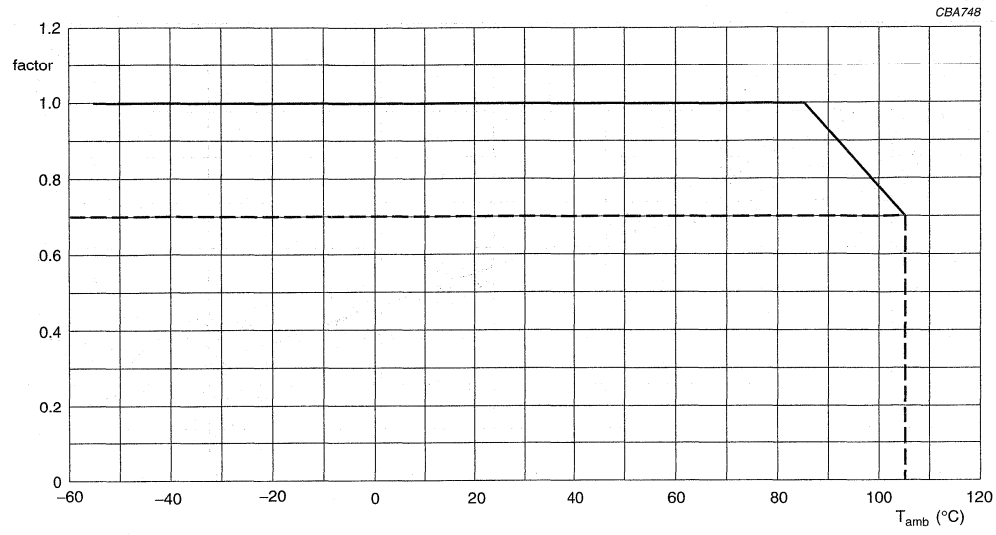

Fig.27 Multiplying factor as a function of temperature.

Maximum RMS voltage (sinewave) as a function of frequency

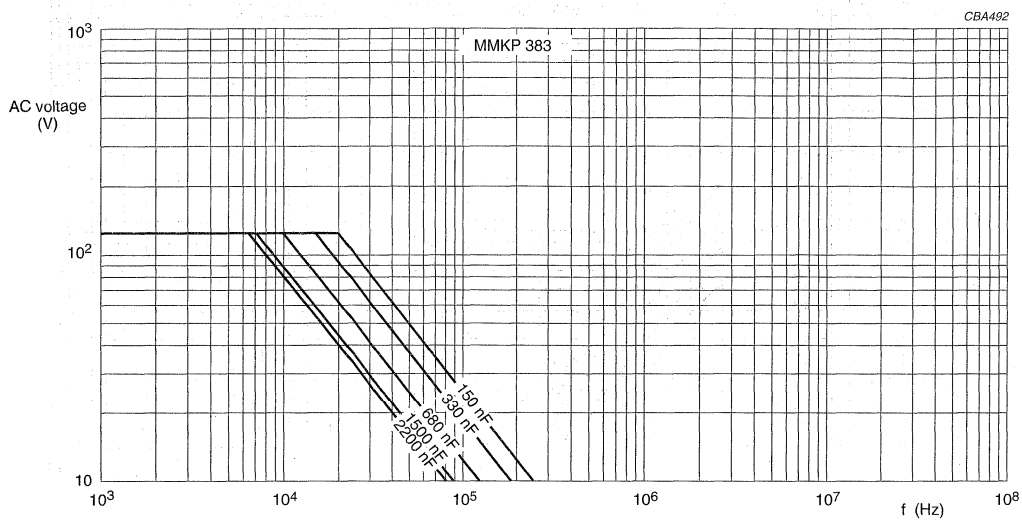

Fig.28 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C for $U_{Rdc} = 250$ V.

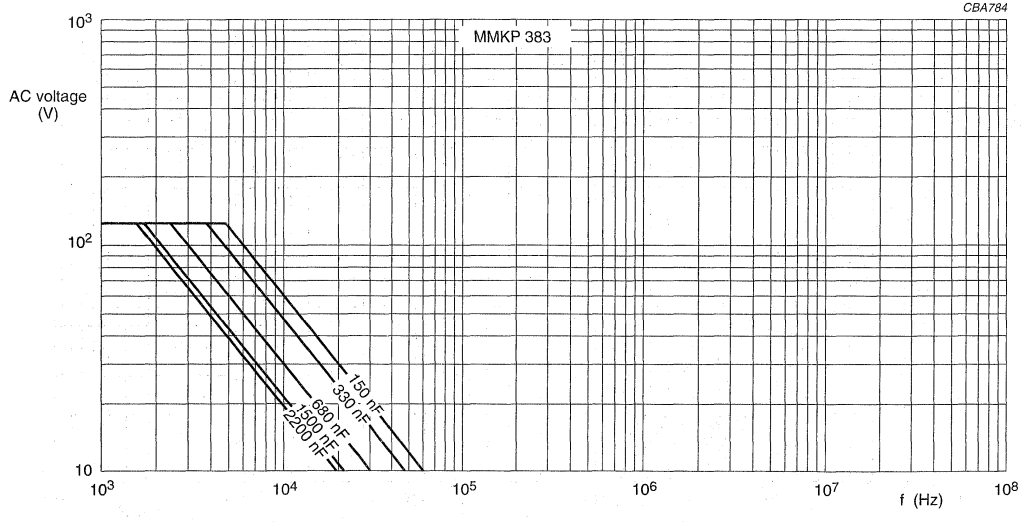

Fig.29 AC voltage (RMS value) as a function of frequency at 85 °C < $T_{amb} \leq 105$ °C for $U_{Rdc} = 250$ V.

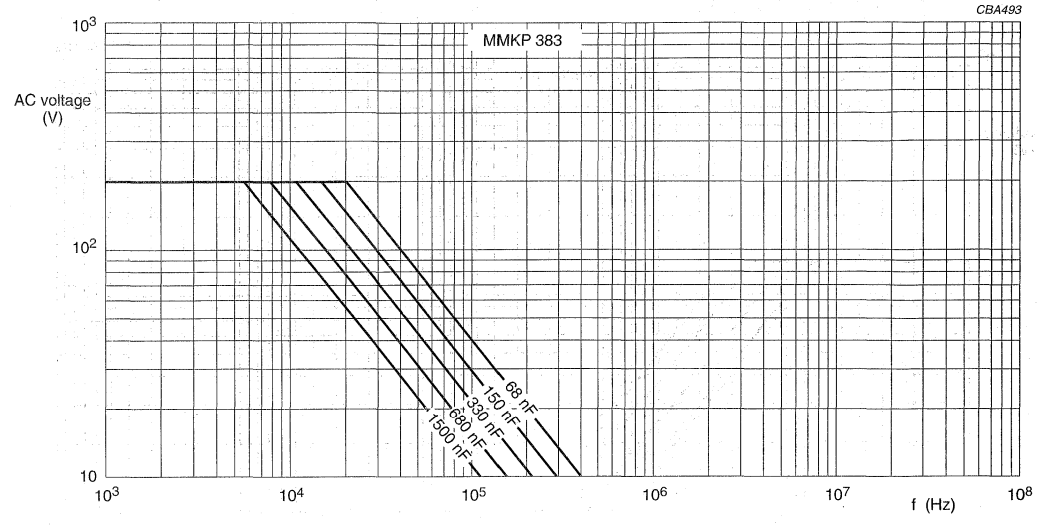

Fig.30 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C for $U_{Rdc} = 400$ V.

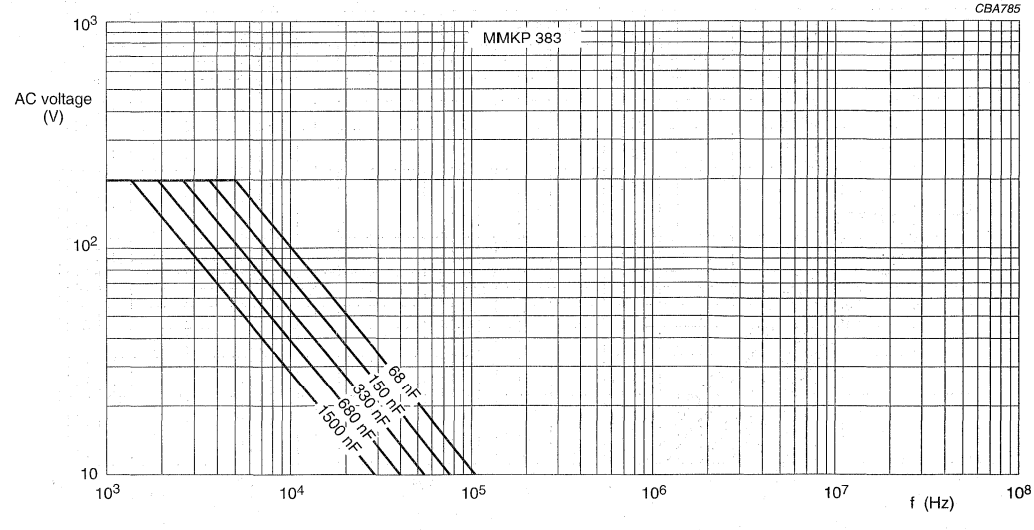

Fig.31 AC voltage (RMS value) as a function of frequency at 85 °C < $T_{amb} \leq 105$ °C for $U_{Rdc} = 400$ V.

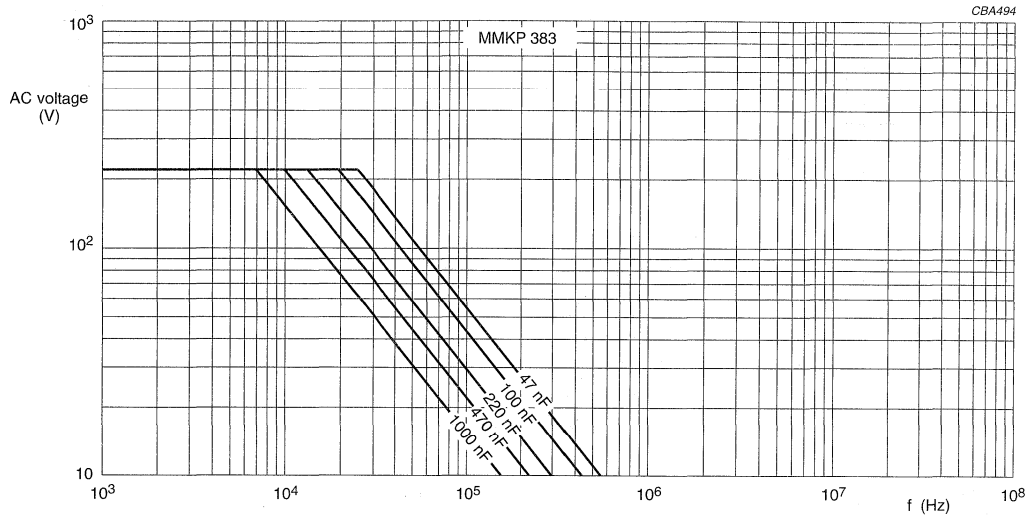

Fig.32 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C for $U_{Rdc} = 630$ V.

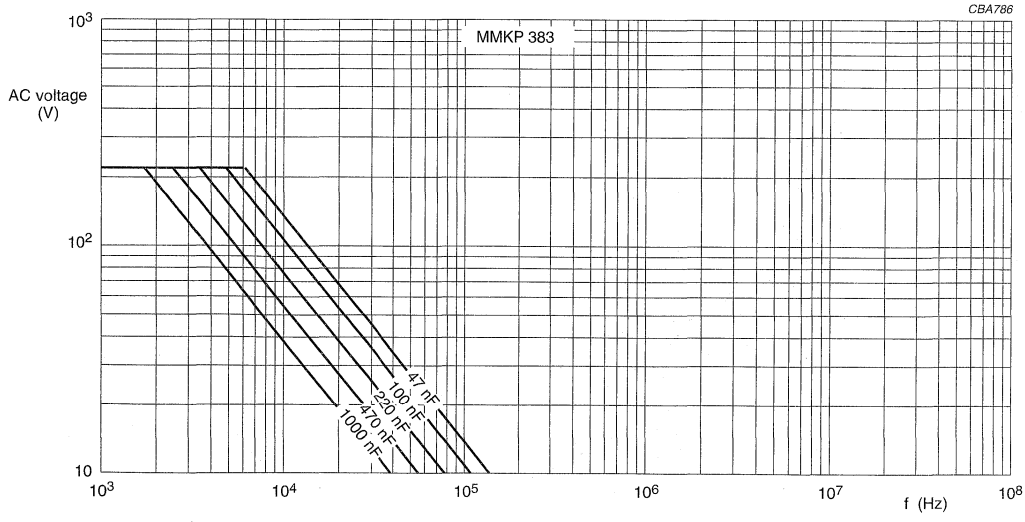

Fig.33 AC voltage (RMS value) as a function of frequency 85 °C < $T_{amb} \leq 105$ °C for $U_{Rdc} = 630$ V.

AC and pulse double sided metallized polypropylene film capacitor

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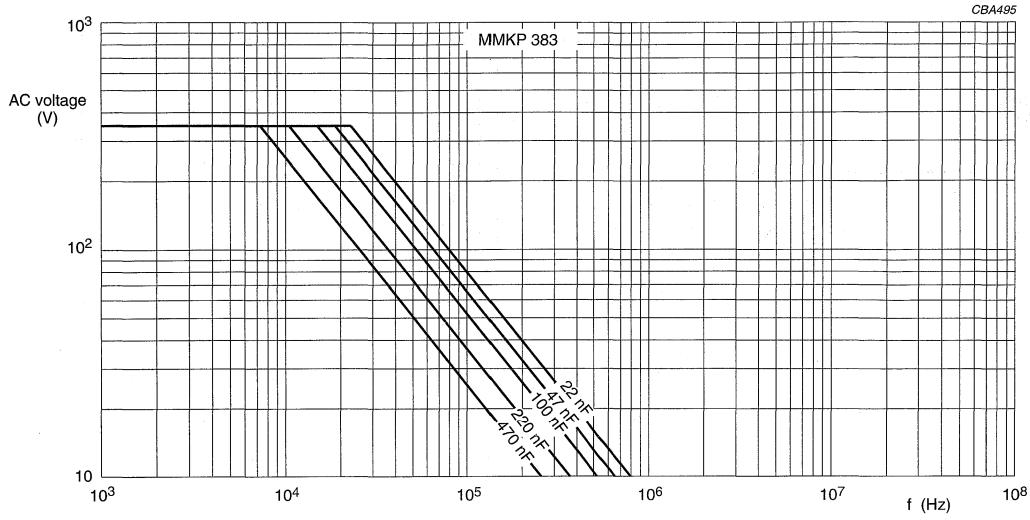

Fig.34 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C for $U_{Rdc} = 1000$ V.

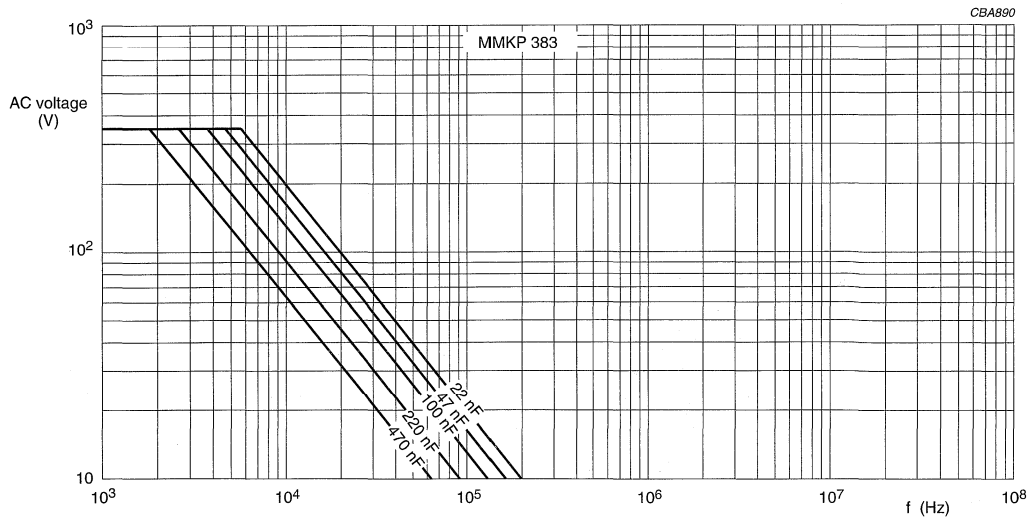

Fig.35 AC voltage (RMS value) as a function of frequency at 85 °C < $T_{amb} \leq 105$ °C for $U_{Rdc} = 1000$ V.

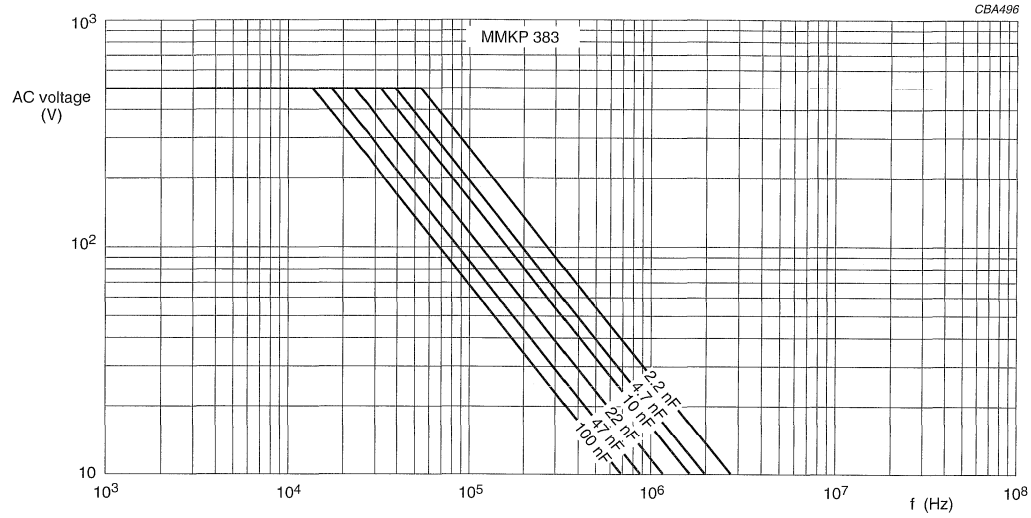

Fig.36 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C for $U_{Rdc} = 1400$ V.

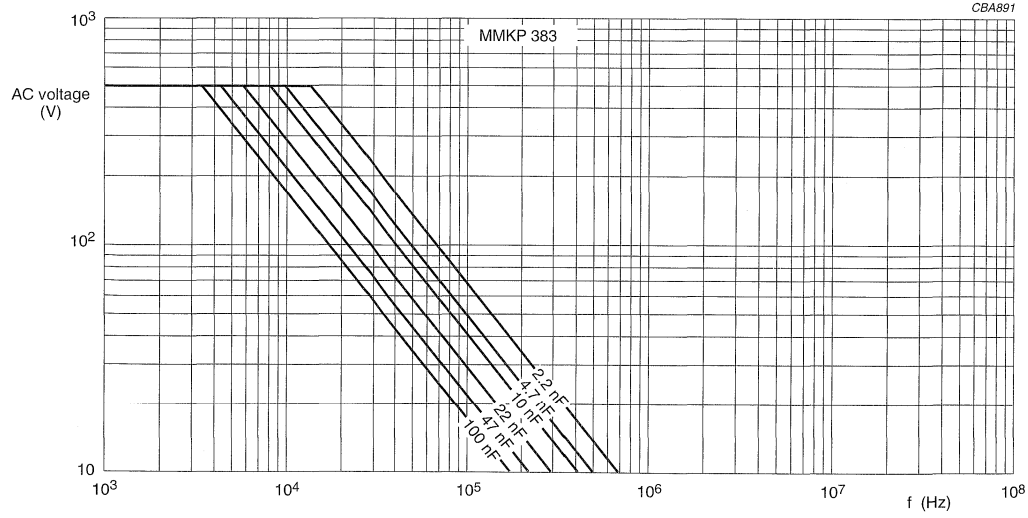

Fig.37 AC voltage (RMS value) at 85 °C < $T_{amb} \leq 105$ °C for $U_{Rdc} = 1400$ V.

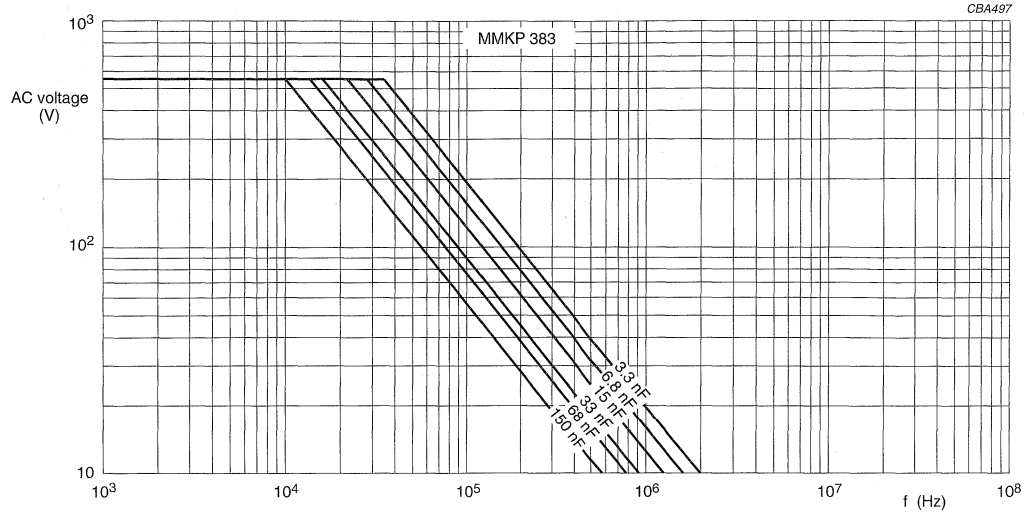

Fig.38 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C for $U_{Rdc} = 1600$ V.

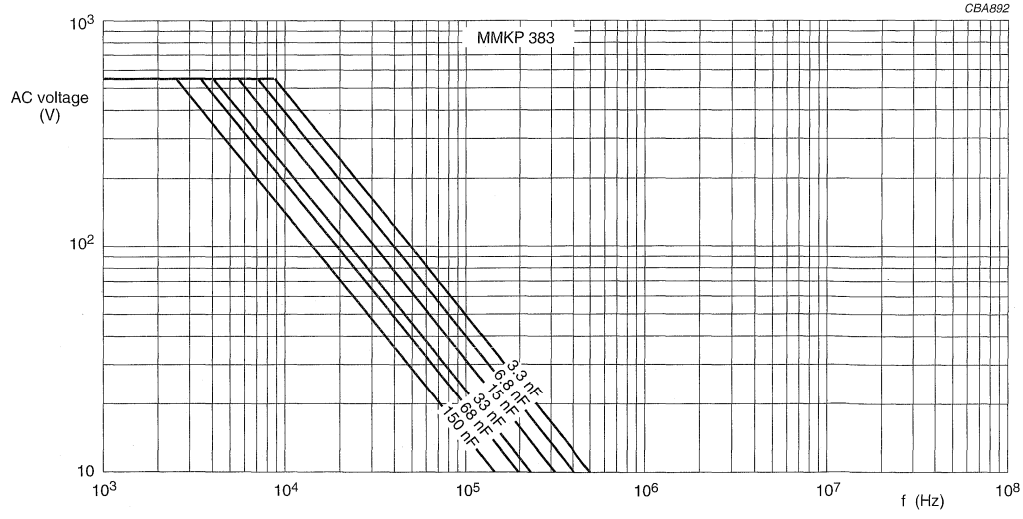

Fig.39 AC voltage (RMS value) as a function of frequency at 85 °C < $T_{amb} \leq 105$ °C for $U_{Rdc} = 1600$ V.

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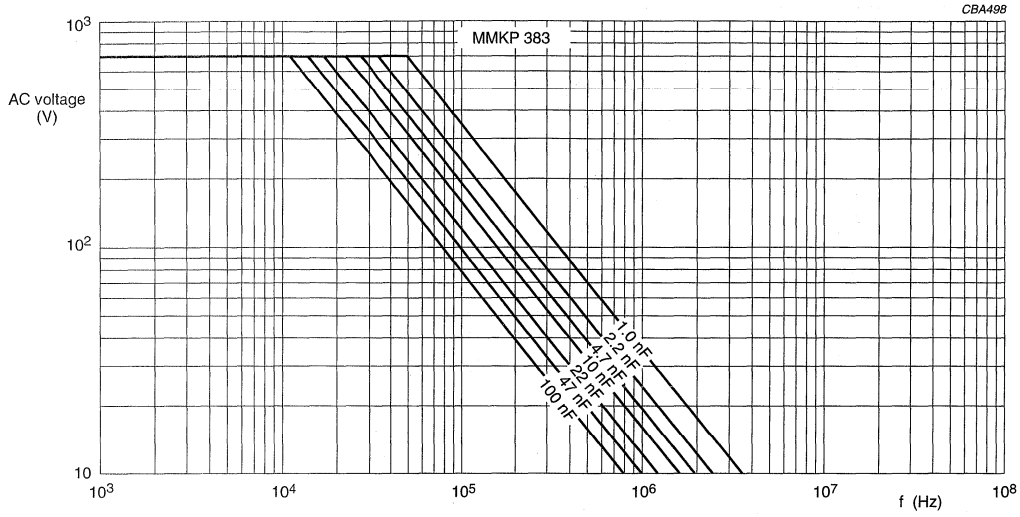

Fig.40 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C for $U_{Rdc} = 2000$ V.

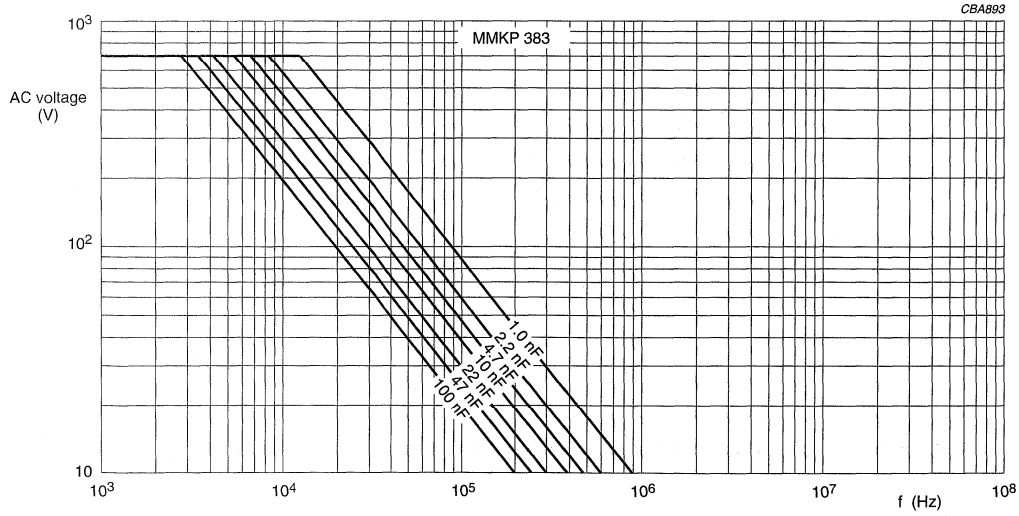

Fig.41 AC voltage (RMS value) as a function of frequency at 85 °C < $T_{amb} \leq 105$ °C for $U_{Rdc} = 2000$ V.

AC and pulse double sided metallized polypropylene film capacitor

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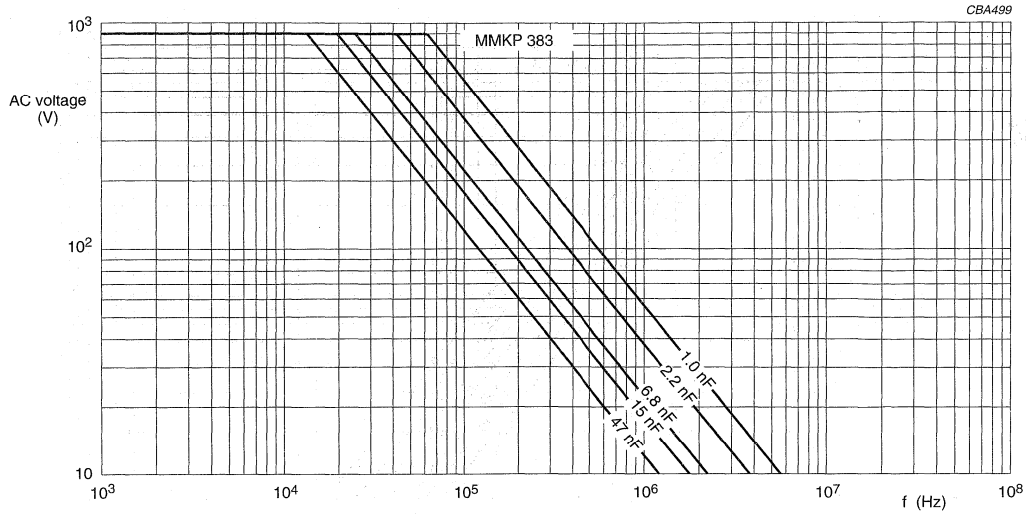

Fig.42 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C for $U_{Rdc} = 2500$ V.

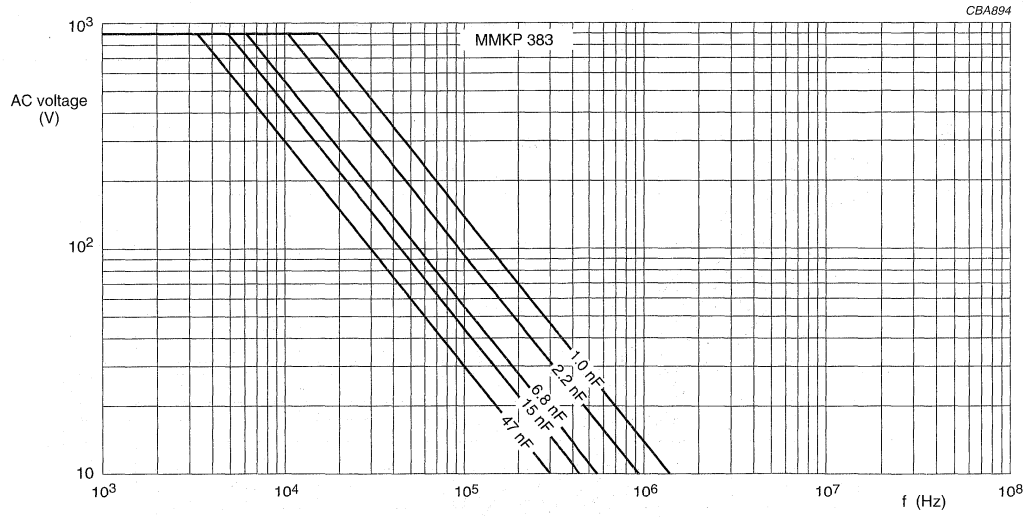

Fig.43 AC voltage (RMS value) as a function of frequency at 85 °C < $T_{amb} \leq 105$ °C for $U_{Rdc} = 2500$ V.

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 28 to 43.

Tangent of loss angle

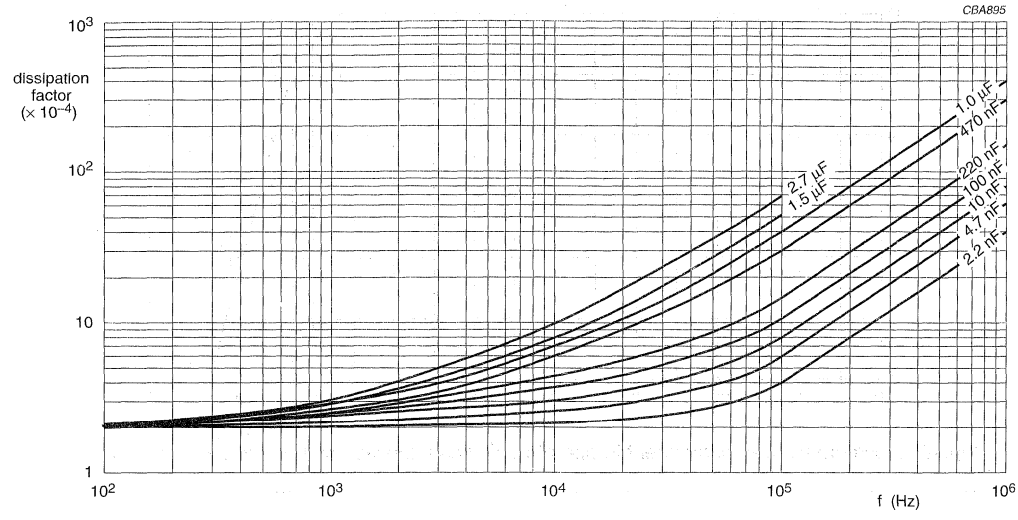

Fig.44 Tangent of loss angle as a function of frequency: typical curves.

Insulation resistance

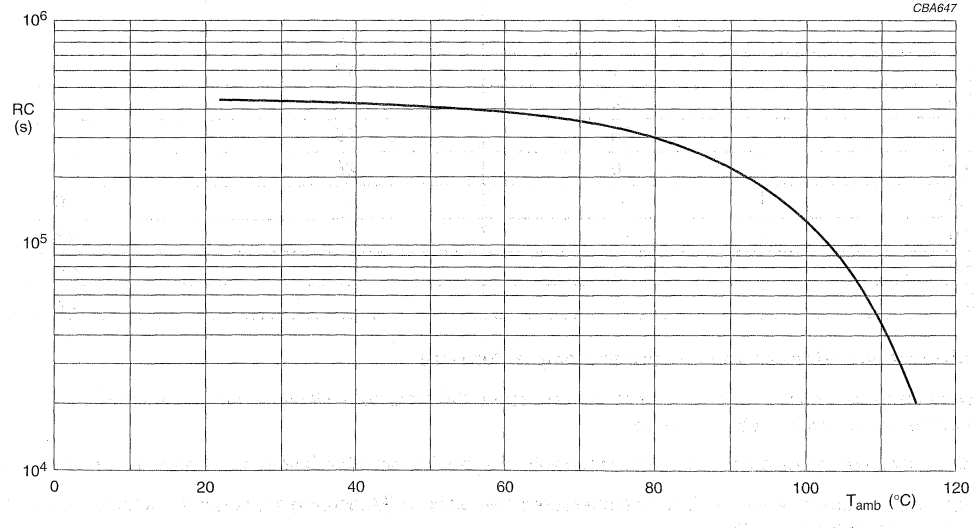

Fig.45 RC product as a function of ambient temperature: typical curve.

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

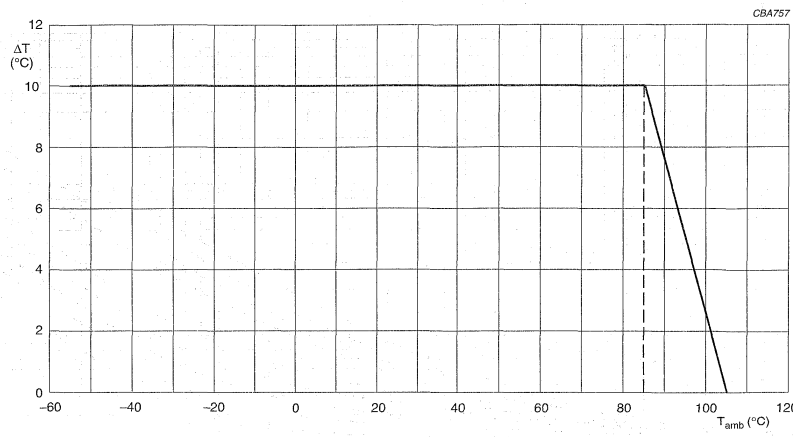

Fig.46 Maximum allowed component temperature rise as a function of the ambient temperature.

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)		
	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.

Power dissipation can be calculated in accordance with 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).

Measuring the component temperature

A thermocouple must be attached to the capacitor body; see Fig.47.

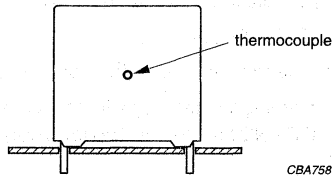

Fig.47 Mounting the thermocouple.

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.

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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 by safety standards and therefore electromagnetic interference suppression capacitors conforming to 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.46.
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	$T_{amb} \leq 85$ °C	85 °C < $T_{amb} \leq 105$ °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)	$1.6 \times U_{Rdc}$	$1.1 \times U_{Rdc}$

Example

C = 4n7 - 1600 V used for the voltage signal shown in Fig.48.

U_{p-p} = 1000 V; U_p = 900 V; T_1 = 12 µs; T_2 = 64 µs; T_3 = 4 µs

The ambient temperature is 80 °C. In case of failure, the oscillation is blocked.

Checking the conditions:

1. The peak voltage U_p = 900 V is lower than 1600 V (DC).
2. The peak-to-peak voltage 1000 V is lower than $2 \times \sqrt{2} \times 550$ V (AC) = 1600 U_{p-p}.
3. The voltage pulse slope dU/dt = 1000 V/4µs = 250 V/ µs.
   This is lower than 8000 V/µs (see specific reference data for each version).
4. The dissipated power is 109 mW as calculated with Fourier terms.

   The temperature rise for b_{max} = 6.0 and pitch = 15 mm will be $\frac{109 \text{ mW}}{11 \text{ mW/°C}} = 9.9$ °C.

   This is lower than 10 °C temperature rise at 80 °C, according Fig.46.
5. Oscillation is blocked.
6. Not applicable.

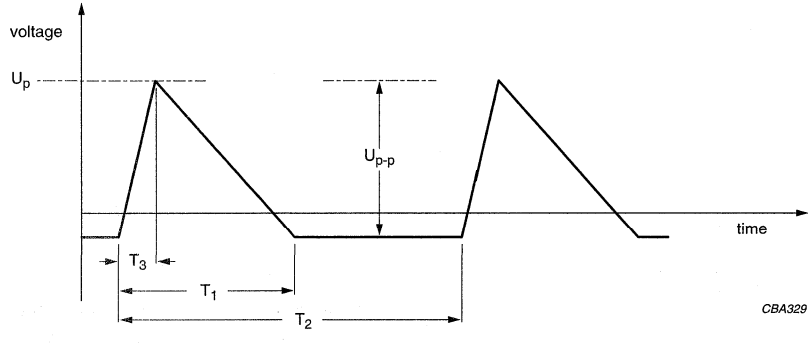


Fig.48 Voltage signal.

MARKING

Product marking

The capacitors are marked by laser print; on the top for original pitch ≥22.5 mm (see Fig.50) or on the top and one side for original pitch = 15 mm (see Fig.49), with the following information:

1. Rated capacitance code in accordance with *"IEC 60062"*
2. Tolerance on rated capacitance: J = ±5%
3. Rated (DC) voltage (e.g. 1000 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. 9703).

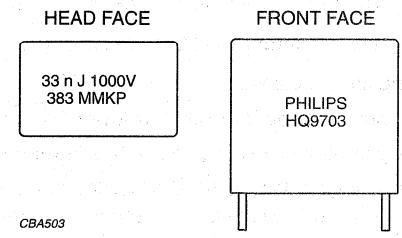


Fig.49 Example of marking for a capacitor with original pitch = 15 mm.

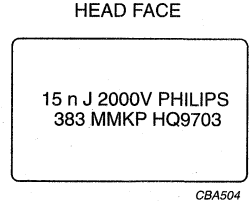
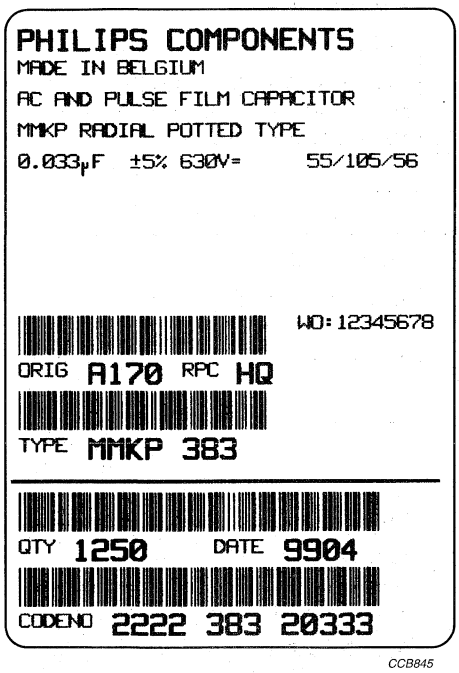


Fig.50 Example of marking for a capacitor with original pitch = 22.5 or 27.5 mm.

Package marking

The package containing the capacitors is marked as shown in Fig.51.

Please note:
In due time BC COMPONENTS
will replace PHILIPS COMPONENTS



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	–
7	Preference origin code: A Country of origin in code: 170 (Belgium) Responsible production centre: HQ WO: work order
8	Product type description
9	Quantity and production period, year and week code
10	Product code (12NC)

Fig.51 Barcode label.

AC and pulse double sided metallized polypropylene film capacitor

MMKP 383

QUICK REFERENCE TEST REQUIREMENTS (see note 1)

TEST	PROCEDURE (quick reference)	REQUIREMENTS
Robustness of leads		
Tensile strength: *"IEC 60068-2-21"*	load 10 N; 10 s	no visible damage legible marking $\lvert\Delta C/C\rvert \leq 1\%$ $\Delta\tan\delta \leq 5 \times 10^{-4}$ ($C \leq 100$ 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 × 90°	
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	$\lvert\Delta C/C\rvert \leq 1\%$ $\Delta\tan\delta \leq 5 \times 10^{-4}$ ($C \leq 100$ 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	$\lvert\Delta C/C\rvert \leq 2\%$ (original pitch = 22.5 or 27.5 mm) $\lvert\Delta C/C\rvert \leq 3\%$ (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	$\lvert\Delta C/C\rvert \leq 1\%$ $\Delta\tan\delta \leq 5 \times 10^{-4}$ ($C \leq 100$ 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 × U_{Rac} (RMS); 50 Hz; 105 °C	$\lvert\Delta C/C\rvert \leq 5\%$ $\Delta\tan\delta \leq 5 \times 10^{-4}$ ($C \leq 100$ 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 sided metallized polypropylene film capacitor

MMKP 383

TEST	PROCEDURE (quick reference)	REQUIREMENTS
Heat storage: *"IEC 60384-17"*	2000 hours; 105 °C	$\lvert\Delta C/C\rvert \leq 1\%$ (original pitch = 22.5 or 27.5 mm) $\lvert\Delta C/C\rvert \leq 2\%$ (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	$\lvert\Delta C/C\rvert \leq 1\%$ (original pitch = 22.5 or 27.5 mm) $\lvert\Delta C/C\rvert \leq 2\%$ (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	$\lvert\Delta C/C\rvert \leq 3\%$ for 250 V $\lvert\Delta C/C\rvert \leq 2\%$ 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

Note

1. For detailed information: see *"Type detail specification HQN-384-17/106"*.

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)

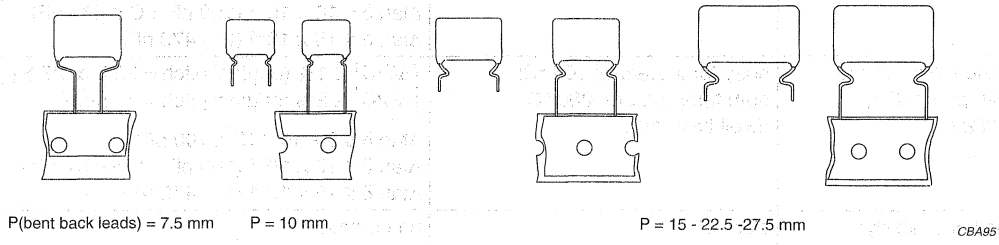


Fig.1 Simplified outlines.

FEATURES

- 10 to 27.5 mm lead pitch
- Supplied loose in box 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)	0.002 to 3.9 µF
Capacitance tolerance	±5%
Rated (DC) voltage	160 V; 250 V; 400 V; 630 V; 1000 V; 1250 V;1600 V; 2000 V; 2500 V
Rated (AC) voltage	100 V; 160 V; 200 V; 200 V; 350 V; 440 V; 550 V; 700 V; 900 V
Rated peak-to-peak voltage	280 V; 450 V; 560 V; 560 V; 1000 V; 1250 V; 1600 V; 2000 V; 2500 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

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

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

CAPACITANCE (numerically)

Example:
104 = 10 × 10 = 100 nF

2222	479	XX	XX	X

TYPE	PACKAGING	LEAD CONFIGURATION	C-TOL	160 V	250 V	250 V monitor type	400 V	400 V monitor type
479	loose in box	lead length 5.0 mm	±5%	32	42	41	52	51
		lead length 3.5 mm	±5%	34	44	43	54	53
	taped on reel	H = 16.0 mm; P_0 = 12.7 mm	±5%	35	45	47	55	57
	taped on reel (bent back)	H = 16.0 mm; P_0 = 15.0 mm	±5%	36	46	49	56	59

AC and pulse metallized polypropylene film capacitors

MKP 479

TYPE AND PITCHES	
479	15.0/7.5 mm
	10.0 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 × 10 = 100 nF

2222	479	XX	XX	X

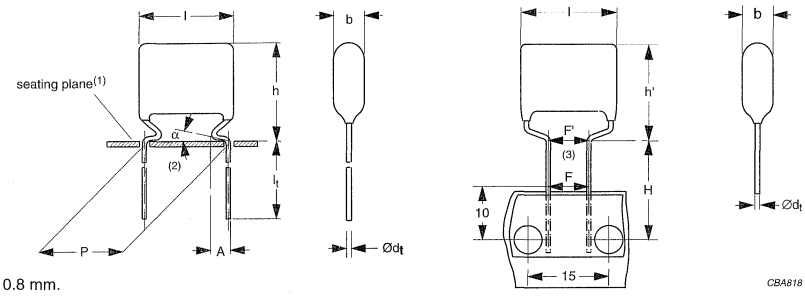
TYPE	PACKAGING	LEAD CONFIGURATION	C-TOL	630 V	1000 V	1250 V	1600 V	2000 V	2500 V
479	loose in box	lead length 5.0 mm	±5%	62	72	82	02	12	22
		lead length 3.5 mm	±5%	64	74	84	04	14	24
	taped on reel	H = 16.0 mm; P_0 = 12.7 mm	±5%	65	75	85	05	15	25
	taped on reel (bent back)	H = 16.0 mm; P_0 = 15.0 mm	±5%	66	76	86	06	16	–

AC and pulse metallized polypropylene film capacitors

MKP 479

MKP 479 GENERAL DATA

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



(1) Hole ∅1.3 for d_t = 0.8 mm.
(2) $0 \leq \alpha < 50°$.
(3) $|F - F'| < 0.3$ mm.
F = 7.5 +0.6/–0.1 mm.

Fig.4 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 µF	$\leq 5 \times 10^{-4}$	$\leq 20 \times 10^{-4}$
0.075 µF < C ≤ 0.11 µF	$\leq 5 \times 10^{-4}$	$\leq 25 \times 10^{-4}$
0.11 µF < C ≤ 0.18 µF	$\leq 10 \times 10^{-4}$	$\leq 30 \times 10^{-4}$
0.18 µF < C ≤ 0.3 µF	$\leq 10 \times 10^{-4}$	$\leq 35 \times 10^{-4}$
0.3 µF < C ≤ 0.39 µF	$\leq 10 \times 10^{-4}$	$\leq 40 \times 10^{-4}$
0.39 µF < C ≤ 0.56 µF	$\leq 10 \times 10^{-4}$	$\leq 45 \times 10^{-4}$
0.56 µF < C ≤ 0.68 µF	$\leq 10 \times 10^{-4}$	$\leq 50 \times 10^{-4}$
0.68 µF < C ≤ 0.75 µF	$\leq 10 \times 10^{-4}$	$\leq 55 \times 10^{-4}$
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 ≤ 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	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 ±1.0 mm	±5%	2222 479 32...	preferred
	l_t = 3.5 ±0.5 mm	±5%	2222 479 34...	on request
Taped on reel	H = 16.0 mm; P_0 = 12.7 mm; note 2	±5%	2222 479 35...	on request
Taped on reel (bent back)	H = 16.0 mm; P_0 = 15.0 mm; note 2	±5%	2222 479 36...	preferred

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse metallized polypropylene film capacitors

MKP 479

U_{Rdc} = 160 V; U_{Rac} = 100 V/U_{p-p} = 280 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; H = 16.0 mm; P_0 = 15.0 mm[2]
			l_t = 5.0 ±1.0 mm	pitch 7.5 mm (bent back)
			C-tol = ±5%	C-tol = ±5%
			catalogue number[3]	catalogue number[3]
Pitch = 10.0 ±0.4 mm; d_t = 0.60 ±0.06 mm; A = 2.0 +1.0/–0.5 mm				
0.075	6.0 × 15.0 × 12.5	0.9	2222 479 32**753**	not available
0.082			2222 479 32**823**	
0.091			2222 479 32**913**	
0.1			2222 479 32**104**	
0.11			2222 479 32**114**	
0.12			2222 479 32**124**	
0.13			2222 479 32**134**	
0.15	6.5 × 15.5 × 12.5	1.0	2222 479 32**154**	
0.16			2222 479 32**164**	
Pitch = 15.0 ±0.4 mm (pitch = 7.5 ±0.4 mm for bent back leads); d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/–0.5 mm				
0.18	6.0 × 15.0 (16.5) × 17.5	1.2	2222 479 32**184**	.. 36**184**
0.20	6.5 × 15.5 (17.0) × 17.5	1.3	2222 479 32**204**	.. 36**204**
0.22			2222 479 32**224**	.. 36**224**
0.24	7.0 × 16.0 (17.5) × 17.5	1.4	2222 479 32**244**	.. 36**244**
0.27			2222 479 32**274**	.. 36**274**
0.30			2222 479 32**304**	.. 36**304**
0.33			2222 479 32**334**	.. 36**334**
0.36			2222 479 32**364**	.. 36**364**
0.39			2222 479 32**394**	.. 36**394**
0.43	7.5 × 16.5 (18.0) × 17.5	1.5	2222 479 32**434**	.. 36**434**
0.47			2222 479 32**474**	.. 36**474**
0.51	8.0 × 17.0 (18.5) × 17.5	1.6	2222 479 32**514**	.. 36**514**
0.56			2222 479 32**564**	.. 36**564**
0.62	8.5 × 17.5 (19.0) × 17.5	1.7	2222 479 32**624**	.. 36**624**
0.68	9.0 × 18.0 (19.5) × 17.5	1.8	2222 479 32**684**	.. 36**684**
0.75	9.5 × 18.5 (20.0) × 17.5	1.9	2222 479 32**754**	.. 36**754**

Notes

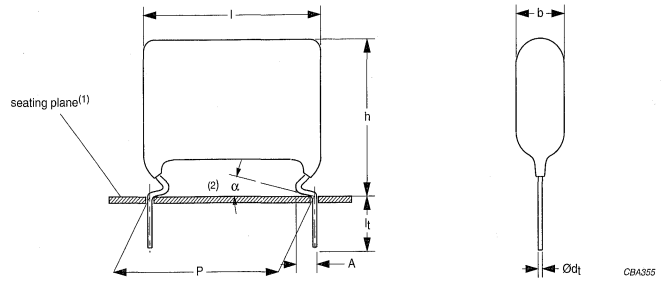
1. Dimensions in brackets for bent back leads.
2. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*:
   a) For pitch = 10.0 and 15.0 mm: H = 16.0 mm and P_0 = 12.7 mm.
   b) For pitch = 15/7.5 mm (bent back): H = 16.0 mm and P_0 = 15.0 mm.
   Standard reel diameter = 500 mm. Small reel diameter = 356 mm is available on request.
3. The shading indicates preferred types.

AC and pulse metallized polypropylene film capacitors

MKP 479

MKP 479 GENERAL DATA

PITCH 22.5/27.5 mm



(1) Hole Ø1.3 for d_t = 0.8 mm.
(2) $0 \leq \alpha < 50°$.

Fig.5 Outline.

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:			Tangent of loss angle:		
C = 0.82 µF	$\leq 10 \times 10^{-4}$	$\leq 55 \times 10^{-4}$	1.8 µF < C ≤ 2.0 µF	$\leq 10 \times 10^{-4}$	$\leq 95 \times 10^{-4}$
0.82 µF < C ≤ 0.91 µF	$\leq 10 \times 10^{-4}$	$\leq 60 \times 10^{-4}$	2.0 µF < C ≤ 2.2 µF	$\leq 10 \times 10^{-4}$	$\leq 100 \times 10^{-4}$
0.91 µF < C ≤ 1.0 µF	$\leq 10 \times 10^{-4}$	$\leq 65 \times 10^{-4}$	2.2 µF < C ≤ 2.4 µF	$\leq 15 \times 10^{-4}$	$\leq 105 \times 10^{-4}$
1.0 µF < C ≤ 1.2 µF	$\leq 10 \times 10^{-4}$	$\leq 70 \times 10^{-4}$	2.4 µF < C ≤ 2.7 µF	$\leq 15 \times 10^{-4}$	$\leq 110 \times 10^{-4}$
1.2 µF < C ≤ 1.3 µF	$\leq 10 \times 10^{-4}$	$\leq 75 \times 10^{-4}$	2.7 µF < C ≤ 3.0 µF	$\leq 15 \times 10^{-4}$	$\leq 115 \times 10^{-4}$
1.3 µF < C ≤ 1.5 µF	$\leq 10 \times 10^{-4}$	$\leq 80 \times 10^{-4}$	3.0 µF < C ≤ 3.3 µF	$\leq 15 \times 10^{-4}$	$\leq 125 \times 10^{-4}$
1.5 µF < C ≤ 1.6 µF	$\leq 10 \times 10^{-4}$	$\leq 85 \times 10^{-4}$	3.3 µF < C ≤ 3.6 µF	$\leq 15 \times 10^{-4}$	$\leq 130 \times 10^{-4}$
1.6 µF < C ≤ 1.8 µF	$\leq 10 \times 10^{-4}$	$\leq 90 \times 10^{-4}$	3.6 µF < C ≤ 3.9 µF	$\leq 15 \times 10^{-4}$	$\leq 135 \times 10^{-4}$
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 ≤ 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	>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	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 ±1.0 mm	±5%	2222 479 32...	preferred
	l_t = 3.5 ±0.5 mm	±5%	2222 479 34...	on request
Taped on reel	H = 16.0 mm; P_0 = 12.7 mm; note 2	±5%	2222 479 35...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*; taped on reel pitch = 27.5 mm is not available.
2. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse metallized polypropylene film capacitors

MKP 479

U_{Rdc} = 160 V; U_{Rac} = 100 V/U_{p-p} = 280 V

C (µF)	DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER[1] LOOSE IN BOX l_t = 5.0 ±1.0 mm C-tol = ±5%
Pitch = 22.5 ±0.4 mm; d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/–0.5 mm			
0.82	7.0 × 20.0 × 26.0	1.8	2222 479 32**824**
0.91	7.5 × 20.5 × 26.0	1.9	2222 479 32**914**
1			2222 479 32**105**
1.1	8.0 × 21.0 × 26.0	2.0	2222 479 32**115**
1.2	8.5 × 21.5 × 26.0	2.1	2222 479 32**125**
1.3			2222 479 32**135**
1.5	9.5 × 22.5 × 26.0	2.4	2222 479 32**155**
1.6			2222 479 32**165**
1.8	10.0 × 23.0 × 26.0	2.5	2222 479 32**185**
Pitch = 27.5 ±0.4 mm; d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/–0.5 mm			
2	10.0 × 23.0 × 30.0	5.0	2222 479 32**205**
2.2	10.5 × 23.5 × 30.0	5.0	2222 479 32**225**
2.4	11.0 × 24.0 × 30.0	5.5	2222 479 32**245**
2.7	11.5 × 24.5 × 30.0	5.5	2222 479 32**275**
3	12.0 × 25.0 × 30.0	6.0	2222 479 32**305**
3.3	13.0 × 26.0 × 30.0	6.5	2222 479 32**335**
3.6	13.5 × 26.5 × 30.0	7.0	2222 479 32**365**
3.9	14.0 × 27.0 × 30.0	7.0	2222 479 32**395**

Note

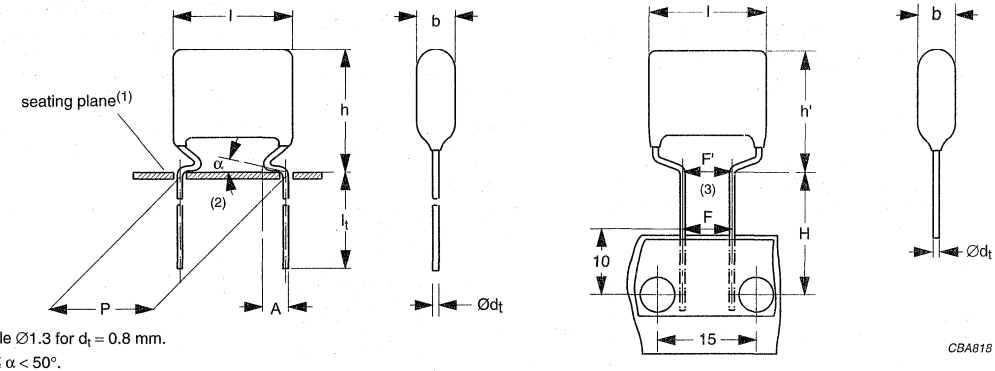
1. The shading indicates preferred types.

AC and pulse metallized polypropylene film capacitors

MKP 479

MKP 479 GENERAL DATA

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



(1) Hole Ø1.3 for $d_t = 0.8$ mm.
(2) $0 \leq \alpha < 50°$.
(3) $|F - F'| < 0.3$ mm.
$F = 7.5 +0.6/-0.1$ mm.

Fig.6 Outline.

Specific reference data for the 250 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
0.047 µF < C ≤ 0.075 µF	$\leq 5 \times 10^{-4}$	$\leq 20 \times 10^{-4}$
0.075 µF < C ≤ 0.11 µF	$\leq 5 \times 10^{-4}$	$\leq 25 \times 10^{-4}$
0.11 µF < C ≤ 0.18 µF	$\leq 10 \times 10^{-4}$	$\leq 30 \times 10^{-4}$
0.18 µF < C ≤ 0.3 µF	$\leq 10 \times 10^{-4}$	$\leq 35 \times 10^{-4}$
0.3 µF < C ≤ 0.39 µF	$\leq 10 \times 10^{-4}$	$\leq 40 \times 10^{-4}$
0.39 µF < C ≤ 0.47 µF	$\leq 10 \times 10^{-4}$	$\leq 45 \times 10^{-4}$
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 ≤ 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	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	±5%	2222 479 42...	preferred
	$l_t = 3.5 \pm 0.5$ mm	±5%	2222 479 44...	on request
Taped on reel	H = 16.0 mm; $P_0 = 12.7$ mm; note 2	±5%	2222 479 45...	on request
Taped on reel (bent back)	H = 16.0 mm; $P_0 = 15.0$ mm; note 2	±5%	2222 479 46...	preferred

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse metallized polypropylene film capacitors

MKP 479

U_{Rdc} = 250 V; U_{Rac} = 160 V/U_{p-p} = 450 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; H = 16.0 mm; P_0 = 15.0 mm[2]
			l_t = 5.0 ±1.0 mm	pitch 7.5 mm (bent back)
			C-tol = ±5%	C-tol = 5%
			catalogue number[3]	catalogue number[3]
Pitch = 10.0 ±0.4 mm; d_t = 0.60 ±0.06 mm; A = 2.0 +1/–0.5 mm				
0.047	6.0 × 15.0 × 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 × 15.5 × 12.5	1.0	2222 479 42104	
Pitch = 15.0 ±0.4 mm; (pitch = 7.5 ±0.4 mm for bent back leads); d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/–0.5 mm				
0.11	6.5 × 15.5 (17.0) × 17.5	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 × 16.0 (17.5) × 17.5	1.4	2222 479 42244	.. 46244
0.27	7.5 × 16.5 (18.0) × 17.5	1.5	2222 479 42274	.. 46274
0.30			2222 479 42304	.. 46304
0.33	8.0 × 17.0 (18.5) × 17.5	1.6	2222 479 42334	.. 46334
0.36	8.5 × 17.5 (19.0) × 17.5	1.7	2222 479 42364	.. 46364
0.39			2222 479 42394	.. 46394
0.43	9.0 × 18.0 (19.5) × 17.5	1.8	2222 479 42434	.. 46434
0.47	9.5 × 18.5 (20.0) × 17.5	1.9	2222 479 42474	.. 46474

Notes

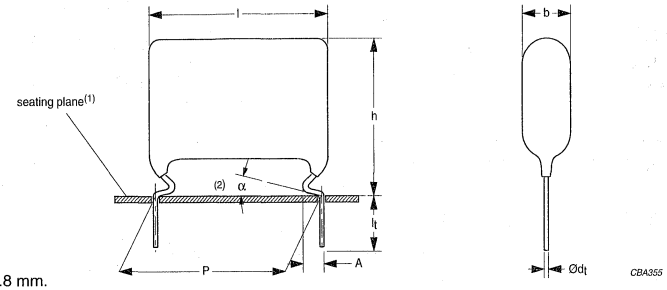
1. Dimensions in brackets for bent back leads.
2. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*:
   a) For pitch = 10.0 and 15.0 mm: H = 16.0 mm and P_0 = 12.7 mm.
   b) For pitch = 15/7.5 mm (bent back): H = 16.0 mm and P_0 = 15.0 mm.
   Standard reel diameter = 500 mm. Small reel diameter = 356 mm is available on request.
3. The shading indicates preferred types.

AC and pulse metallized polypropylene film capacitors

MKP 479

MKP 479 GENERAL DATA

PITCH 22.5/27.5 mm



(1) Hole Ø1.3 for d_t = 0.8 mm.
(2) $0 \leq \alpha < 50°$.

Fig.7 Outline.

Specific reference data for the 250 V DC capacitors

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 µF < C ≤ 0.56 µF	$\leq 10 \times 10^{-4}$	$\leq 45 \times 10^{-4}$	1.3 µF < C ≤ 1.5 µF	$\leq 10 \times 10^{-4}$	$\leq 80 \times 10^{-4}$
0.56 µF < C ≤ 0.68 µF	$\leq 10 \times 10^{-4}$	$\leq 50 \times 10^{-4}$	1.5 µF < C ≤ 1.6 µF	$\leq 10 \times 10^{-4}$	$\leq 85 \times 10^{-4}$
0.68 µF < C ≤ 0.82 µF	$\leq 10 \times 10^{-4}$	$\leq 55 \times 10^{-4}$	1.6 µF < C ≤ 1.8 µF	$\leq 10 \times 10^{-4}$	$\leq 90 \times 10^{-4}$
0.82 µF < C ≤ 0.91 µF	$\leq 10 \times 10^{-4}$	$\leq 60 \times 10^{-4}$	1.8 µF < C ≤ 2.0 µF	$\leq 10 \times 10^{-4}$	$\leq 95 \times 10^{-4}$
0.91 µF < C ≤ 1.0 µF	$\leq 10 \times 10^{-4}$	$\leq 65 \times 10^{-4}$	2.0 µF < C ≤ 2.2 µF	$\leq 10 \times 10^{-4}$	$\leq 100 \times 10^{-4}$
1.0 µF < C ≤ 1.2 µF	$\leq 10 \times 10^{-4}$	$\leq 70 \times 10^{-4}$	2.2 µF < C ≤ 2.4 µF	$\leq 15 \times 10^{-4}$	$\leq 105 \times 10^{-4}$
1.2 µF < C ≤ 1.3 µF	$\leq 10 \times 10^{-4}$	$\leq 75 \times 10^{-4}$	2.4 µF < C ≤ 2.7 µF	$\leq 15 \times 10^{-4}$	$\leq 110 \times 10^{-4}$
			2.7 µF < C ≤ 3 µF	$\leq 15 \times 10^{-4}$	$\leq 115 \times 10^{-4}$
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 ≤ 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	>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	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 ±1.0 mm	±5%	2222 479 42...	preferred
	l_t = 3.5 ±0.5 mm	±5%	2222 479 44...	on request
Taped on reel	H = 16.0 mm; P_0 = 12.7 mm; note 2	±5%	2222 479 45...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*; taped on reel pitch = 27.5 mm is not available.
2. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse metallized polypropylene film capacitors

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U_{Rdc} = 250 V; U_{Rac} = 160 V/U_{p-p} = 450 V

C (µF)	DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER[1] LOOSE IN BOX l_t = 5.0 ±1.0 mm C-tol = ±5%
Pitch = 22.5 ±0.4 mm; d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/–0.5 mm			
0.51	7.0 × 20.0 × 26.0	1.8	2222 479 42**514**
0.56			2222 479 42**564**
0.62	7.5 × 20.5 × 26.0	1.9	2222 479 42**624**
0.68			2222 479 42**684**
0.75	8.0 × 21.0 × 26.0	2.0	2222 479 42**754**
0.82	8.5 × 21.5 × 26.0	2.1	2222 479 42**824**
0.91	9.0 × 22.0 × 26.0	2.4	2222 479 42**914**
1.0	9.5 × 22.5 × 26.0	2.5	2222 479 42**105**
1.1	10.0 × 23.0 × 26.0	2.6	2222 479 42**115**
1.2	10.5 × 23.5 × 26.0	2.7	2222 479 42**125**
Pitch = 27.5 ±0.4 mm; d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/–0.5 mm			
1.3	10.0 × 23.0 × 30.0	5.0	2222 479 42**135**
1.5	10.5 × 23.5 × 30.0	5.0	2222 479 42**155**
1.6	11.0 × 24.0 × 30.0	5.5	2222 479 42**165**
1.8	11.5 × 24.5 × 30.0	5.5	2222 479 42**185**
2.0	12.5 × 25.5 × 30.0	6.5	2222 479 42**205**
2.2	13.0 × 26.0 × 30.0	6.5	2222 479 42**225**
2.4	13.5 × 26.5 × 30.0	7.0	2222 479 42**245**
2.7	14.0 × 27.0 × 30.0	7.0	2222 479 42**275**
3.0	15.0 × 28.0 × 30.0	7.5	2222 479 42**305**

Note

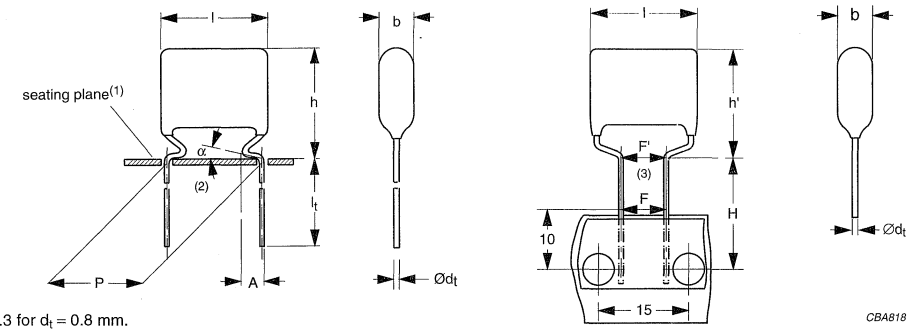
1. The shading indicates preferred types.

AC and pulse metallized polypropylene film capacitors

MKP 479

MKP 479 GENERAL DATA

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



(1) Hole Ø1.3 for d_t = 0.8 mm.
(2) $0 \leq \alpha < 50°$.
(3) $|F - F'| < 0.3$ mm
F = 7.5 +0.6/–0.1 mm

Fig.8 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 µF < C ≤ 0.027 µF	$\leq 5 \times 10^{-4}$	$\leq 15 \times 10^{-4}$
0.027 µF < C ≤ 0.075 µF	$\leq 5 \times 10^{-4}$	$\leq 20 \times 10^{-4}$
0.075 µF < C ≤ 0.11 µF	$\leq 5 \times 10^{-4}$	$\leq 25 \times 10^{-4}$
0.11 µF < C ≤ 0.18 µF	$\leq 10 \times 10^{-4}$	$\leq 30 \times 10^{-4}$
0.18 µF < C ≤ 0.22 µF	$\leq 10 \times 10^{-4}$	$\leq 35 \times 10^{-4}$
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 ≤ 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	400 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 250 V DC versions (monitor type)

PACKAGING(1)	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	l_t = 5.0 ±1.0 mm	±5%	2222 479 41...	preferred
	l_t = 3.5 ±0.5 mm	±5%	2222 479 43...	on request
Taped on reel	H = 16.0 mm; P_0 = 12.7 mm; note 2	±5%	2222 479 47...	on request
Taped on reel (bent back)	H = 16.0 mm; P_0 = 15.0 mm; note 2	±5%	2222 479 49...	preferred

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse metallized polypropylene film capacitors

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U_{Rdc} = 250 V; U_{Rac} = 160 V/U_{p-p} = 450 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; H = 16.0 mm; P_0 = 15.0 mm(2)
			l_t = 5.0 ±1.0 mm	pitch 7.5 mm (bent back)
			C-tol = ±5%	C-tol = ±5%
			catalogue number(3)	catalogue number(3)
Pitch = 10.0 ±0.4 mm; d_t = 0.60 ±0.06 mm; A = 2.0 +1/–0.5 mm				
0.022	6.0 × 15.0 × 12.5	0.9	2222 479 41**223**	not available
0.024			2222 479 41**243**	
0.027			2222 479 41**273**	
0.03			2222 479 41**303**	
0.033			2222 479 41**333**	
0.036			2222 479 41**363**	
0.039			2222 479 41**393**	
0.043			2222 479 41**433**	
0.047			2222 479 41**473**	
Pitch = 15.0 ±0.4 mm (Pitch = 7.5 0.4 mm for bent back leads); d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/–0.5 mm				
0.051	6.5 × 15.5 (17.0) × 17.5	1.3	2222 479 41**513**	.. 49**513**
0.056			2222 479 41**563**	.. 49**563**
0.062			2222 479 41**623**	.. 49**623**
0.068			2222 479 41**683**	.. 49**683**
0.075			2222 479 41**753**	.. 49**753**
0.082			2222 479 41**823**	.. 49**823**
0.091	7.0 × 16.0 (17.5) × 17.5	1.4	2222 479 41**913**	.. 49**913**
0.1			2222 479 41**104**	.. 49**104**
0.11			2222 479 41**114**	.. 49**114**
0.12			2222 479 41**124**	.. 49**124**
0.13	7.5 × 16.5 (18.0) × 17.5	1.5	2222 479 41**134**	.. 49**134**
0.15			2222 479 41**154**	.. 49**154**
0.16	8.0 × 17.0 (18.5) × 17.5	1.6	2222 479 41**164**	.. 49**164**
0.18	8.5 × 17.5 (19.0) × 17.5	1.7	2222 479 41**184**	.. 49**184**
0.2			2222 479 41**204**	.. 49**204**
0.22	9.0 × 18.0 (19.5) × 17.5	1.8	2222 479 41**224**	.. 49**224**

Notes

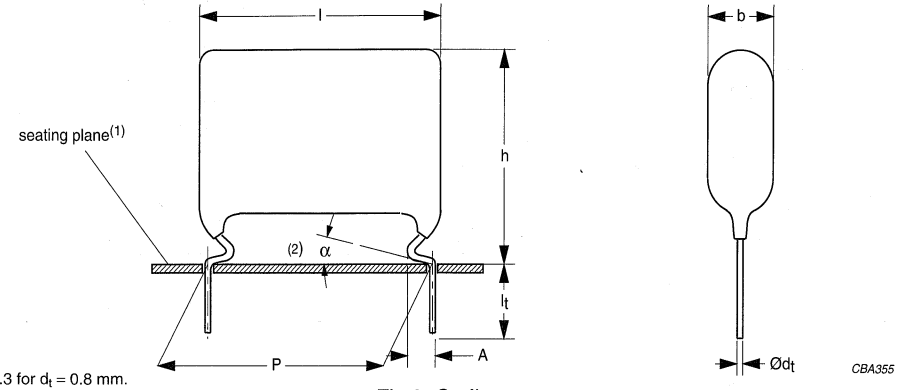
1. Dimensions in brackets for bent back leads.
2. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*:
   a) For pitch = 10.0 and 15.0 mm: H = 16.0 mm and P_0 = 12.7 mm.
   b) For pitch = 15/7.5 mm (bent back): H = 16.0 mm and P_0 = 15.0 mm.
   Standard reel diameter = 500 mm. Small reel diameter = 356 mm is available on request.
3. The shading indicates preferred types.

AC and pulse metallized polypropylene film capacitors

MKP 479

MKP 479 GENERAL DATA

PITCH 22.5/27.5 mm



(1) Hole Ø1.3 for d_t = 0.8 mm.
(2) $0 \leq \alpha < 50°$.

Fig.9 Outline.

Specific reference data for the 250 V DC capacitors (monitor type)

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
0.24 µF < C ≤ 0.3 µF	$\leq 10 \times 10^{-4}$	$\leq 35 \times 10^{-4}$
0.3 µF < C ≤ 0.39 µF	$\leq 10 \times 10^{-4}$	$\leq 40 \times 10^{-4}$
0.39 µF < C ≤ 0.56 µF	$\leq 10 \times 10^{-4}$	$\leq 45 \times 10^{-4}$
0.56 µF < C ≤ 0.68 µF	$\leq 10 \times 10^{-4}$	$\leq 50 \times 10^{-4}$
0.68 µF < C ≤ 0.82 µF	$\leq 10 \times 10^{-4}$	$\leq 55 \times 10^{-4}$
0.82 µF < C ≤ 0.91 µF	$\leq 10 \times 10^{-4}$	$\leq 60 \times 10^{-4}$
0.91 µF < C ≤ 1.0 µF	$\leq 10 \times 10^{-4}$	$\leq 65 \times 10^{-4}$
1.0 µF < C ≤ 1.2 µF	$\leq 10 \times 10^{-4}$	$\leq 70 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 250 V (DC):		
P = 22.5 mm	70 V/µs	
P = 27.5 mm	50 V/µs	
R between leads, for C ≤ 1.0 µF at 100 V; 1 minute	>100000 MΩ	
RC between leads, for C > 1.0 µF at 100 V; 1 minute	>100000 s	
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	400 V; 1 minute	
Withstanding (DC) voltage between leads and case	2840 V; 1 minute	

Available 250 V DC versions (monitor type)

PACKAGING(1)	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	l_t = 5.0 ±1.0 mm	±5%	2222 479 41...	preferred
	l_t = 3.5 ±0.5 mm	±5%	2222 479 43...	on request
Taped on reel	H = 16.0 mm; P_0 = 12.7 mm; note 2	±5%	2222 479 47...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*; taped on reel pitch = 27.5 mm is not available.
2. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse metallized polypropylene film capacitors

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U_{Rdc} = 250 V; U_{Rac} = 160 V/U_{p-p} = 450 V (monitor type)

C (µF)	DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER[1] LOOSE IN BOX l_t = 5.0 ±1.0 mm C-tol = ±5%
Pitch = 22.5 ±0.4 mm; d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/–0.5 mm			
0.24	6.5 × 19.5 × 26.0	1.7	2222 479 41**244**
0.27	7.0 × 20.0 × 26.0	1.8	2222 479 41**274**
0.3	7.5 × 20.5 × 26.0	1.9	2222 479 41**304**
0.33			2222 479 41**334**
0.36	8.0 × 21.0 × 26.0	2.0	2222 479 41**364**
0.39	8.5 × 21.5 × 26.0	2.1	2222 479 41**394**
0.43			2222 479 41**434**
0.47	9.0 × 22.0 × 26.0	2.4	2222 479 41**474**
0.51	9.5 × 22.5 × 26.0	2.5	2222 479 41**514**
0.56	10.0 × 23.0 × 26.0	2.6	2222 479 41**564**
0.62	10.5 × 23.5 × 26.0	2.7	2222 479 41**624**
Pitch = 27.5 ±0.4 mm; d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/–0.5 mm			
0.68	10.0 × 23.0 × 30.0	5.0	2222 479 41**684**
0.75	10.5 × 23.5 × 30.0	5.0	2222 479 41**754**
0.82	11.0 × 24.0 × 30.0	5.5	2222 479 41**824**
0.91	11.5 × 24.5 × 30.0	5.5	2222 479 41**914**
1.0	12.0 × 25.0 × 30.0	6.0	2222 479 41**105**
1.1	12.5 × 25.5 × 30.0	6.5	2222 479 41**115**
1.2	13.0 × 26.0 × 30.0	6.5	2222 479 41**125**

Note

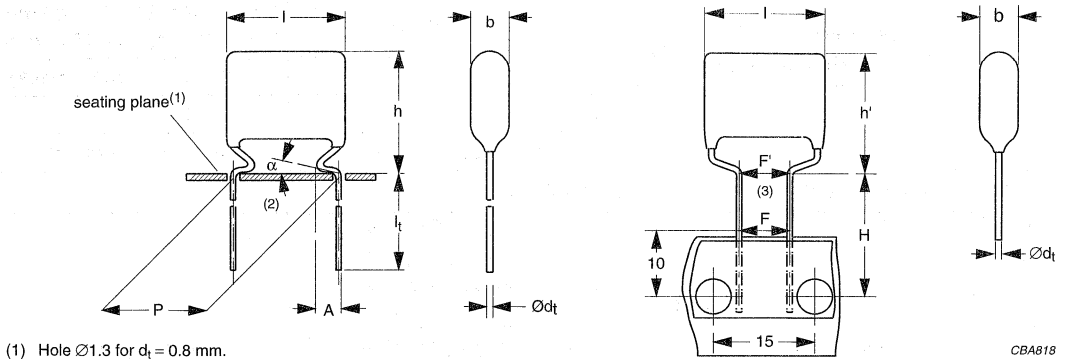
1. The shading indicates preferred types.

AC and pulse metallized polypropylene film capacitors

MKP 479

MKP 479 GENERAL DATA

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



(1) Hole Ø1.3 for d_t = 0.8 mm.
(2) $0 \leq \alpha < 50°$.
(3) $|F - F'| < 0.3$ mm.
F = 7.5 +0.6/−0.1 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:		
0.022 µF < C ≤ 0.027 µF	$\leq 5 \times 10^{-4}$	$\leq 15 \times 10^{-4}$
0.027 µF < C ≤ 0.075 µF	$\leq 5 \times 10^{-4}$	$\leq 20 \times 10^{-4}$
0.075 µF < C ≤ 0.11 µF	$\leq 5 \times 10^{-4}$	$\leq 25 \times 10^{-4}$
0.11 µF < C ≤ 0.18 µF	$\leq 10 \times 10^{-4}$	$\leq 30 \times 10^{-4}$
0.18 µF < C ≤ 0.22 µF	$\leq 10 \times 10^{-4}$	$\leq 35 \times 10^{-4}$
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 ≤ 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

PACKAGING(1)	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	l_t = 5.0 ±1.0 mm	±5%	2222 479 52...	preferred
	l_t = 3.5 ±0.5 mm	±5%	2222 479 54...	on request
Taped on reel	H = 16.0 mm; P_0 = 12.7 mm; note 2	±5%	2222 479 55...	on request
Taped on reel (bent back)	H = 16.0 mm; P_0 = 15.0 mm; note 2	±5%	2222 479 56...	preferred

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse metallized polypropylene film capacitors

MKP 479

U_{Rdc} = 400 V; U_{Rac} = 200 V/U_{p-p} = 560 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; H = 16.0 mm; P_0 = 15.0 mm[2]
			l_t = 5.0 ±1.0 mm	pitch 7.5 mm (bent back)
			C-tol = ±5%	C-tol = ±5%
			catalogue number[3]	catalogue number[3]
Pitch = 10.0 ±0.4 mm; d_t = 0.60 ±0.06 mm; A = 2.0 +1/–0.5 mm				
0.022	6.0 × 15.0 × 12.5	0.9	2222 479 52**223**	not available
0.024			2222 479 52**243**	
0.027			2222 479 52**273**	
0.03			2222 479 52**303**	
0.033			2222 479 52**333**	
0.036			2222 479 52**363**	
0.039			2222 479 52**393**	
0.043			2222 479 52**433**	
0.047			2222 479 52**473**	
Pitch = 15.0 ±0.4 mm; (pitch = 7.5 ±0.4 mm for bent back leads); d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/–0.5 mm				
0.051	6.5 × 15.5 (17.0) × 17.5	1.3	2222 479 52**513**	.. 56**513**
0.056			2222 479 52**563**	.. 56**563**
0.062			2222 479 52**623**	.. 56**623**
0.068			2222 479 52**683**	.. 56**683**
0.075			2222 479 52**753**	.. 56**753**
0.082			2222 479 52**823**	.. 56**823**
0.091	7.0 × 16.0 (17.5) × 17.5	1.4	2222 479 52**913**	.. 56**913**
0.1			2222 479 52**104**	.. 56**104**
0.11			2222 479 52**114**	.. 56**114**
0.12			2222 479 52**124**	.. 56**124**
0.13	7.5 × 16.5 (18.0) × 17.5	1.5	2222 479 52**134**	.. 56**134**
0.15			2222 479 52**154**	.. 56**154**
0.16	8.0 × 17.0 (18.5) × 17.5	1.6	2222 479 52**164**	.. 56**164**
0.18	8.5 × 17.5 (19.0) × 17.5	1.7	2222 479 52**184**	.. 56**184**
0.2			2222 479 52**204**	.. 56**204**
0.22	9.0 × 18.0 (19.5) × 17.5	1.8	2222 479 52**224**	.. 56**224**

Notes

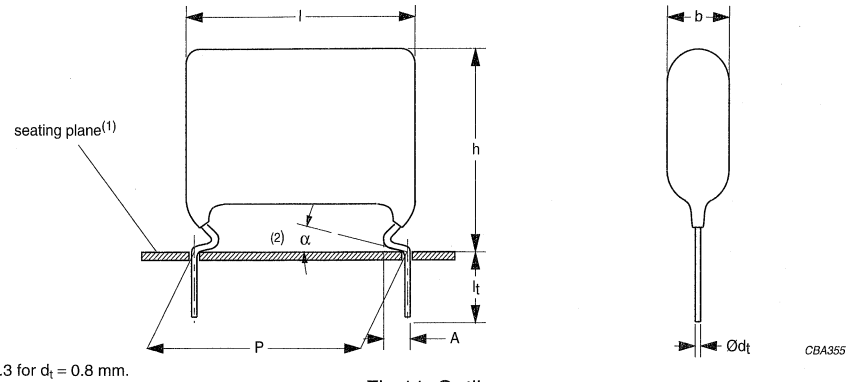
1. Dimensions in brackets for bent back leads.
2. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*:
   a) For pitch = 10.0 and 15.0 mm: H = 16.0 mm and P_0 = 12.7 mm.
   b) For pitch = 15/7.5 mm (bent back): H = 16.0 mm and P_0 = 15.0 mm.
   Standard reel diameter = 500 mm. Small reel diameter = 356 mm is available on request.
3. The shading indicates preferred types.

AC and pulse metallized polypropylene film capacitors

MKP 479

MKP 479 GENERAL DATA

PITCH 22.5/27.5 mm



(1) Hole ∅1.3 for d_t = 0.8 mm.
(2) $0 \leq \alpha < 50°$.

Fig.11 Outline.

Specific reference data for the 400 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
0.24 µF < C ≤ 0.3 µF	$\leq 10 \times 10^{-4}$	$\leq 35 \times 10^{-4}$
0.3 µF < C ≤ 0.39 µF	$\leq 10 \times 10^{-4}$	$\leq 40 \times 10^{-4}$
0.39 µF < C ≤ 0.56 µF	$\leq 10 \times 10^{-4}$	$\leq 45 \times 10^{-4}$
0.56 µF < C ≤ 0.68 µF	$\leq 10 \times 10^{-4}$	$\leq 50 \times 10^{-4}$
0.68 µF < C ≤ 0.82 µF	$\leq 10 \times 10^{-4}$	$\leq 55 \times 10^{-4}$
0.82 µF < C ≤ 0.91 µF	$\leq 10 \times 10^{-4}$	$\leq 60 \times 10^{-4}$
0.91 µF < C ≤ 1.0 µF	$\leq 10 \times 10^{-4}$	$\leq 65 \times 10^{-4}$
1.0 µF < C ≤ 1.2 µF	$\leq 10 \times 10^{-4}$	$\leq 70 \times 10^{-4}$
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 ≤ 1.0 µF at 100 V; 1 minute	>100000 MΩ	
RC between leads, for C > 1.0 µF at 100 V; 1 minute	>100000 s	
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

PACKAGING(1)	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	l_t = 5.0 ±1.0 mm	±5%	2222 479 52...	preferred
	l_t = 3.5 ±0.5 mm	±5%	2222 479 54...	on request
Taped on reel	H = 16.0 mm; P_0 = 12.7 mm; note 2	±5%	2222 479 55...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*; taped on reel pitch = 27.5 mm is not available.
2. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse metallized polypropylene film capacitors

MKP 479

U_{Rdc} = 400 V; U_{Rac} = 200 V/U_{p-p} = 450 V

C (µF)	DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER(1)
			LOOSE IN BOX
			l_t = 5.0 ±1.0 mm
			C-tol = ±5%
Pitch = 22.5 ±0.4 mm; d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/–0.5 mm			
0.24	6.5 × 19.5 × 26.0	1.7	2222 479 52**244**
0.27	7.0 × 20.0 × 26.0	1.8	2222 479 52**274**
0.3	7.5 × 20.5 × 26.0	1.9	2222 479 52**304**
0.33			2222 479 52**334**
0.36	8.0 × 21.0 × 26.0	2.0	2222 479 52**364**
0.39	8.5 × 21.5 × 26.0	2.1	2222 479 52**394**
0.43			2222 479 52**434**
0.47	9.0 × 22.0 × 26.0	2.4	2222 479 52**474**
0.51	9.5 × 22.5 × 26.0	2.5	2222 479 52**514**
0.56	10.0 × 23.0 × 26.0	2.6	2222 479 52**564**
0.62	10.5 × 23.5 × 26.0	2.7	2222 479 52**624**
Pitch = 27.5 ±0.4 mm; d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/–0.5 mm			
0.68	10.0 × 23.0 × 30.0	5.0	2222 479 52**684**
0.75	10.5 × 23.5 × 30.0	5.0	2222 479 52**754**
0.82	11.0 × 24.0 × 30.0	5.5	2222 479 52**824**
0.91	11.5 × 24.5 × 30.0	5.5	2222 479 52**914**
1.0	12.0 × 25.0 × 30.0	6.0	2222 479 52**105**
1.1	12.5 × 25.5 × 30.0	6.5	2222 479 52**115**
1.2	13.0 × 26.0 × 30.0	6.5	2222 479 52**125**

Note

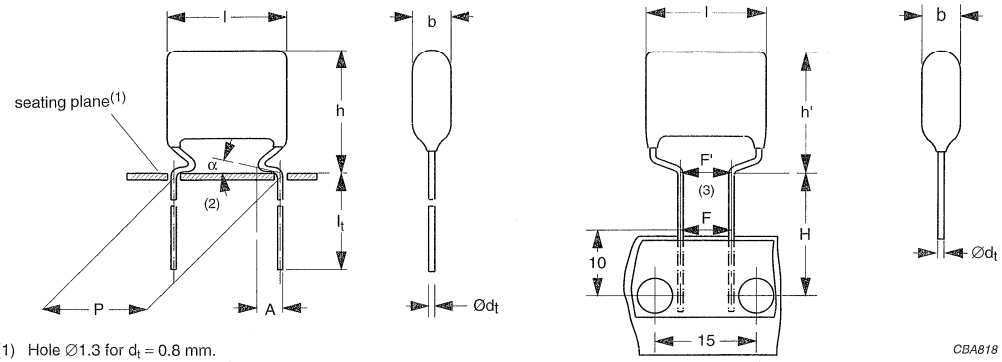
1. The shading indicates preferred types.

AC and pulse metallized polypropylene film capacitors

MKP 479

MKP 479 GENERAL DATA

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



(1) Hole Ø1.3 for d_t = 0.8 mm.
(2) $0 \leq \alpha < 50°$.
(3) $|F - F'| < 0.3$ mm.
F = 7.5 +0.6/–0.1 mm.

Fig.12 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 µF < C ≤ 0.027 µF	$\leq 5 \times 10^{-4}$	$\leq 15 \times 10^{-4}$
0.027 µF < C ≤ 0.075 µF	$\leq 5 \times 10^{-4}$	$\leq 20 \times 10^{-4}$
0.075 µF < C ≤ 0.11 µF	$\leq 5 \times 10^{-4}$	$\leq 25 \times 10^{-4}$
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 ≤ 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 (monitor type)

PACKAGING(1)	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	l_t = 5.0 ±1.0 mm	±5%	2222 479 51...	preferred
	l_t = 3.5 ±0.5 mm	±5%	2222 479 53...	on request
Taped on reel	H = 16.0 mm; P_0 = 12.7 mm; note 2	±5%	2222 479 57...	on request
Taped on reel (bent back)	H = 16.0 mm; P_0 = 15.0 mm; note 2	±5%	2222 479 59...	preferred

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse metallized polypropylene film capacitors

MKP 479

U_{Rdc} = 400 V; U_{Rac} = 200 V/U_{p-p} = 560 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; H = 16.0 mm; P_0 = 15.0 mm[2]
			l_t = 5.0 ±1.0 mm	pitch 7.5 mm (bent back)
			C-tol = ±5%	C-tol = ±5%
			catalogue number[3]	catalogue number[3]
Pitch = 10.0 ±0.4 mm; d_t = 0.60 ±0.06 mm; A = 2.0 +1/–0.5 mm				
0.01	6.0 × 15.0 × 12.5	0.9	2222 479 51**103**	not available
0.011			2222 479 51**113**	
0.012			2222 479 51**123**	
0.013			2222 479 51**133**	
0.015			2222 479 51**153**	
0.016			2222 479 51**163**	
0.018			2222 479 51**183**	
0.02			2222 479 51**203**	
0.022			2222 479 51**223**	
0.024			2222 479 51**243**	
0.027	6.5 × 15.5 × 12.5	1.0	2222 479 51**273**	
Pitch = 15.0 ±0.4 mm; (pitch = 7.5 ±0.4 mm for bent back leads); d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/–0.5 mm				
0.03	6.5 × 15.5 (17.0) × 17.5	1.3	2222 479 51**303**	.. 59**303**
0.033			2222 479 51**333**	.. 59**333**
0.036			2222 479 51**363**	.. 59**363**
0.039			2222 479 51**393**	.. 59**393**
0.043			2222 479 51**433**	.. 59**433**
0.047			2222 479 51**473**	.. 59**473**
0.051			2222 479 51**513**	.. 59**513**
0.056			2222 479 51**563**	.. 59**563**
0.062	7.0 × 16.0 (17.5) × 17.5	1.4	2222 479 51**623**	.. 59**623**
0.068	7.5 × 16.5 (18.0) × 17.5	1.5	2222 479 51**683**	.. 59**683**
0.075	8.0 × 17.0 (18.5) × 17.5	1.6	2222 479 51**753**	.. 59**753**
0.082			2222 479 51**823**	.. 59**823**
0.091	8.5 × 17.5 (19.0) × 17.5	1.7	2222 479 51**913**	.. 59**913**
0.1	9.0 × 18.0 (19.5) × 17.5	1.8	2222 479 51**104**	.. 59**104**
0.11	9.5 × 18.5 (20.0) × 17.5	1.9	2222 479 51**114**	.. 59**114**

Notes

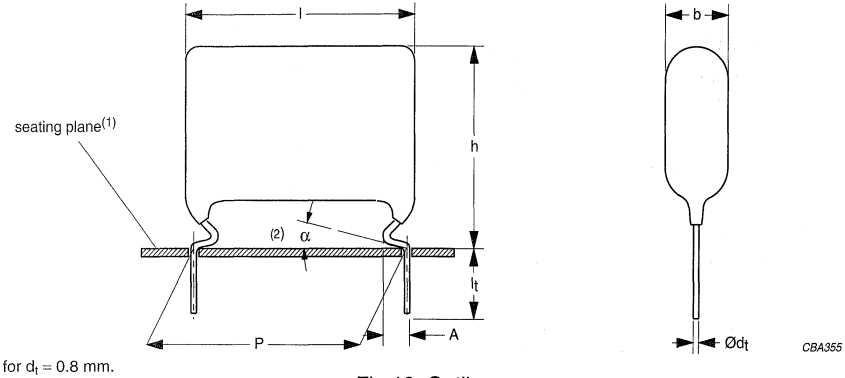
1. Dimensions in brackets for bent back leads.
2. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*:
   a) For pitch = 10.0 and 15.0 mm: H = 16.0 mm and P_0 = 12.7 mm.
   b) For pitch = 15/7.5 mm (bent back): H = 16.0 mm and P_0 = 15.0 mm.
   Standard reel diameter = 500 mm. Small reel diameter = 356 mm is available on request.
3. The shading indicates preferred types.

AC and pulse metallized polypropylene film capacitors

MKP 479

MKP 479 GENERAL DATA

PITCH 22.5/27.5 mm



(1) Hole ∅1.3 for d_t = 0.8 mm.
(2) $0 \leq \alpha < 50°$.

Fig.13 Outline.

Specific reference data for the 400 V DC capacitors (monitor type)

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
0.12 µF < C ≤ 0.18 µF	$\leq 10 \times 10^{-4}$	$\leq 30 \times 10^{-4}$
0.18 µF < C ≤ 0.3 µF	$\leq 10 \times 10^{-4}$	$\leq 35 \times 10^{-4}$
0.3 µF < C ≤ 0.39 µF	$\leq 10 \times 10^{-4}$	$\leq 40 \times 10^{-4}$
0.39 µF < C ≤ 0.56 µF	$\leq 10 \times 10^{-4}$	$\leq 45 \times 10^{-4}$
0.56 µF < C ≤ 0.68 µF	$\leq 10 \times 10^{-4}$	$\leq 50 \times 10^{-4}$
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 ≤ 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 (monitor type)

PACKAGING(1)	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	l_t = 5.0 ±1.0 mm	±5%	2222 479 51...	preferred
	l_t = 3.5 ±0.5 mm	±5%	2222 479 53...	on request
Taped on reel	H = 16.0 mm; P_0 = 12.7 mm; note 2	±5%	2222 479 57...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*; taped on reel pitch = 27.5 mm is not available.
2. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse metallized polypropylene film capacitors

MKP 479

U_{Rdc} = 400 V; U_{Rac} = 200 V/U_{p-p} = 560 V (monitor type)

C (µF)	DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER[1] LOOSE IN BOX l_t = 5.0 ±1.0 mm C-tol = ±5%
Pitch = 22.5 ±0.4 mm; d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/–0.5 mm			
0.12	6.5 × 19.5 × 26.0	1.7	2222 479 51**124**
0.13	7.0 × 20.0 × 26.0	1.8	2222 479 51**134**
0.15	7.5 × 20.5 × 26.0	1.9	2222 479 51**154**
0.16			2222 479 51**164**
0.18	8.0 × 21.0 × 26.0	2.0	2222 479 51**184**
0.20	8.5 × 21.5 × 26.0	2.1	2222 479 51**204**
0.22	9.0 × 22.0 × 26.0	2.4	2222 479 51**224**
0.24			2222 479 51**244**
0.27	9.5 × 22.5 × 26.0	2.5	2222 479 51**274**
0.30	10.0 × 23.0 × 26.0	2.7	2222 479 51**304**
Pitch = 27.5 ±0.4 mm; d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/–0.5 mm			
0.33	9.5 × 22.5 × 30.0	5.0	2222 479 51**334**
0.36	10.0 × 22.5 × 30.0	5.0	2222 479 51**364**
0.39	10.5 × 23.0 × 30.0	5.0	2222 479 51**394**
0.43	11.0 × 23.0 × 30.0	5.5	2222 479 51**434**
0.47	11.5 × 24.5 × 30.0	5.5	2222 479 51**474**
0.51	12.0 × 25.0 × 30.0	6.0	2222 479 51**514**
0.56	13.0 × 26.0 × 30.0	6.5	2222 479 51**564**
0.62	13.5 × 26.5 × 30.0	6.5	2222 479 51**624**
0.68	14.0 × 27.0 × 30.0	7.0	2222 479 51**684**

Note

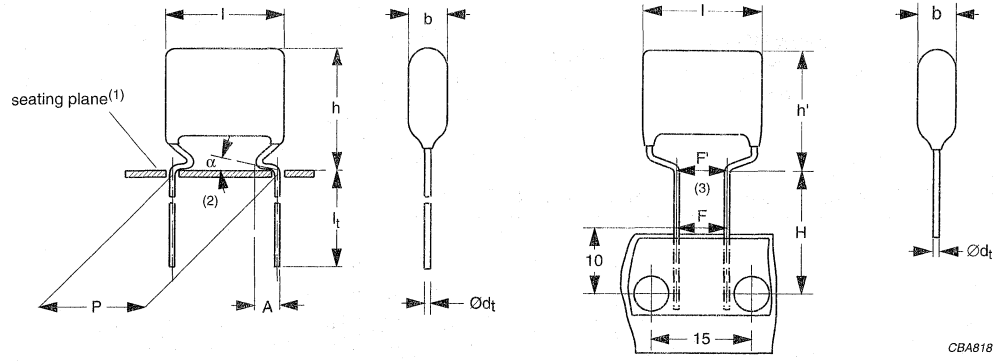
1. The shading indicates preferred types.

AC and pulse metallized polypropylene film capacitors

MKP 479

MKP 479 GENERAL DATA

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



(1) Hole Ø1.3 for d_t = 0.8 mm.
(2) $0 \leq \alpha < 50°$.
(3) $|F - F'| < 0.3$ mm.
F = 7.5 +0.6/–0.1 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:		
0.01 µF < C ≤ 0.027 µF	$\leq 5 \times 10^{-4}$	$\leq 15 \times 10^{-4}$
0.027 µF < C ≤ 0.075 µF	$\leq 5 \times 10^{-4}$	$\leq 20 \times 10^{-4}$
0.075 µF < C ≤ 0.11 µF	$\leq 5 \times 10^{-4}$	$\leq 25 \times 10^{-4}$
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 ≤ 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 630 V DC versions

PACKAGING(1)	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	l_t = 5.0 ±1.0 mm	±5%	2222 479 62...	preferred
	l_t = 3.5 ±0.5 mm	±5%	2222 479 64...	on request
Taped on reel	H = 16.0 mm; P_0 = 12.7 mm; note 2	±5%	2222 479 65...	on request
Taped on reel (bent back)	H = 16.0 mm; P_0 = 15.0 mm; note 2	±5%	2222 479 66...	preferred

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse metallized polypropylene film capacitors

MKP 479

U_{Rdc} = 630 V; U_{Rac} = 200 V/U_{p-p} = 560 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; H = 16.0 mm; P_0 = 15.0 mm[2]
			l_t = 5.0 ±1.0 mm	pitch 7.5 mm (bent back)
			C-tol = ±5%	C-tol = ±5%
			catalogue number[3]	catalogue number[3]
Pitch = 10.0 ±0.4 mm; d_t = 0.60 ±0.06 mm; A = 2.0 +1/–0.5 mm				
0.01	6.0 × 15.0 × 12.5	0.9	2222 479 62**103**	not available
0.011			2222 479 62**113**	
0.012			2222 479 62**123**	
0.013			2222 479 62**133**	
0.015			2222 479 62**153**	
0.016			2222 479 62**163**	
0.018			2222 479 62**183**	
0.02			2222 479 62**203**	
0.022			2222 479 62**223**	
0.024			2222 479 62**243**	
0.027	6.5 × 15.5 × 12.5	1.0	2222 479 62**273**	
Pitch = 15.0 ±0.4 mm; (pitch = 7.5 ±0.4 mm for bent back leads); d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/–0.5 mm				
0.03	6.5 × 15.5 (17.0) × 17.5	1.3	2222 479 62**303**	.. 66**303**
0.033			2222 479 62**333**	.. 66**333**
0.036			2222 479 62**363**	.. 66**363**
0.039			2222 479 62**393**	.. 66**393**
0.043			2222 479 62**433**	.. 66**433**
0.047			2222 479 62**473**	.. 66**473**
0.051			2222 479 62**513**	.. 66**513**
0.056			2222 479 62**563**	.. 66**563**
0.062	7.0 × 16.0 (17.5) × 17.5	1.4	2222 479 62**623**	.. 66**623**
0.068	7.5 × 16.5 (18.0) × 17.5	1.5	2222 479 62**683**	.. 66**683**
0.075	8.0 × 17.0 (18.5) × 17.5	1.6	2222 479 62**753**	.. 66**753**
0.082			2222 479 62**823**	.. 66**823**
0.091	8.5 × 17.5 (19.0) × 17.5	1.7	2222 479 62**913**	.. 66**913**
0.1	9.0 × 18.0 (19.5) × 17.5	1.8	2222 479 62**104**	.. 66**104**
0.11	9.5 × 18.5 (20.0) × 17.5	1.9	2222 479 62**114**	.. 66**114**

Notes

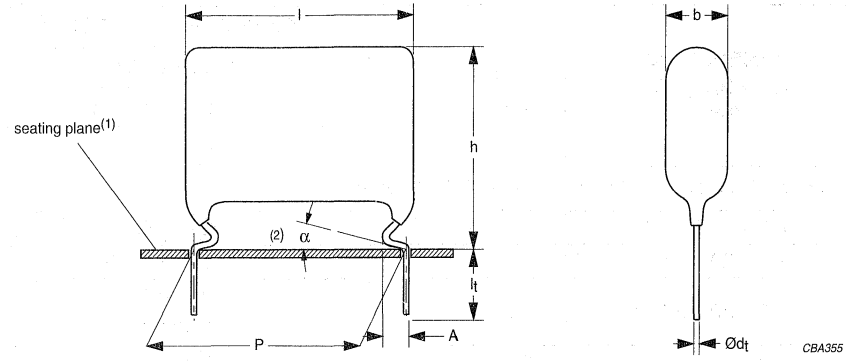
1. Dimensions in brackets for bent back leads.
2. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*:
   a) For pitch = 10.0 and 15.0 mm: H = 16.0 mm and P_0 = 12.7 mm.
   b) For pitch = 15/7.5 mm (bent back): H = 16.0 mm and P_0 = 15.0 mm.
   Standard reel diameter = 500 mm. Small reel diameter = 356 mm is available on request.
3. The shading indicates preferred types.

AC and pulse metallized polypropylene film capacitors

MKP 479

MKP 479 GENERAL DATA

PITCH 22.5/27.5 mm



(1) Hole Ø1.3 for d_t = 0.8 mm.
(2) $0 \leq \alpha < 50°$.

Fig.15 Outline.

Specific reference data for the 630 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
0.12 µF < C ≤ 0.18 µF	$\leq 10 \times 10^{-4}$	$\leq 30 \times 10^{-4}$
0.18 µF < C ≤ 0.3 µF	$\leq 10 \times 10^{-4}$	$\leq 35 \times 10^{-4}$
0.3 µF < C ≤ 0.39 µF	$\leq 10 \times 10^{-4}$	$\leq 40 \times 10^{-4}$
0.39 µF < C ≤ 0.56 µF	$\leq 10 \times 10^{-4}$	$\leq 45 \times 10^{-4}$
0.56 µF < C ≤ 0.68 µF	$\leq 10 \times 10^{-4}$	$\leq 50 \times 10^{-4}$
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 ≤ 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 630 V DC versions

PACKAGING(1)	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	l_t = 5.0 ±1.0 mm	±5%	2222 479 62...	preferred
	l_t = 3.5 ±0.5 mm	±5%	2222 479 64...	on request
Taped on reel	H = 16.0 mm; P_0 = 12.7 mm; note 2	±5%	2222 479 65...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*; taped on reel pitch = 27.5 mm is not available.
2. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse metallized polypropylene film capacitors

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U_{Rdc} = 630 V; U_{Rac} = 200 V/U_{p-p} = 560 V

C (µF)	DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER[1] LOOSE IN BOX l_t = 5.0 ±1.0 mm C-tol = ±5%
Pitch = 22.5 ±0.4 mm; d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/–0.5 mm			
0.12	6.5 × 19.5 × 26.0	1.7	2222 479 62**124**
0.13	7.0 × 20.0 × 26.0	1.8	2222 479 62**134**
0.15	7.5 × 20.5 × 26.0	1.9	2222 479 62**154**
0.16			2222 479 62**164**
0.18	8.0 × 21.0 × 26.0	2.0	2222 479 62**184**
0.20	8.5 × 21.5 × 26.0	2.1	2222 479 62**204**
0.22	9.0 × 22.0 × 26.0	2.4	2222 479 62**224**
0.24			2222 479 62**244**
0.27	9.5 × 22.5 × 26.0	2.5	2222 479 62**274**
0.30	10.0 × 23.0 × 26.0	2.7	2222 479 62**304**
Pitch = 27.5 ±0.4 mm; d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/–0.5 mm			
0.33	9.5 × 22.5 × 30.0	5.0	2222 479 62**334**
0.36	10.0 × 22.5 × 30.0	5.0	2222 479 62**364**
0.39	10.5 × 23.0 × 30.0	5.0	2222 479 62**394**
0.43	11.0 × 23.0 × 30.0	5.5	2222 479 62**434**
0.47	11.5 × 24.5 × 30.0	5.5	2222 479 62**474**
0.51	12.0 × 25.0 × 30.0	6.0	2222 479 62**514**
0.56	13.0 × 26.0 × 30.0	6.5	2222 479 62**564**
0.62	13.5 × 26.5 × 30.0	6.5	2222 479 62**624**
0.68	14.0 × 27.0 × 30.0	7.0	2222 479 62**684**

Note

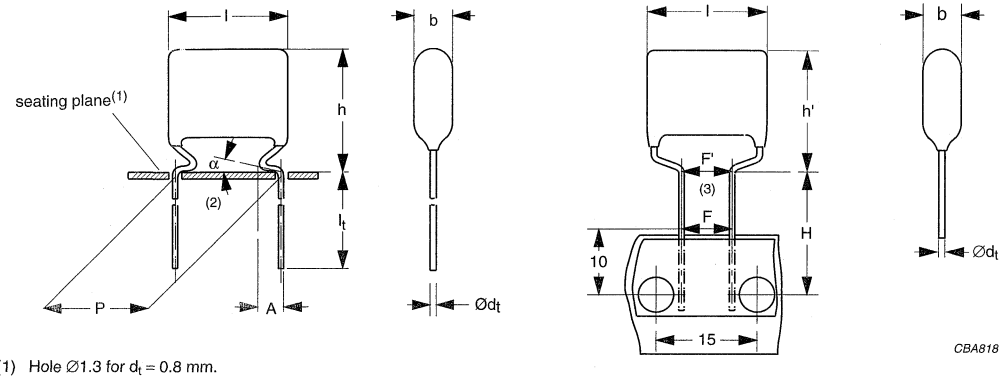
1. The shading indicates preferred types.

AC and pulse metallized polypropylene film capacitors

MKP 479

MKP 479 GENERAL DATA

PITCH 15 mm
PITCH 7.5 mm (bent back leads)



(1) Hole Ø1.3 for d_t = 0.8 mm.
(2) $0 \leq \alpha < 50°$.
(3) $|F - F'| < 0.3$ mm.
F = 7.5 +0.6/–0.1 mm.

Fig.16 Outline.

Specific reference data for the 1000 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: C ≤ 0.039 µF	$\leq 5 \times 10^{-4}$	$\leq 15 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 1000 V (DC)	450 V/µs	
R between leads, for C ≤ 1.0 µF at 100 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	>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 = 5.0 ±1.0 mm	±5%	2222 479 72...	preferred
	l_t = 3.5 ±0.5 mm	±5%	2222 479 74...	on request
Taped on reel	H = 16.0 mm; P_0 = 12.7 mm; note 2	±5%	2222 479 75...	on request
Taped on reel (bent back)	H = 16.0 mm; P_0 = 15.0 mm; note 2	±5%	2222 479 76...	preferred

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse metallized polypropylene film capacitors

MKP 479

U_{Rdc} = 1000 V; U_{Rac} = 350 V/U_{p-p} = 1000 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; H = 16.0 mm; P_0 = 15.0 mm(2)
			l_t = 5.0 ±1.0 mm	pitch 7.5 mm (bent back)
			C-tol = ±5%	C-tol = ±5%
			catalogue number(3)	catalogue number(3)
Pitch = 15.0 ±0.4 mm; (pitch = 7.5 ±0.4 mm for bent back leads); d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/−0.5 mm				
0.013(4)	6.0 × 15.0 (16.5) × 17.5	1.2	2222 479 72**133**	.. 76133
0.015(4)	6.5 × 15.5 (17.0) × 17.5	1.3	2222 479 72**153**	.. 76153
0.016(4)			2222 479 72**163**	.. 76163
0.018(4)	7.0 × 16.0 (17.5) × 17.5	1.4	2222 479 72**183**	.. 76183
0.02(4)			2222 479 72**203**	.. 76203
0.022(4)	7.5 × 16.5 (18.0) × 17.5	1.5	2222 479 72**223**	.. 76223
0.024(4)			2222 479 72**243**	.. 76243
0.027(4)	8.0 × 17.0 (18.5) × 17.5	1.6	2222 479 72**273**	.. 76273
0.03(4)	8.5 × 17.5 (19.0) × 17.5	1.7	2222 479 72**303**	.. 76303
0.033(4)	9.0 × 18.0 (19.5) × 17.5	1.8	2222 479 72**333**	.. 76333
0.036(4)	9.5 × 18.5 (20.0) × 17.5	1.9	2222 479 72**363**	.. 76363
0.039(4)			2222 479 72**393**	.. 76393

Notes

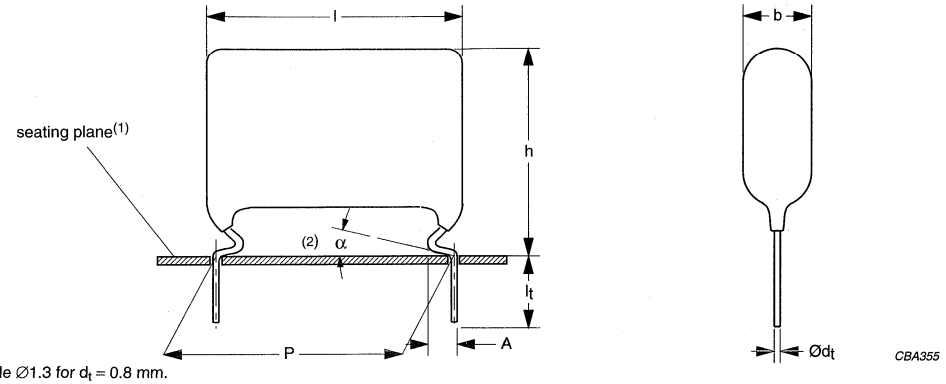
1. Dimensions in brackets for bent back leads.
2. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*:
   a) For pitch = 10.0 and 15.0 mm: H = 16.0 mm and P_0 = 12.7 mm.
   b) For pitch = 15/7.5 mm (bent back): H = 16.0 mm and P_0 = 15.0 mm.
   Standard reel diameter = 500 mm. Small reel diameter = 356 mm is available on request.
3. The shading indicates preferred types.
4. Under development.

AC and pulse metallized polypropylene film capacitors

MKP 479

MKP 479 GENERAL DATA

PITCH 22.5/27.5 mm



(1) Hole Ø1.3 for d_t = 0.8 mm.
(2) $0 \leq \alpha < 50°$.

Fig.17 Outline.

Specific reference data for the 1000 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
0.039 µF < C ≤ 0.1 µF	$\leq 5 \times 10^{-4}$	$\leq 20 \times 10^{-4}$
0.1 µF < C ≤ 0.15 µF	$\leq 5 \times 10^{-4}$	$\leq 25 \times 10^{-4}$
0.15 µF < C ≤ 0.22 µF	$\leq 5 \times 10^{-4}$	$\leq 30 \times 10^{-4}$
0.22 µF < C ≤ 0.27 µF	$\leq 5 \times 10^{-4}$	$\leq 35 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 1000 V (DC):		
P = 22.5 mm	200 V/µs	
P = 27.5 mm	110 V/µs	
R between leads, for C ≤ 1.0 µF at 100 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	>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 = 5.0 ±1.0 mm	±5%	2222 479 72...	preferred
	l_t = 3.5 ±0.5 mm	±5%	2222 479 74...	on request
Taped on reel	H = 16.0 mm; P_0 = 12.7 mm; note 2	±5%	2222 479 75...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*; taped on reel pitch = 27.5 mm is not available.
2. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse metallized polypropylene film capacitors

MKP 479

U_{Rdc} = 1000 V; U_{Rac} = 350 V/U_{p-p} = 1000 V

C (µF)	DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER[1] LOOSE IN BOX l_t = 5.0 ±1.0 mm C-tol = ±5%
Pitch = 22.5 ±0.4 mm; d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/–0.5 mm			
0.043[2]	7.0 × 19.0 × 26.0	1.8	2222 479 72433
0.047[2]			2222 479 72473
0.051[2]	7.5 × 19.5 × 26.0	1.9	2222 479 72513
0.056[2]			2222 479 72563
0.062[2]	8.0 × 21.0 × 26.0	2.0	2222 479 72623
0.068[2]	8.5 × 21.5 × 26.0	2.1	2222 479 72683
0.075[2]			2222 479 72753
0.082[2]	9.0 × 22.0 × 26.0	2.3	2222 479 72823
0.091[2]	9.5 × 22.5 × 26.0	2.5	2222 479 72913
0.1[2]	10.0 × 23.0 × 26.0	2.6	2222 479 72104
0.11[2]	10.5 × 23.5 × 26.0	2.7	2222 479 72114
Pitch = 27.5 ±0.4 mm; d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/–0.5 mm			
0.12[2]	9.5 × 22.5 × 31.0	5.0	2222 479 72124
0.13[2]	10.0 × 23.0 × 31.0	5.0	2222 479 72134
0.15[2]	11.0 × 24.0 × 31.0	5.5	2222 479 72154
0.16[2]			2222 479 72164
0.18[2]	12.0 × 25.0 × 31.0	6.0	2222 479 72184
0.20[2]	12.5 × 25.5 × 31.0	6.5	2222 479 72204
0.22[2]	13.0 × 26.0 × 31.0	6.5	2222 479 72224
0.24[2]	14.0 × 27.0 × 31.0	7.0	2222 479 72244
0.27[2]	14.5 × 27.5 × 31.0	7.5	2222 479 72274

Notes

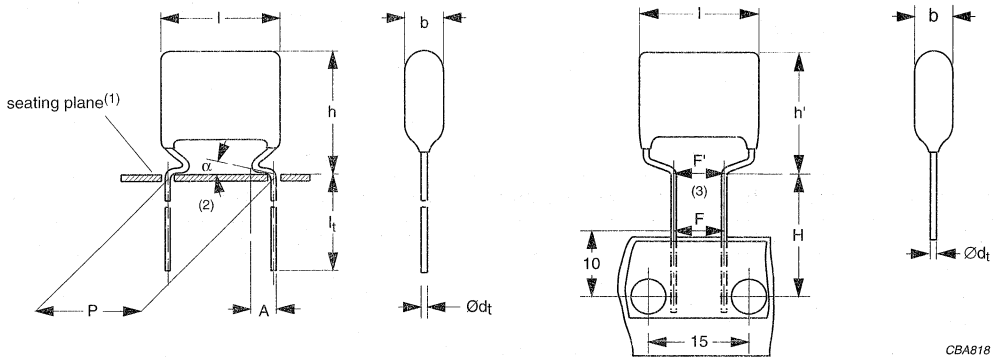
1. The shading indicates preferred types.
2. Under development.

AC and pulse metallized polypropylene film capacitors

MKP 479

MKP 479 GENERAL DATA

PITCH 15 mm
PITCH 7.5 mm (bent back leads)



(1) Hole Ø1.3 for d_t = 0.8 mm.
(2) $0 \leq \alpha < 50°$.
(3) $|F - F'| < 0.3$ mm.
F = 7.5 +0.6/–0.1 mm.

Fig.18 Outline.

Specific reference data for the 1250 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: C ≤ 0.024 µF	$\leq 5 \times 10^{-4}$	$\leq 15 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 1250 V (DC)	550 V/µs	
R between leads, for C ≤ 1.0 µF at 100 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	>500 V	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	2000 V; 1 minute	
Withstanding (DC)voltage between leads and case	2840 V; 1 minute	

Available 1250 V DC versions

PACKAGING(1)	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	l_t = 5.0 ±1.0 mm	±5%	2222 479 82...	preferred
	l_t = 3.5 ±0.5 mm	±5%	2222 479 84...	on request
Taped on reel	H = 16.0 mm; P_0 = 12.7 mm; note 2	±5%	2222 479 85...	on request
Taped on reel (bent back)	H = 16.0 mm; P_0 = 15.0 mm; note 2	±5%	2222 479 86...	preferred

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse metallized polypropylene film capacitors

MKP 479

U_{Rdc} = 1250 V; U_{Rac} = 440 V/U_{p-p} = 1250 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; H = 16.0 mm; P_0 = 15.0 mm(2)
			l_t = 5.0 ±1.0 mm	pitch 7.5 mm (bent back)
			C-tol = ±5%	C-tol = ±5%
			catalogue number(3)	catalogue number(3)
Pitch = 15.0 ±0.4 mm; (pitch = 7.5 ±0.4 mm for bent back leads); d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/–0.5 mm				
0.0082(4)	6.0 × 15.0 (16.5) × 17.5	1.2	2222 479 82**822**	.. 86**822**
0.0091(4)	6.5 × 15.5 (17.0) × 17.5	1.3	2222 479 82**912**	.. 86**912**
0.01(4)			2222 479 82**103**	.. 86**103**
0.011(4)			2222 479 82**113**	.. 86**113**
0.012(4)	7.0 × 16.0 (17.5) × 17.5	1.4	2222 479 82**123**	.. 86**123**
0.013(4)			2222 479 82**133**	.. 86**133**
0.015(4)	7.5 × 16.5 (18.0) × 17.5	1.5	2222 479 82**153**	.. 86**153**
0.016(4)	8.0 × 17.0 (18.5) × 17.5	1.6	2222 479 82**163**	.. 86**163**
0.018(4)			2222 479 82**183**	.. 86**183**
0.02(4)	8.5 × 17.5 (19.0) × 17.5	1.7	2222 479 82**203**	.. 86**203**
0.022(4)	9.0 × 18.0 (19.5) × 17.5	1.8	2222 479 82**223**	.. 86**223**
0.024(4)	9.5 × 18.5 (20.0) × 17.5	1.9	2222 479 82**243**	.. 86**243**

Notes

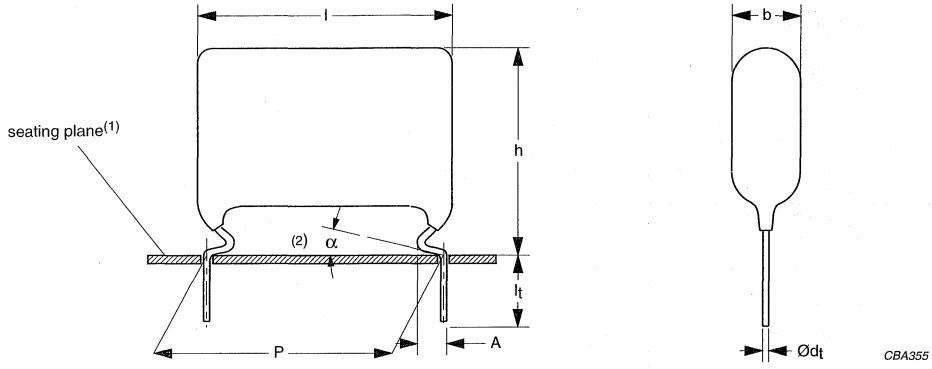
1. Dimensions in brackets for bent back leads.
2. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*:
   a) For pitch = 10.0 and 15.0 mm: H = 16.0 mm and P_0 = 12.7 mm.
   b) For pitch = 15/7.5 mm (bent back): H = 16.0 mm and P_0 = 15.0 mm.
   Standard reel diameter = 500 mm. Small reel diameter = 356 mm is available on request.
3. The shading indicates preferred types.
4. Under development.

AC and pulse metallized polypropylene film capacitors

MKP 479

MKP 479 GENERAL DATA

PITCH 22.5/27.5 mm



(1) Hole Ø1.3 for $d_t = 0.8$ mm.
(2) $0 \leq \alpha < 50°$.

Fig.19 Outline.

Specific reference data for the 1250 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
0.024 µF < C ≤ 0.068 µF	$\leq 5 \times 10^{-4}$	$\leq 20 \times 10^{-4}$
0.068 µF < C ≤ 0.1 µF	$\leq 5 \times 10^{-4}$	$\leq 25 \times 10^{-4}$
0.1 µF < C ≤ 0.18 µF	$\leq 5 \times 10^{-4}$	$\leq 30 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 1000 V (DC):		
P = 22.5 mm	250 V/µs	
P = 27.5 mm	140 V/µs	
R between leads, for C ≤ 1.0 µF at 100 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	>500 V	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	2000 V; 1 minute	
Withstanding (DC)voltage between leads and case	2840 V; 1 minute	

Available 1250 V DC versions

PACKAGING(1)	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	l_t = 5.0 ±1.0 mm	±5%	2222 479 82...	preferred
	l_t = 3.5 ±0.5 mm	±5%	2222 479 84...	on request
Taped on reel	H = 16.0 mm; P_0 = 12.7 mm; note 2	±5%	2222 479 85...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*; taped on reel pitch = 27.5 mm is not available.
2. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse metallized polypropylene film capacitors

MKP 479

U_{Rdc} = 1250 V; U_{Rac} = 440 V/U_{p-p} = 1250 V

C (µF)	DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER[1] LOOSE IN BOX l_t = 5.0 ±1.0 mm C-tol = ±5%
Pitch = 22.5 ±0.4 mm; d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/–0.5 mm			
0.027[2]	6.5 × 18.5 × 26.0	1.7	2222 479 82**273**
0.03[2]	7.0 × 19.0 × 26.0	1.8	2222 479 82**303**
0.033[2]	7.5 × 19.5 × 26.0	1.9	2222 479 82**333**
0.036[2]			2222 479 82**363**
0.039[2]	8.0 × 21.0 × 26.0	2.0	2222 479 82**393**
0.043[2]			2222 479 82**433**
0.047[2]	8.5 × 21.5 × 26.0	2.1	2222 479 82**473**
0.051[2]	9.0 × 22.0 × 26.0	2.3	2222 479 82**513**
0.056[2]	9.5 × 22.5 × 26.0	2.5	2222 479 82**563**
0.062[2]	10.0 × 23.0 × 26.0	2.6	2222 479 82**623**
0.068[2]	10.5 × 23.5 × 26.0	2.7	2222 479 82**683**
Pitch = 27.5 ±0.4 mm; d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/–0.5 mm			
0.075[2]	9.5 × 22.5 × 31.0	5.0	2222 479 82**753**
0.082[2]	10.0 × 23.0 × 31.0	5.0	2222 479 82**823**
0.091[2]	10.5 × 23.5 × 31.0	5.5	2222 479 82**913**
0.1[2]	11.0 × 24.0 × 31.0	5.5	2222 479 82**104**
0.11[2]	11.5 × 24.5 × 31.0	6.0	2222 479 82**114**
0.12[2]	12.0 × 25.0 × 31.0	6.0	2222 479 82**124**
0.13[2]	12.5 × 25.5 × 31.0	6.5	2222 479 82**134**
0.15[2]	13.5 × 26.5 × 31.0	7.0	2222 479 82**154**
0.16[2]	14.0 × 27.0 × 31.0	7.0	2222 479 82**164**
0.18[2]	15.0 × 28.0 × 31.0	7.5	2222 479 82**184**

Notes

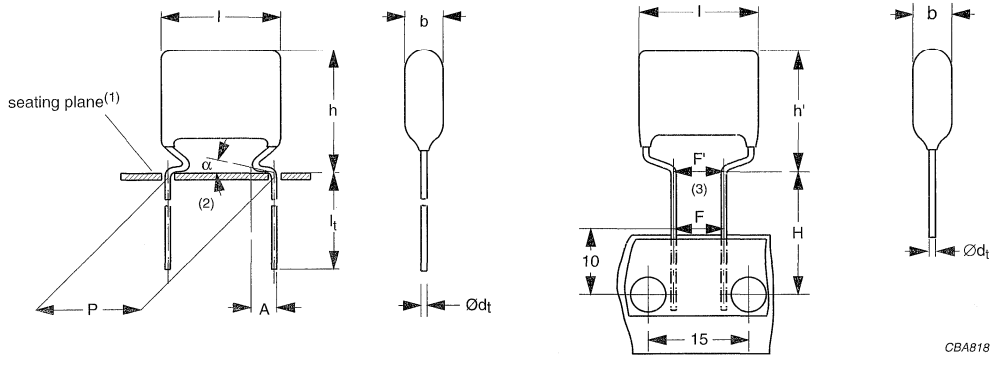
1. The shading indicates preferred types.
2. Under development.

AC and pulse metallized polypropylene film capacitors

MKP 479

MKP 479 GENERAL DATA

PITCH 15 mm
PITCH 7.5 mm (bent back leads)



(1) Hole ∅1.3 for d_t = 0.8 mm.
(2) $0 \leq \alpha < 50°$.
(3) $|F - F'| < 0.3$ mm.
F = 7.5 +0.6/–0.1 mm.

Fig.20 Outline.

Specific reference data for the 1600 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: C ≤ 0.013 µF	$\leq 5 \times 10^{-4}$	$\leq 15 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 1600 V (DC)	1400 V/µs	
R between leads, for C ≤ 1.0 µF at 100 V; 1 minute	>100000 MΩ	
R between leads and case; 500 V; 1 minute	>100000 MΩ	
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 = 5.0 ±1.0 mm	±5%	2222 479 02...	preferred
	l_t = 3.5 ±0.5 mm	±5%	2222 479 04...	on request
Taped on reel	H = 16.0 mm; P_0 = 12.7 mm; note 2	±5%	2222 479 05...	on request
Taped on reel (bent back)	H = 16.0 mm; P_0 = 15.0 mm; note 2	±5%	2222 479 06...	preferred

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse metallized polypropylene film capacitors

MKP 479

U_{Rdc} = 1600 V; U_{Rac} = 550 V/U_{p-p} = 1600 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; H = 16.0 mm; P_0 = 15.0 mm(2)
			l_t = 5.0 ±1.0 mm	pitch 7.5 mm (bent back)
			C-tol = ±5%	C-tol = ±5%
			catalogue number(3)	catalogue number(3)
Pitch = 15.0 ±0.4 mm (Pitch = 7.5 ±0.4 mm for bent back leads); d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/–0.5 mm				
0.0047(4)	6.0 × 15.0 (16.5) × 17.5	1.2	2222 479 02**472**	.. 06**472**
0.0051(4)			2222 479 02**512**	.. 06**512**
0.0056(4)	6.5 × 15.5 (17.0) × 17.5	1.3	2222 479 02**562**	.. 06**562**
0.0062(4)			2222 479 02**622**	.. 06**622**
0.0068(4)	7.0 × 16.0 (17.5) × 17.5	1.4	2222 479 02**682**	.. 06**682**
0.0075(4)			2222 479 02**752**	.. 06**752**
0.0082(4)	7.5 × 16.5 (18.0) × 17.5	1.5	2222 479 02**822**	.. 06**822**
0.0091(4)	8.0 × 17.0 (18.5) × 17.5	1.6	2222 479 02**912**	.. 06**912**
0.01(4)			2222 479 02**103**	.. 06**103**
0.011(4)	8.5 × 17.5 (19.0) × 17.5	1.7	2222 479 02**113**	.. 06**113**
0.012(4)	9.0 × 18.0 (19.5) × 17.5	1.8	2222 479 02**123**	.. 06**123**
0.013(4)			2222 479 02**133**	.. 06**133**

Notes

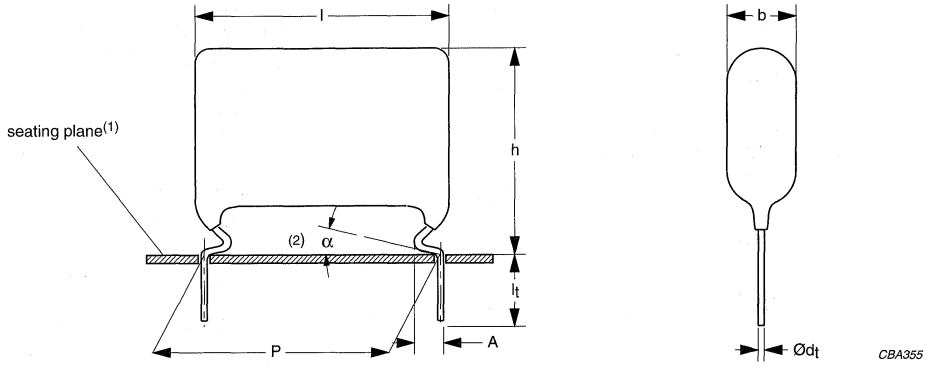
1. Dimensions in brackets for bent back leads.
2. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*:
   a) For pitch = 10.0 and 15.0 mm: H = 16.0 mm and P_0 = 12.7 mm.
   b) For pitch = 15/7.5 mm (bent back): H = 16.0 mm and P_0 = 15.0 mm.
   Standard reel diameter = 500 mm. Small reel diameter = 356 mm is available on request.
3. The shading indicates preferred types.
4. Under development.

AC and pulse metallized polypropylene film capacitors

MKP 479

MKP 479 GENERAL DATA

PITCH 22.5/27.5 mm



(1) Hole ∅1.3 for d_t = 0.8 mm.
(2) $0 \leq \alpha < 50°$.

Fig.21 Outline.

Specific reference data for the 1600 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
0.013 μF < C ≤ 0.036 μF	$\leq 5 \times 10^{-4}$	$\leq 20 \times 10^{-4}$
0.036 μF < C ≤ 0.1 μF	$\leq 5 \times 10^{-4}$	$\leq 25 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 1600 V (DC):		
P = 22.5 mm	550 V/μs	
P = 27.5 mm	350 V/μs	
R between leads, for C ≤ 1.0 μF at 100 V; 1 minute	>100000 MΩ	
R between leads and case; 500 V; 1 minute	>100000 MΩ	
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 = 5.0 ±1.0 mm	±5%	2222 479 02...	preferred
	l_t = 3.5 ±0.5 mm	±5%	2222 479 04...	on request
Taped on reel	H = 16.0 mm; P_0 = 12.7 mm; note 2	±5%	2222 479 05...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*; taped on reel pitch = 27.5 mm is not available.
2. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse metallized polypropylene film capacitors

MKP 479

U_{Rdc} = 1600 V; U_{Rac} = 550 V/U_{p-p} = 1600 V

C (µF)	DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER[1] LOOSE IN BOX l_t = 5.0 ±1.0 mm C-tol = ±5%
Pitch = 22.5 ±0.4 mm; d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/–0.5 mm			
0.015[2]	6.5 × 18.5 × 26.0	1.7	2222 479 02**153**
0.016[2]	7.0 × 19.0 × 26.0	1.8	2222 479 02**163**
0.018[2]			2222 479 02**183**
0.02[2]	7.5 × 19.5 × 26.0	1.9	2222 479 02**203**
0.022[2]	8.0 × 21.0 × 26.0	2.0	2222 479 02**223**
0.024[2]			2222 479 02**243**
0.027[2]	8.5 × 21.5 × 26.0	2.1	2222 479 02**273**
0.03[2]	9.0 × 22.0 × 26.0	2.3	2222 479 02**303**
0.033[2]	9.5 × 22.5 × 26.0	2.5	2222 479 02**333**
0.036[2]	10.0 × 23.0 × 26.0	2.6	2222 479 02**363**
0.039[2]	10.5 × 23.5 × 26.0	2.7	2222 479 02**393**
Pitch = 27.5 ±0.4 mm; d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/–0.5 mm			
0.043[2]	10.0 × 23.0 × 31.0	5.0	2222 479 02**433**
0.047[2]			2222 479 02**473**
0.051[2]	10.5 × 23.5 × 31.0	5.5	2222 479 02**513**
0.056[2]	11.0 × 24.0 × 31.0	5.5	2222 479 02**563**
0.062[2]	12.0 × 25.0 × 31.0	6.0	2222 479 02**623**
0.068[2]	12.5 × 25.5 × 31.0	6.5	2222 479 02**683**
0.075[2]	13.0 × 26.0 × 31.0	6.5	2222 479 02**753**
0.082[2]	13.5 × 26.5 × 31.0	7.0	2222 479 02**823**
0.091[2]	14.5 × 27.5 × 31.0	7.5	2222 479 02**913**
0.1[2]	15.0 × 28.0 × 31.0	7.5	2222 479 02**104**

Notes

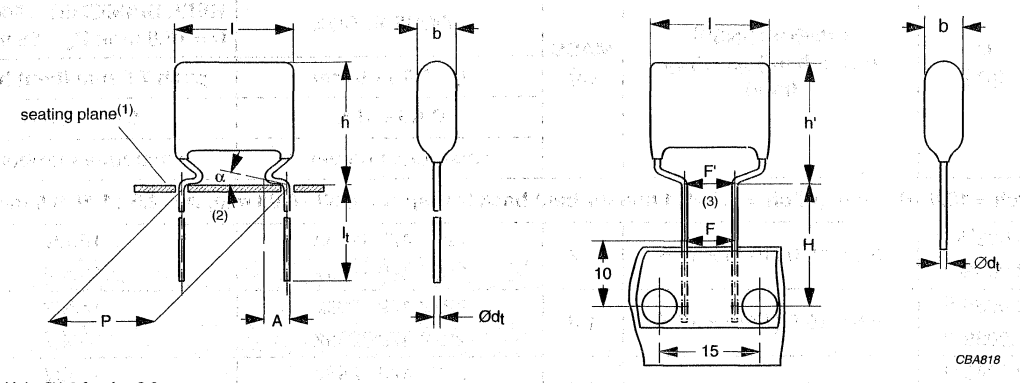
1. The shading indicates preferred types.
2. Under development.

AC and pulse metallized polypropylene film capacitors

MKP 479

MKP 479 GENERAL DATA

PITCH 15 mm
PITCH 7.5 mm (bent back leads)



(1) Hole Ø1.3 for d_t = 0.8 mm.
(2) $0 \leq \alpha < 50°$.
(3) $|F - F'| < 0.3$ mm.
F = 7.5 +0.6/–0.1 mm.

Fig.22 Outline.

Specific reference data for the 2000 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: C ≤ 0.0091 µF	$\leq 5 \times 10^{-4}$	$\leq 15 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 2000 V (DC)	1700 V/µs	
R between leads, for C ≤ 1.0 µF at 100 V; 1 minute	>100000 MΩ	
R between leads and case; 500 V; 1 minute	>100000 MΩ	
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 = 5.0 ±1.0 mm	±5%	2222 479 12...	preferred
	l_t = 3.5 ±0.5 mm	±5%	2222 479 14...	on request
Taped on reel	H = 16.0 mm; P_0 = 12.7 mm; note 2	±5%	2222 479 15...	on request
Taped on reel (bent back)	H = 16.0 mm; P_0 = 15.0 mm; note 2	±5%	2222 479 16...	preferred

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse metallized polypropylene film capacitors

MKP 479

U_{Rdc} = 2000 V; U_{Rac} = 700 V/U_{p-p} = 2000 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; H = 16.0 mm; P_0 = 15.0 mm[2]
			l_t = 5.0 ±1.0 mm	pitch 7.5 mm (bent back)
			C-tol = ±5%	C-tol = ±5%
			catalogue number[3]	catalogue number[3]
Pitch = 15.0 ±0.4 mm; (pitch = 7.5 ±0.4 mm for bent back leads); d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/–0.5 mm				
0.003[4]	6.0 × 15.0 (16.5) × 17.5	1.2	2222 479 12302	.. 16302
0.0033[4]			2222 479 12332	.. 16332
0.0036[4]	6.5 × 15.5 (17.0) × 17.5	1.3	2222 479 12362	.. 16362
0.0039[4]			2222 479 12392	.. 16392
0.0043[4]	7.0 × 16.0 (17.5) × 17.5	1.4	2222 479 12432	.. 16432
0.0047[4]			2222 479 12472	.. 16472
0.0051[4]	7.5 × 16.5 (18.0) × 17.5	1.5	2222 479 12512	.. 16512
0.0056[4]			2222 479 12562	.. 16562
0.0062[4]	8.0 × 17.0 (18.5) × 17.5	1.6	2222 479 12622	.. 16622
0.0068[4]	8.5 × 17.5 (19.0) × 17.5	1.7	2222 479 12682	.. 16682
0.0075[4]			2222 479 12752	.. 16752
0.0082[4]	9.0 × 18.0 (19.5) × 17.5	1.8	2222 479 12822	.. 16822
0.0091[4]	9.5 × 18.5 (20.0) × 17.5	1.9	2222 479 12912	.. 16912

Notes

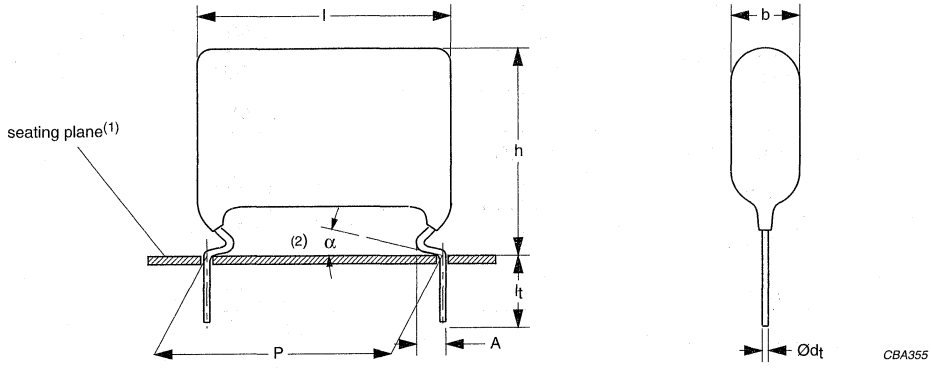
1. Dimensions in brackets for bent back leads.
2. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*.
   a) For pitch = 10.0 and 15.0 mm: H = 16.0 mm and P_0 = 12.7 mm.
   b) For pitch = 15/7.5 mm (bent back): H = 16.0 mm and P_0 = 15.0 mm.
   Standard reel diameter = 500 mm. Small reel diameter = 356 mm is available on request.
3. The shading indicates preferred types.
4. Under development.

AC and pulse metallized polypropylene film capacitors

MKP 479

MKP 479 GENERAL DATA

PITCH 22.5/27.5 mm



(1) Hole ∅1.3 for d_t = 0.8 mm.
(2) $0 \leq \alpha < 50°$.

Fig.23 Outline.

Specific reference data for the 2000 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: 0.0091 µF < C ≤ 0.027 µF 0.027 µF < C ≤ 0.056 µF	 $\leq 5 \times 10^{-4}$ $\leq 5 \times 10^{-4}$	 $\leq 18 \times 10^{-4}$ $\leq 20 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 2000 V (DC): P = 22.5 mm P = 27.5 mm	 700 V/µs 450 V/µs	
R between leads, for C ≤ 1.0 µF at 100 V; 1 minute	>100000 MΩ	
R between leads and case; 500 V; 1 minute	>100000 MΩ	
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 = 5.0 ±1.0 mm	±5%	2222 479 12...	preferred
	l_t = 3.5 ±0.5 mm	±5%	2222 479 14...	on request
Taped on reel	H = 16.0 mm; P_0 = 12.7 mm; note 2	±5%	2222 479 15...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*; taped on reel pitch = 27.5 mm is not available.
2. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse metallized polypropylene film capacitors

MKP 479

U_{Rdc} = 2000 V; U_{Rac} = 700 V/U_{p-p} = 2000 V

C (µF)	DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER[1] LOOSE IN BOX l_t = 5.0 ±1.0 mm C-tol = ±5%
Pitch = 22.5 ±0.4 mm; d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/–0.5 mm			
0.01[2]	6.5 × 18.5 × 26.0	1.7	2222 479 12**103**
0.011[2]	7.0 × 19.0 × 26.0	1.8	2222 479 12**113**
0.012[2]			2222 479 12**123**
0.013[2]	7.5 × 19.5 × 26.0	1.9	2222 479 12**133**
0.015[2]	8.0 × 21.0 × 26.0	2.0	2222 479 12**153**
0.016[2]			2222 479 12**163**
0.018[2]	8.5 × 21.5 × 26.0	2.1	2222 479 12**183**
0.02[2]	9.0 × 22.0 × 26.0	2.3	2222 479 12**203**
0.022[2]	9.5 × 22.5 × 26.0	2.5	2222 479 12**223**
0.024[2]	10.0 × 23.0 × 26.0	2.6	2222 479 12**243**
0.027[2]	10.5 × 23.5 × 26.0	2.7	2222 479 12**273**
Pitch = 27.5 ±0.4 mm; d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/–0.5 mm			
0.03[2]	10.0 × 23.0 × 31.0	5.0	2222 479 12**303**
0.033[2]	10.5 × 23.5 × 31.0	5.5	2222 479 12**333**
0.036[2]	11.0 × 24.0 × 31.0	5.5	2222 479 12**363**
0.039[2]	11.5 × 24.5 × 31.0	6.0	2222 479 12**393**
0.043[2]	12.0 × 25.0 × 31.0	6.0	2222 479 12**433**
0.047[2]	13.0 × 26.0 × 31.0	6.5	2222 479 12**473**
0.051[2]	13.5 × 26.5 × 31.0	7.0	2222 479 12**513**
0.056[2]	14.0 × 27.0 × 31.0	7.0	2222 479 12**563**

Notes

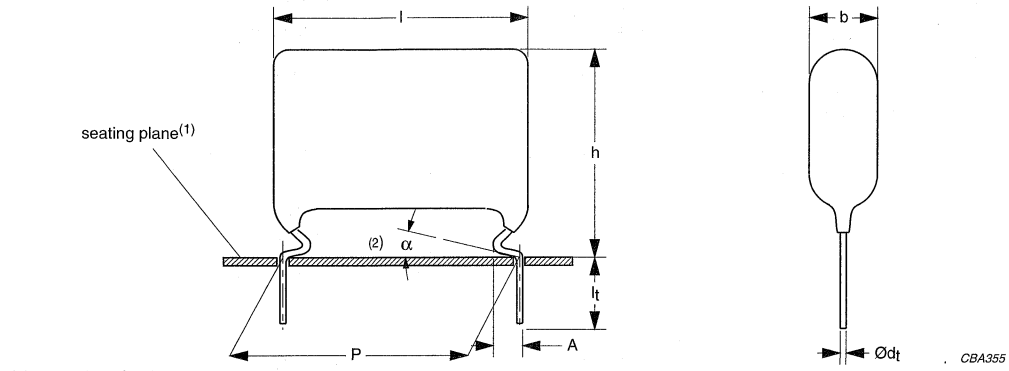
1. The shading indicates preferred types.
2. Under development.

AC and pulse metallized polypropylene film capacitors

MKP 479

MKP 479 GENERAL DATA

PITCH 22.5/27.5 mm



(1) Hole Ø1.3 for d_t = 0.8 mm.
(2) $0 \leq \alpha < 50°$

Fig.24 Outline.

Specific reference data for the 2500 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: C ≤ 0.033 μF	$\leq 5 \times 10^{-4}$	$\leq 15 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 2500 V (DC): P = 22.5 mm P = 27.5 mm	1700 V/μs 900 V/μs	
R between leads, for C ≤ 1.0 μF at 100 V; 1 minute	>100000 MΩ	
R between leads and case; 500 V; 1 minute	>100000 MΩ	
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(1)	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	l_t = 5.0 ±1.0 mm	±5%	2222 479 22...	preferred
	l_t = 3.5 ±0.5 mm	±5%	2222 479 24...	on request
Taped on reel	H = 16.0 mm; P_0 = 12.7 mm; note 2	±5%	2222 479 25...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*; taped on reel pitch = 27.5 mm is not available.
2. H = in-tape height; P_0 = sprocket hole distance; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse metallized polypropylene film capacitors

MKP 479

U_{Rdc} = 2500 V; U_{Rac} = 900 V/U_{p-p} = 2500 V

C (µF)	DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER(1) LOOSE IN BOX l_t = 5.0 ±1.0 mm C-tol = ±5%
Pitch = 22.5 ±0.4 mm; d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/–0.5 mm			
0.002(2)	7.0 × 19.0 × 26.0	1.8	2222 479 22202
0.0022(2)			2222 479 22222
0.0024(2)			2222 479 22242
0.0027(2)			2222 479 22272
0.003(2)			2222 479 22302
0.0033(2)			2222 479 22332
0.0036(2)			2222 479 22362
0.0039(2)			2222 479 22392
0.0043(2)			2222 479 22432
0.0047(2)			2222 479 22472
0.0051(2)			2222 479 22512
0.0056(2)			2222 479 22562
0.0062(2)	7.5 × 19.5 × 26.0	1.9	2222 479 22622
0.0068(2)			2222 479 22682
0.0075(2)	8.0 × 21.0 × 26.0	2.0	2222 479 22752
0.0082(2)	8.5 × 21.5 × 26.0	2.1	2222 479 22822
0.0091(2)			2222 479 22912
0.01(2)	9.0 × 22.0 × 26.0	2.3	2222 479 22103
0.011(2)	9.5 × 22.5 × 26.0	2.5	2222 479 22113
0.012(2)	10.0 × 23.0 × 26.0	2.6	2222 479 22123
0.013(2)	10.5 × 23.5 × 26.0	2.7	2222 479 22133
Pitch = 27.5 ±0.4 mm; d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/–0.5 mm			
0.015(2)	9.5 × 22.5 × 31.0	5.0	2222 479 22153
0.016(2)	10.0 × 23.0 × 31.0	5.0	2222 479 22163
0.018(2)	10.5 × 23.5 × 31.0	5.5	2222 479 22183
0.02(2)	11.0 × 24.0 × 31.0	5.5	2222 479 22203
0.022(2)	12.0 × 25.0 × 31.0	6.0	2222 479 22223
0.024(2)	12.5 × 25.5 × 31.0	6.5	2222 479 22243
0.027(2)	13.0 × 26.0 × 31.0	6.5	2222 479 22273
0.03(2)	14.0 × 27.0 × 31.0	7.0	2222 479 22303
0.033(2)	14.5 × 27.5 × 31.0	7.5	2222 479 22333

Notes

1. The shading indicates preferred types.
2. Under development.

AC and pulse metallized polypropylene film capacitors

MKP 479

CONSTRUCTION

Description

- Low-inductive wound cell of metallized polypropylene (PP) film, epoxy lacquered
- Radial leads, solder-coated wire:
  - Copper clad steel wire for original pitch = 10 and 15 mm
  - Copper wire for original pitch = 22.5 and 27.5 mm.

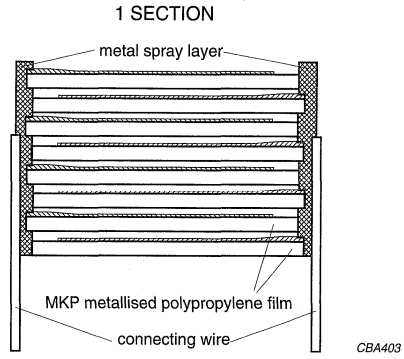


Fig.25 Construction: 160-250-400-630 V versions.

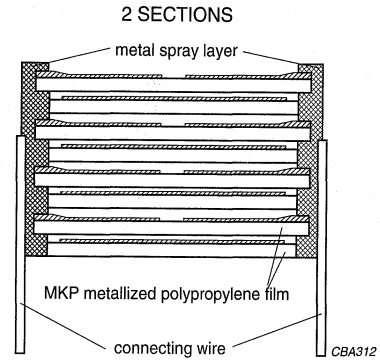


Fig.26 Construction: 1000 V-1250 V versions.

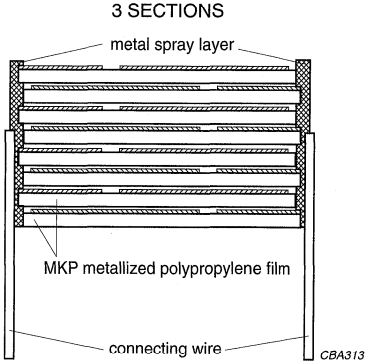


Fig.27 Construction: 1600 V-2000 V versions.

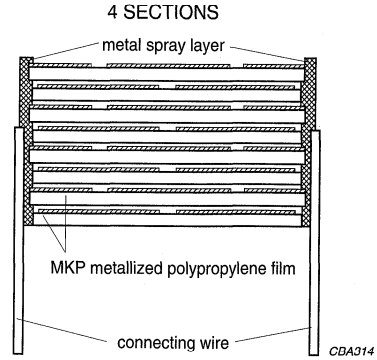


Fig.28 Construction: 2500 V versions.

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 ±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%.

CHARACTERISTICS

Capacitance

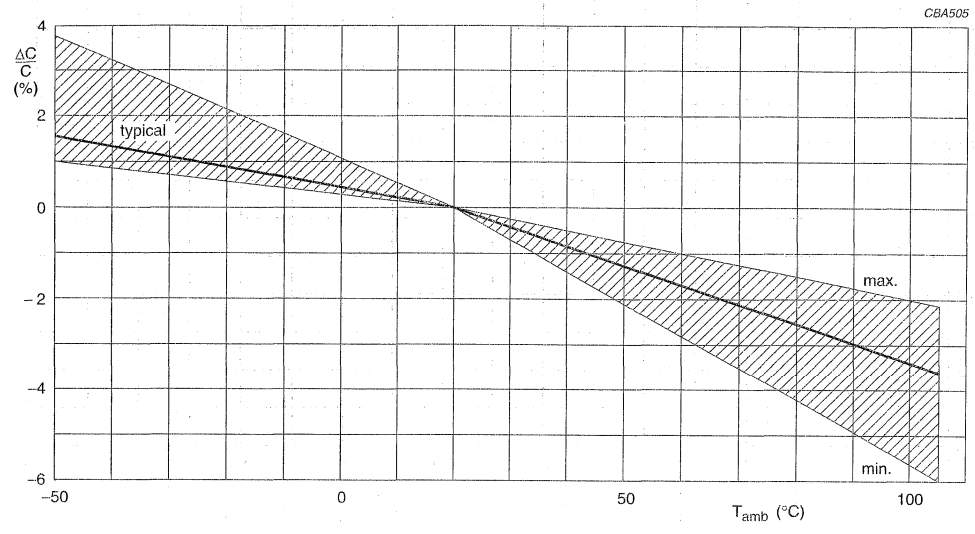


Fig.29 Capacitance change at 1 kHz as a function of temperature.

Impedance

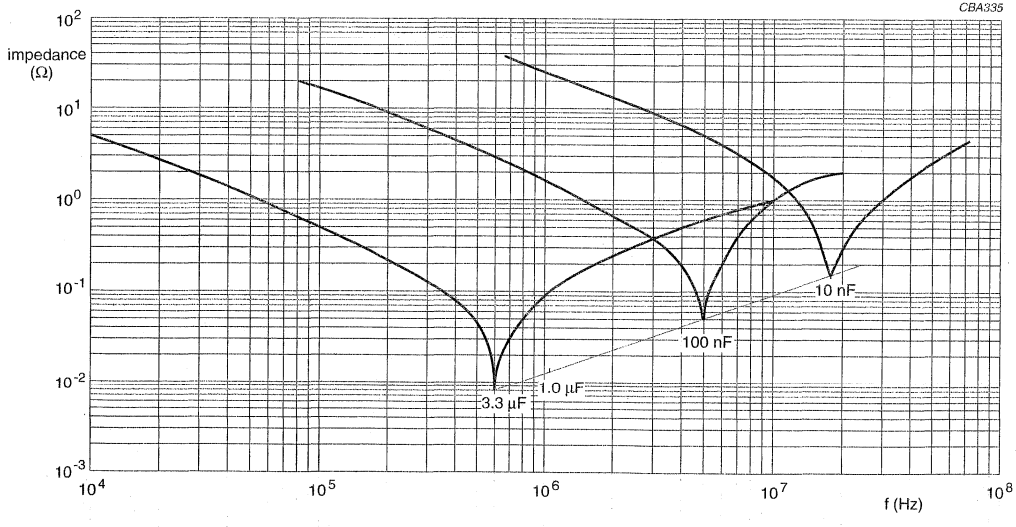


Fig.30 Impedance as a function of frequency: typical curves.

Maximum DC and AC voltage as a function of temperature

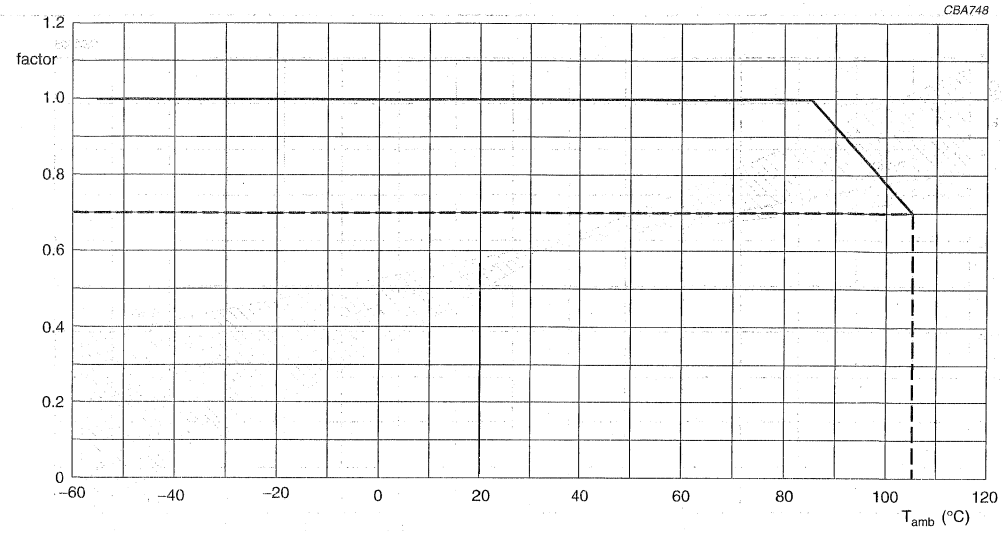


Fig.31 Multiplying factor for DC and AC voltage as a function of temperature.

Maximum RMS voltage (sinewave) as a function of frequency

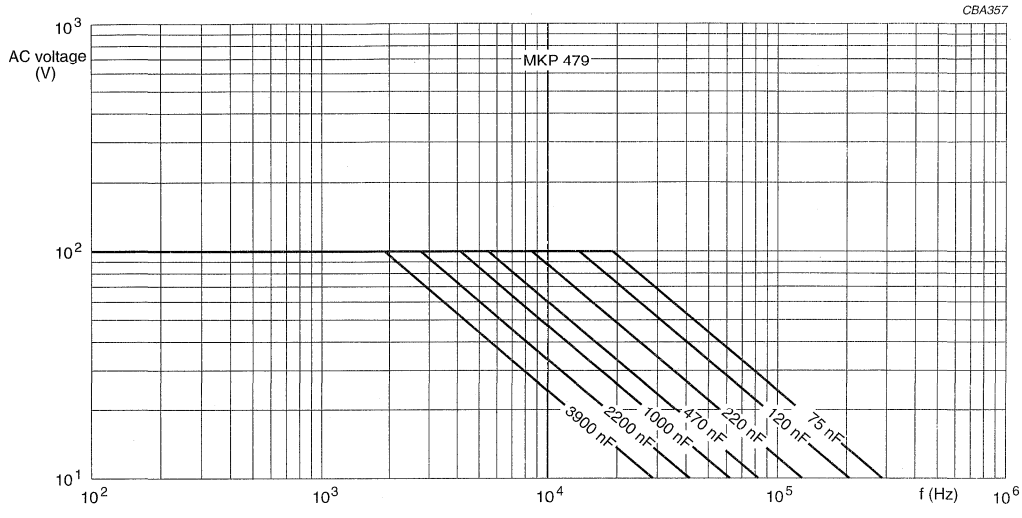


Fig.32 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C for $U_{Rdc} = 160$ V.

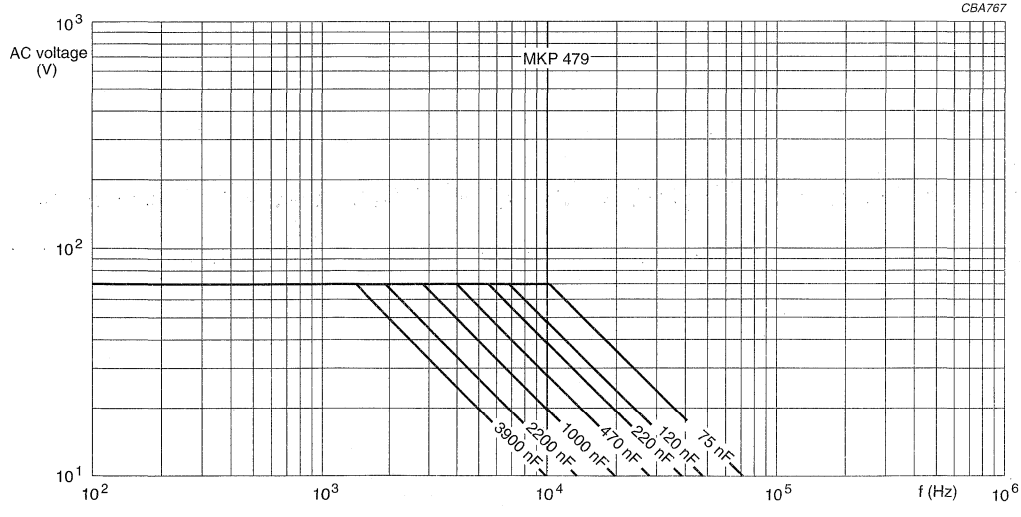


Fig.33 AC voltage (RMS value) as a function of frequency at 85 °C < $T_{amb} \leq 105$ °C for $U_{Rdc} = 160$ V.

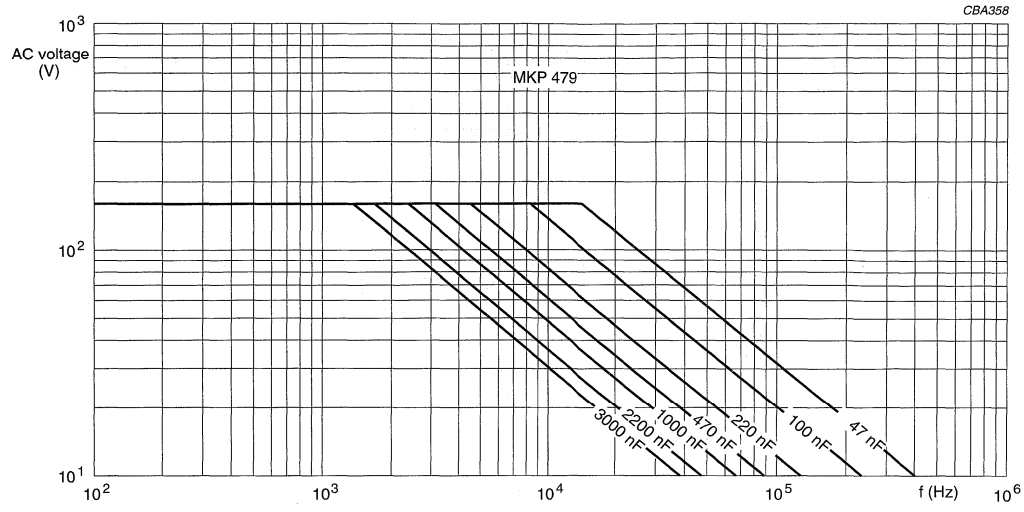


Fig.34 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C for $U_{Rdc} = 250$ V.

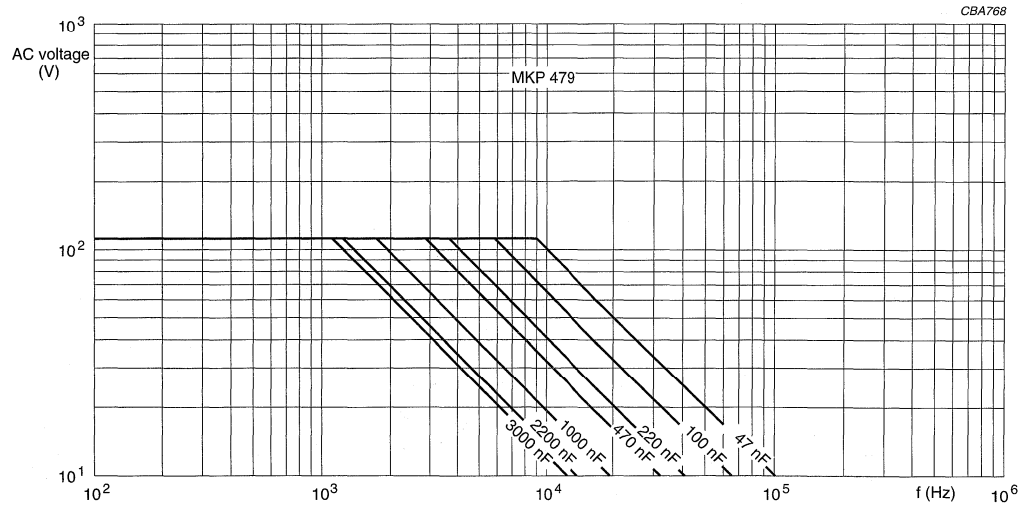


Fig.35 AC voltage (RMS value) as a function of frequency at 85 °C < $T_{amb} \leq 105$ °C for $U_{Rdc} = 250$ V.

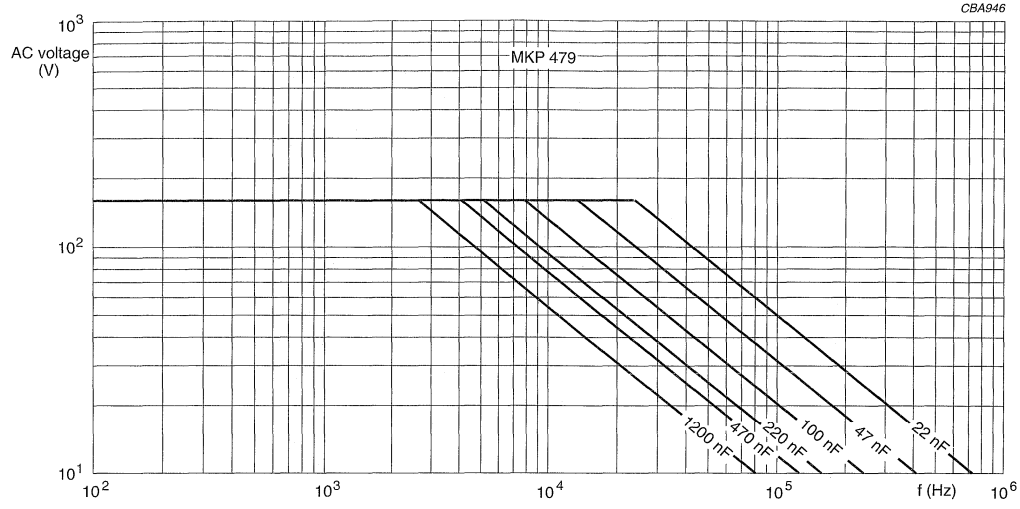


Fig.36 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C for $U_{Rdc} = 250$ V (monitor type).

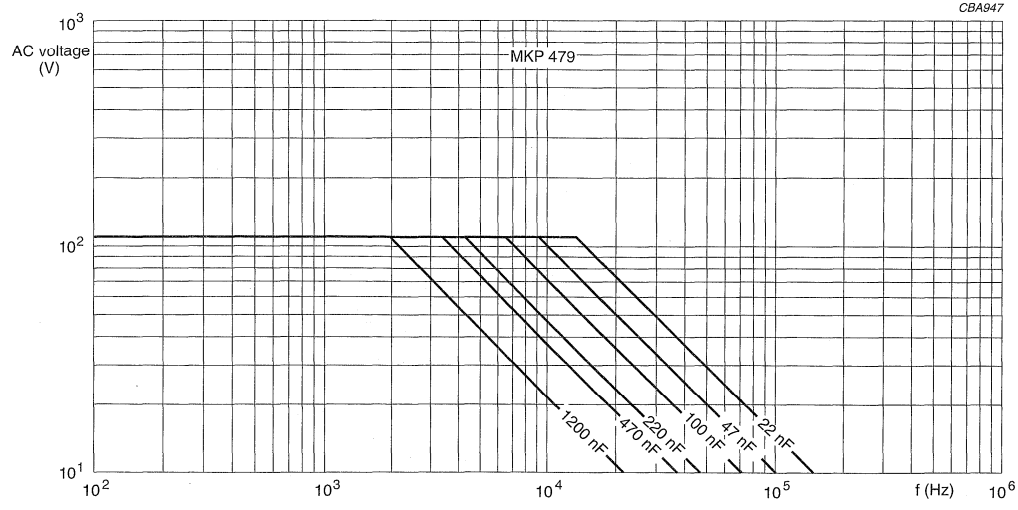


Fig.37 AC voltage (RMS value) as a function of frequency at 85 °C < $T_{amb} \leq 105$ °C for $U_{Rdc} = 250$ V (monitor type).

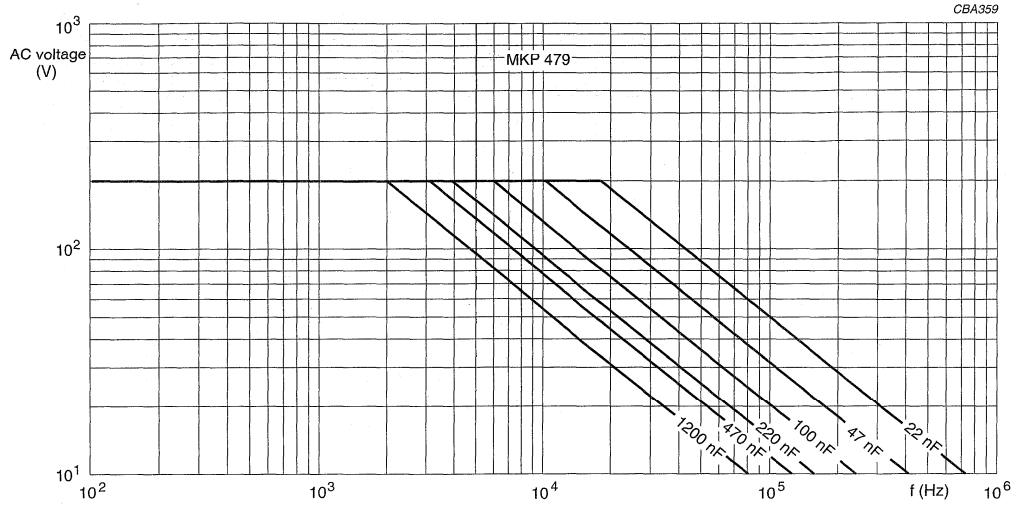


Fig.38 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C for $U_{Rdc} = 400$ V.

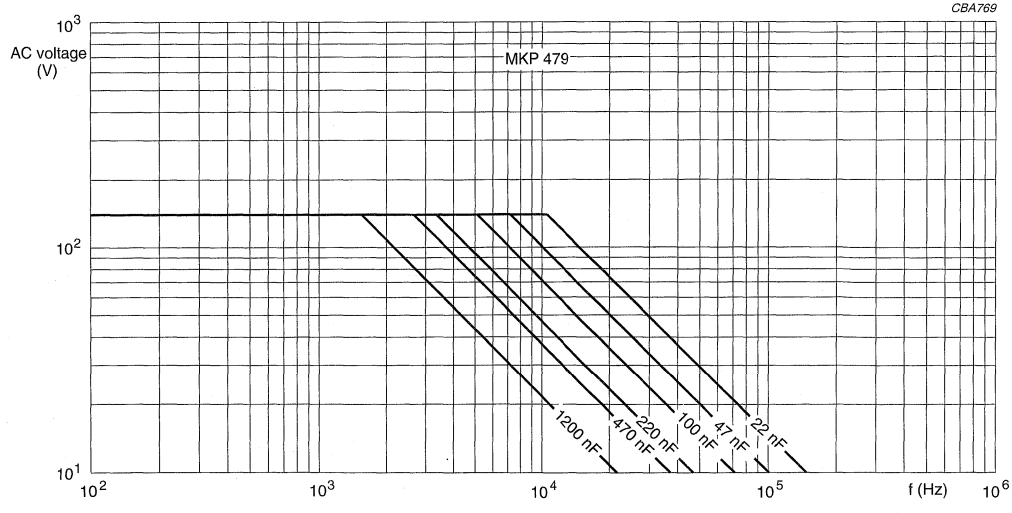


Fig.39 AC voltage (RMS value) as a function of frequency at 85 °C < $T_{amb} \leq 105$ °C for $U_{Rdc} = 400$ V.

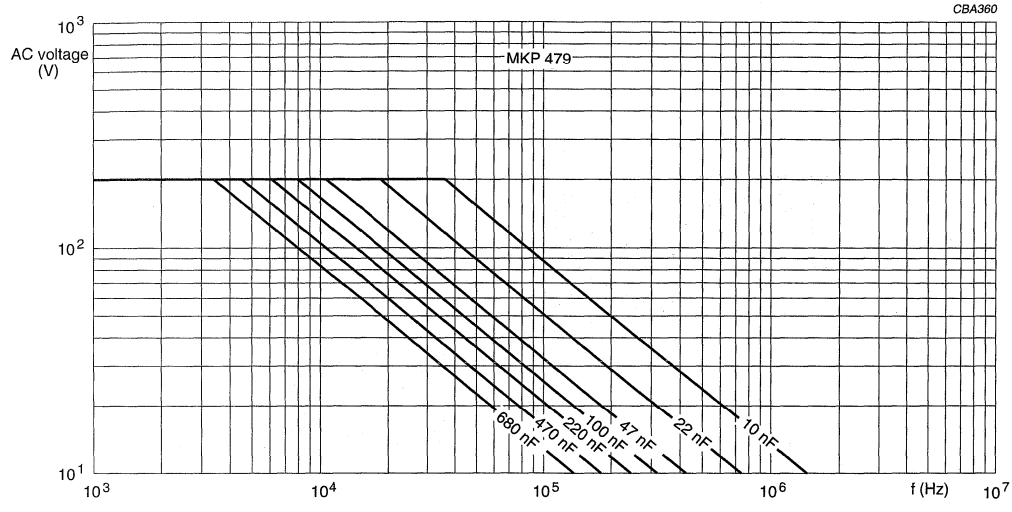


Fig.40 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C for $U_{Rdc} = 400$ V (monitor type).

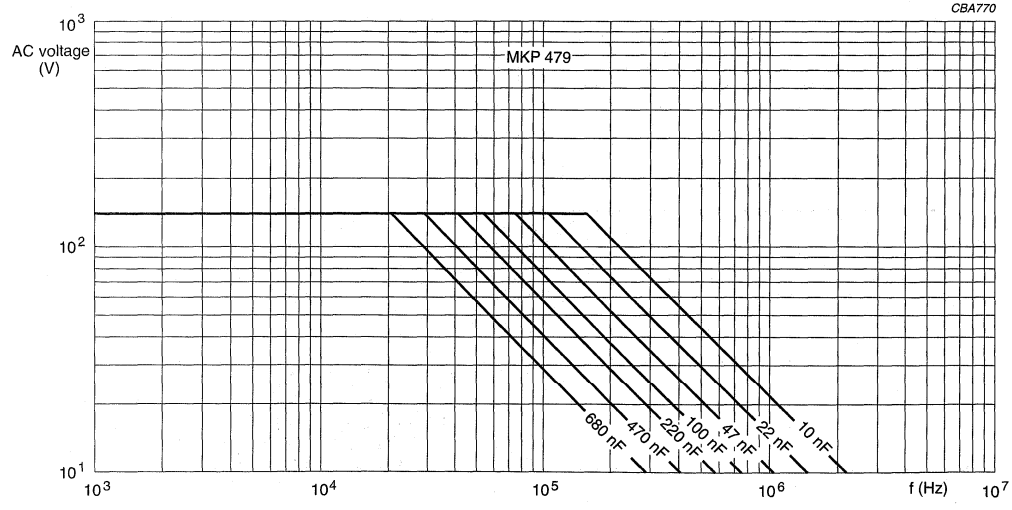


Fig.41 AC voltage (RMS value) as a function of frequency at 85 °C < $T_{amb} \leq 105$ °C for $U_{Rdc} = 400$ V (monitor type).

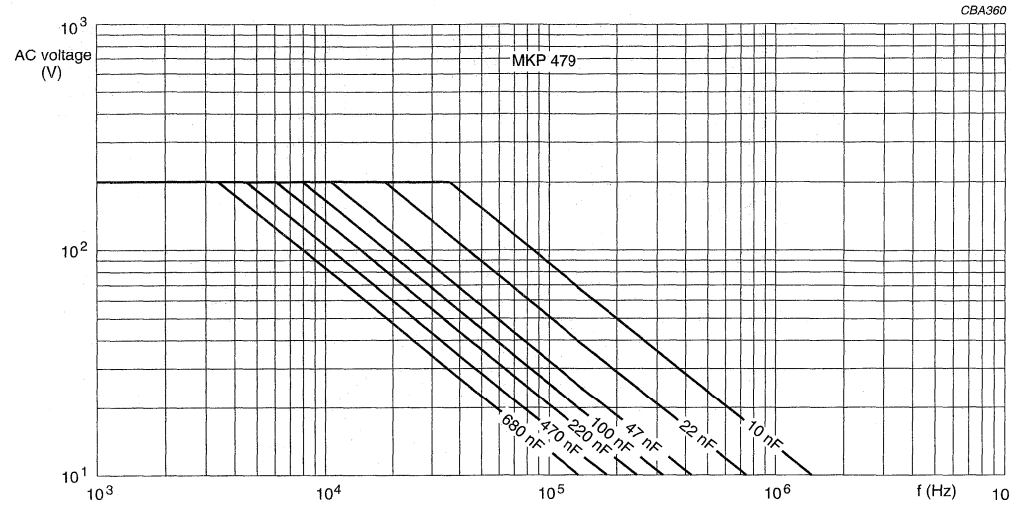


Fig.42 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C for $U_{Rdc} = 630$ V.

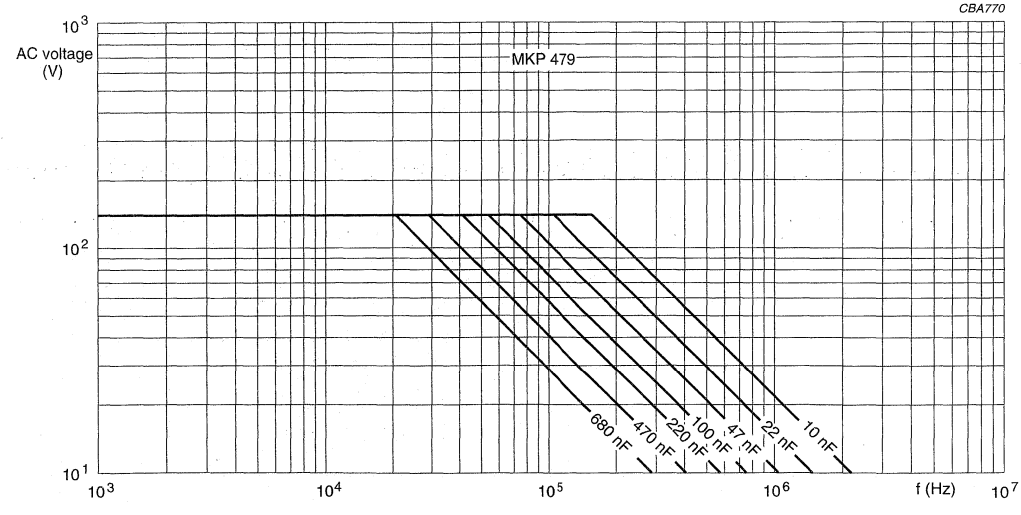


Fig.43 AC voltage (RMS value) as a function of frequency at 85 °C < $T_{amb} \leq 105$ °C for $U_{Rdc} = 630$ V.

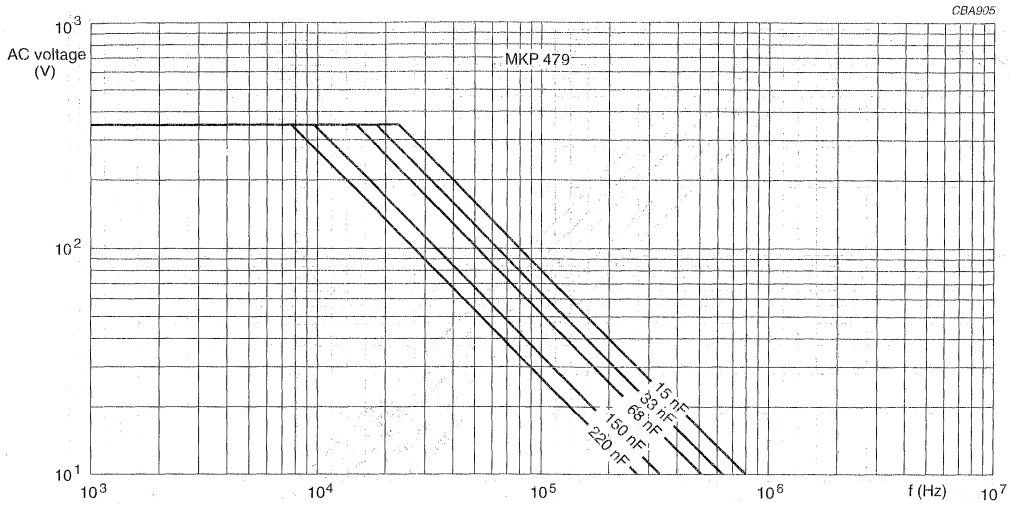


Fig.44 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C for U_{Rdc} = 1000 V.

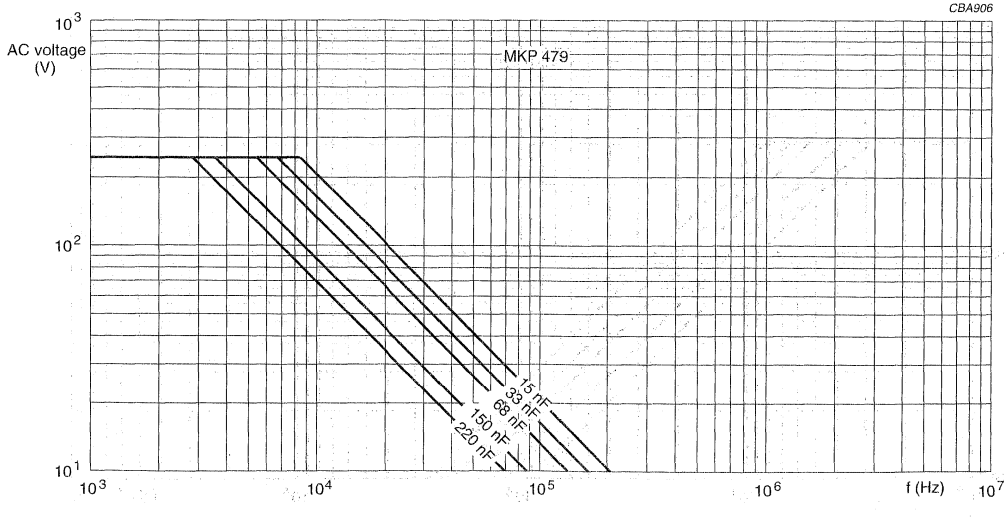


Fig.45 AC voltage (RMS value) as a function of frequency at 85 °C < $T_{amb} \leq$ 105 °C for U_{Rdc} = 1000 V.

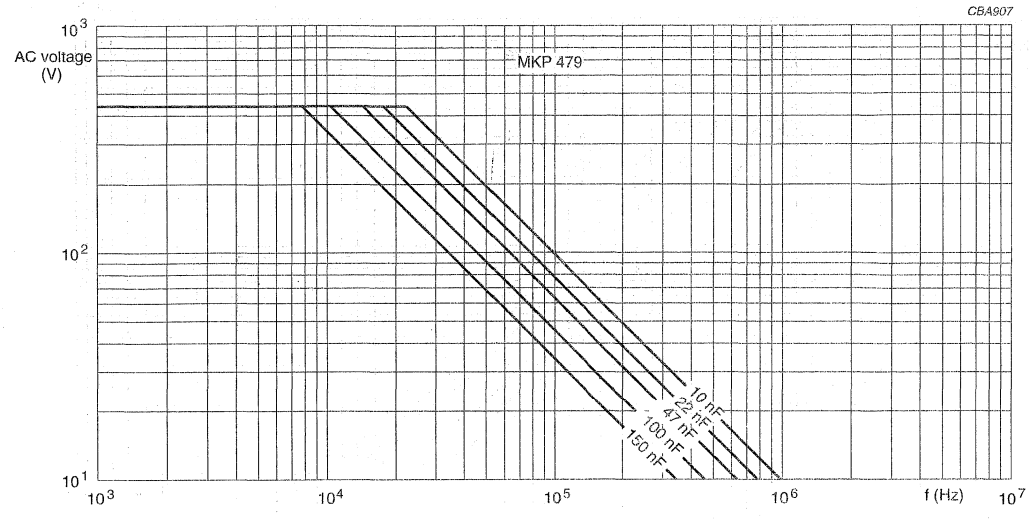


Fig.46 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C for $U_{Rdc} = 1250$ V.

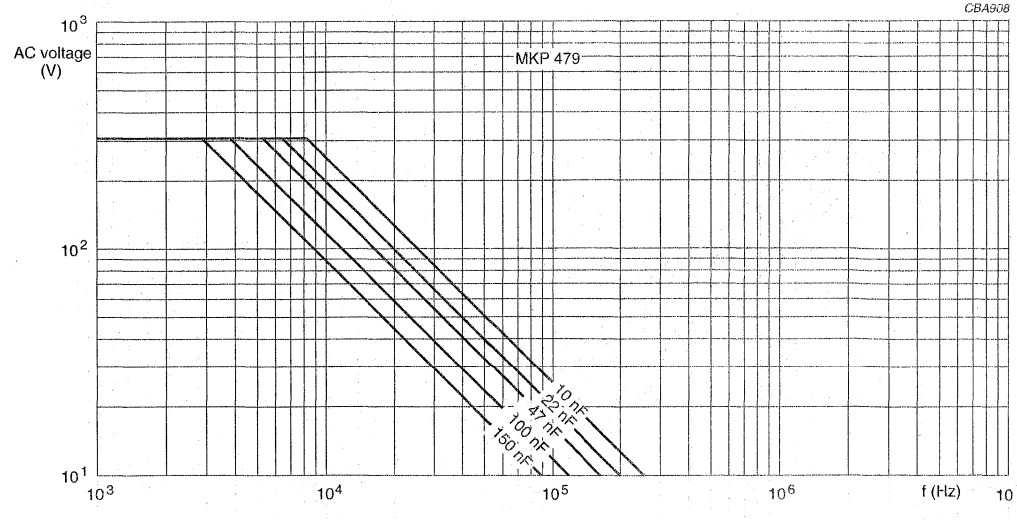


Fig.47 AC voltage (RMS value) as a function of frequency at 85 °C < $T_{amb} \leq 105$ °C for $U_{Rdc} = 1250$ V.

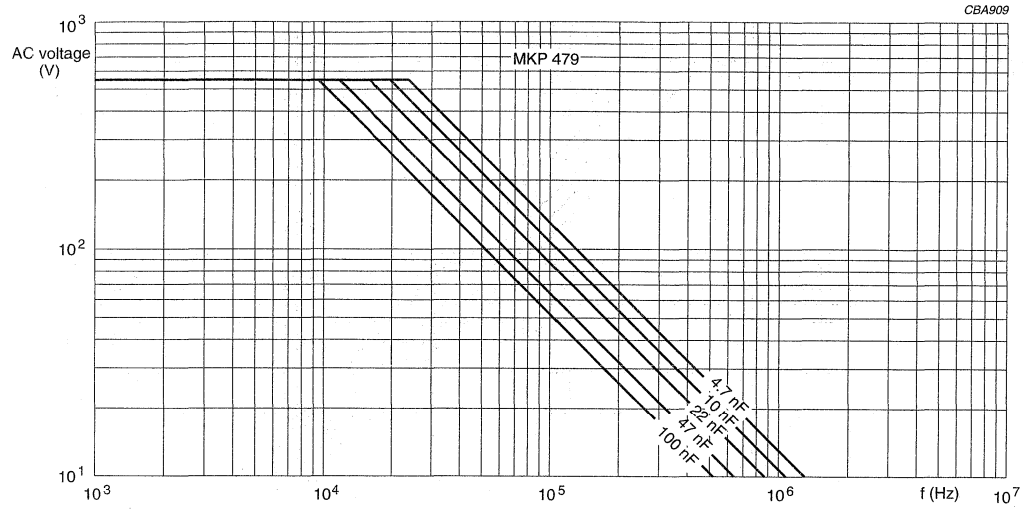


Fig.48 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C for $U_{Rdc} = 1600$ V.

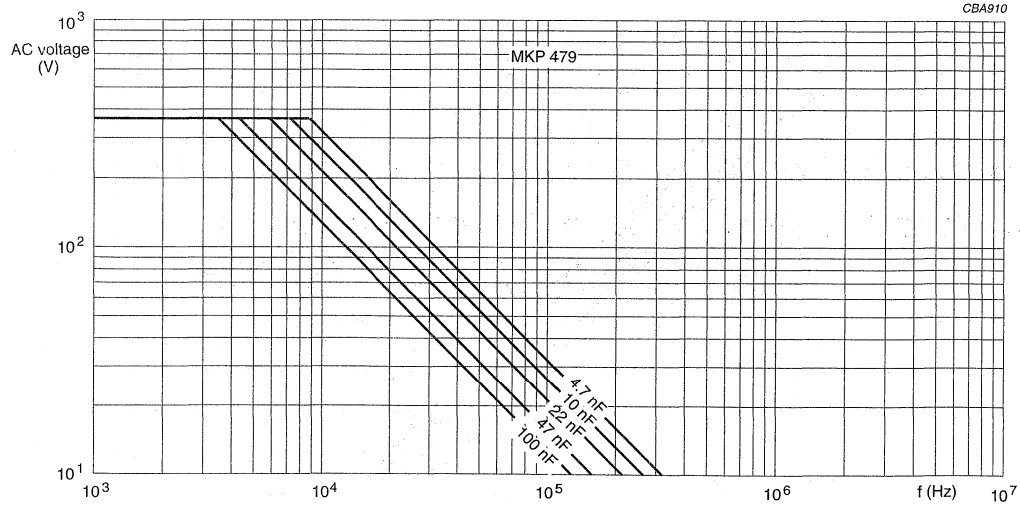


Fig.49 AC voltage (RMS value) as a function of frequency at 85 °C < $T_{amb} \leq 105$ °C for $U_{Rdc} = 1600$ V.

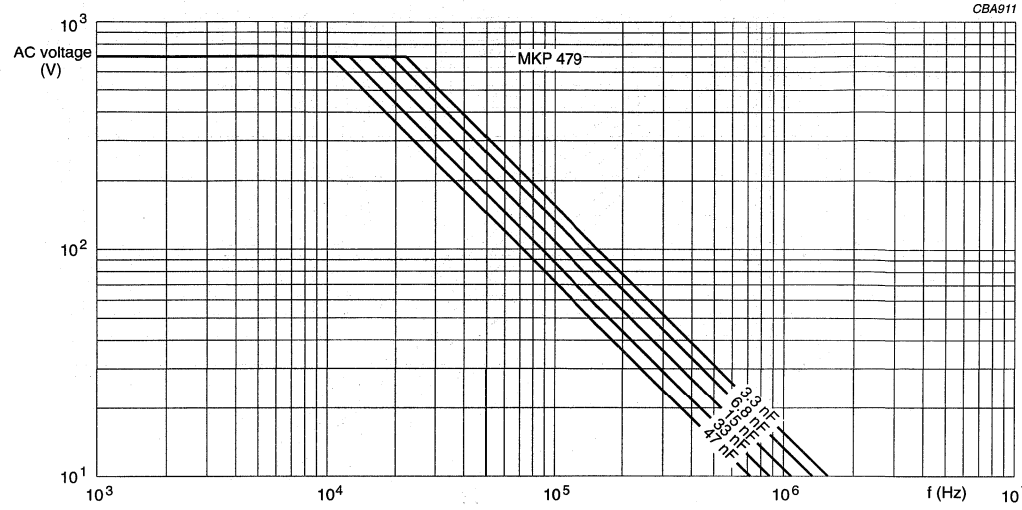


Fig.50 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C for $U_{Rdc} = 2000$ V.

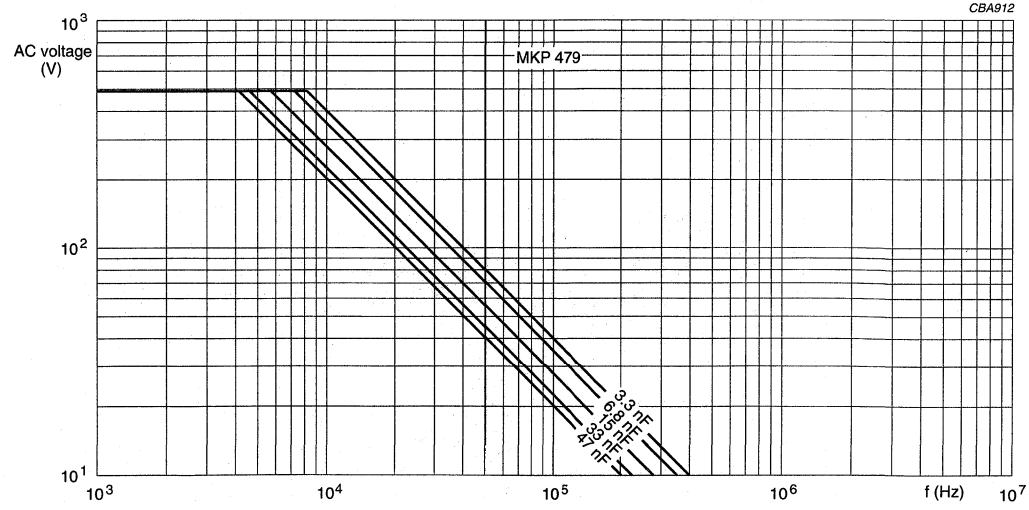


Fig.51 AC voltage (RMS value) as a function of frequency at 85 °C < $T_{amb} \leq 105$ °C for $U_{Rdc} = 2000$ V.

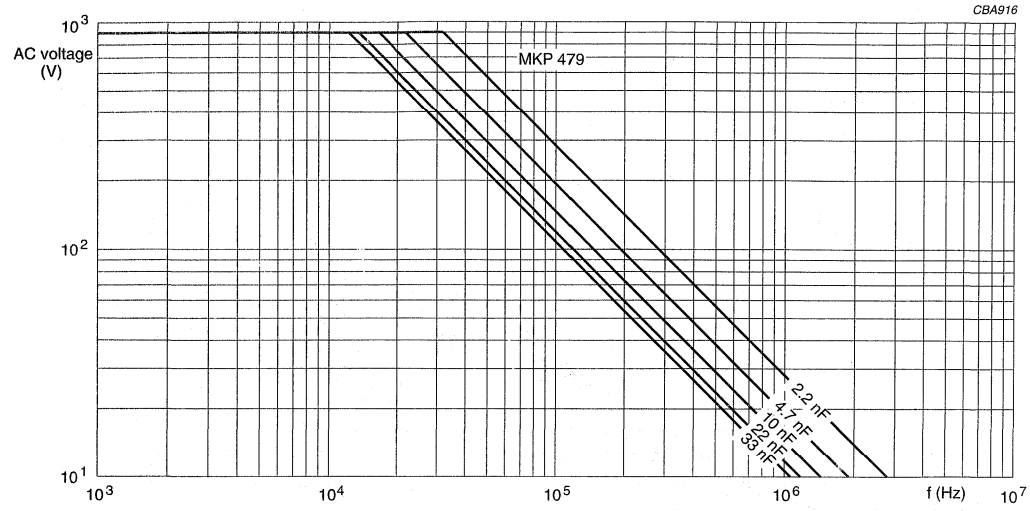


Fig.52 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C for $U_{Rdc} = 2500$ V.

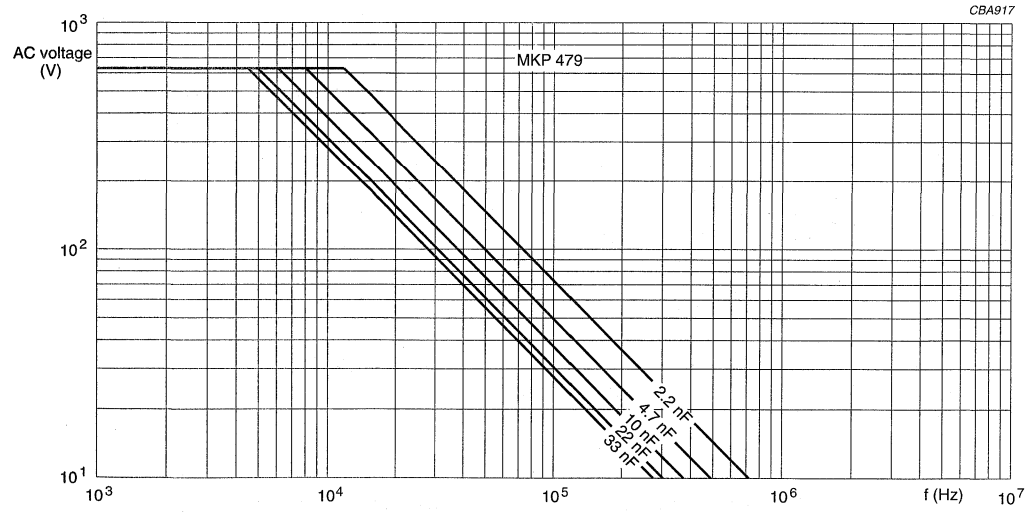


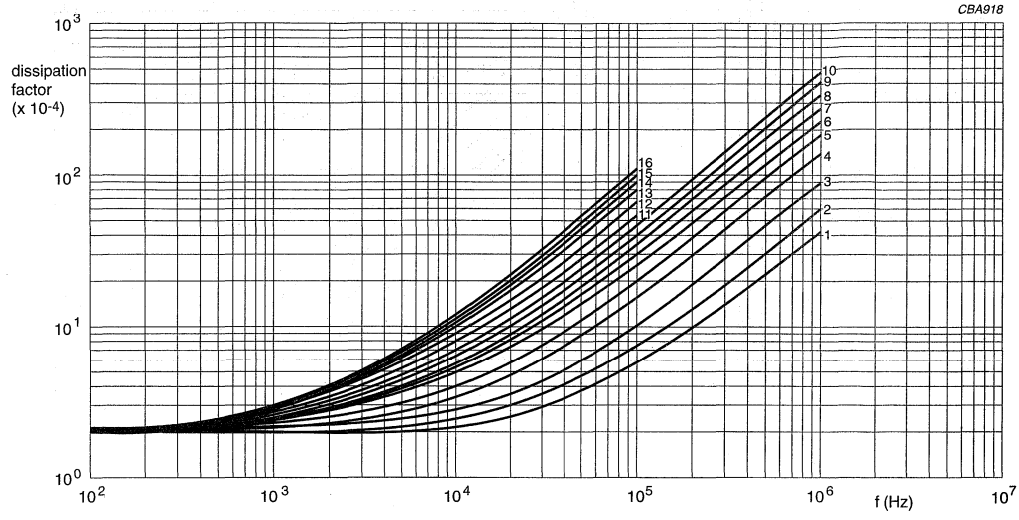
Fig.53 AC voltage (RMS value) as a function of frequency at 85 °C < $T_{amb} \leq 105$ °C for $U_{Rdc} = 2500$ V.

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 32 to 53.

Tangent of loss angle



160 V:
C ≤ 0.10 µF, curve 5.
C ≤ 0.16 µF, curve 6.
C ≤ 0.75 µF, curve 7.
C ≤ 1.0 µF, curve 11.
C ≤ 1.8 µF, curve 12.
C ≤ 3.0 µF, curve 13.
C ≤ 3.9 µF, curve 16.

250 V:
C ≤ 0.068 µF, curve 4.
C ≤ 0.091 µF, curve 5.
C ≤ 0.220 µF, curve 6.
C ≤ 0.470 µF, curve 7.
C ≤ 0.680 µF, curve 10.
C ≤ 1.0 µF, curve 12.
C ≤ 2.0 µF, curve 14.
C ≤ 2.7 µF, curve 15.

400 V:
C ≤ 0.043 µF, curve 4.
C ≤ 0.1 µF, curve 5.
C ≤ 0.22 µF, curve 6.
C ≤ 0.33 µF, curve 7.
C ≤ 0.47 µF, curve 8.
C ≤ 0.68 µF, curve 9.
C ≤ 1.0 µF, curve 10.
C ≤ 1.2 µF, curve 11.

630 V:
C ≤ 0.024 µF, curve 4.
C ≤ 0.047 µF, curve 5.
C ≤ 0.11 µF, curve 6.
C ≤ 0.22 µF, curve 6.
C ≤ 0.3 µF, curve 7.
C ≤ 0.47 µF, curve 9.
C ≤ 0.68 µF, curve 10.

1 000 V:
C ≤ 0.039 µF, curve 2.
C ≤ 0.1 µF, curve 3.
C ≤ 0.15 µF, curve 4.
C ≤ 0.22 µF, curve 5.
C ≤ 0.27 µF, curve 6.

1250 V:
C ≤ 0.024 µF, curve 2.
C ≤ 0.068 µF, curve 3.
C ≤ 0.1 µF, curve 4.
C ≤ 0.18 µF, curve 5.

1600 V:
C ≤ 0.013 µF, curve 2.
C ≤ 0.033 µF, curve 3.
C ≤ 0.1 µF, curve 4.

2000 V:
C ≤ 0.091 µF, curve 1.
C ≤ 0.027 µF, curve 2.
C ≤ 0.056 µF, curve 3.

2500 V:
C ≤ 0.033 µF, curve 1.

Fig.54 Tangent of loss angle as a function of frequency; typical curves.

Insulation resistance

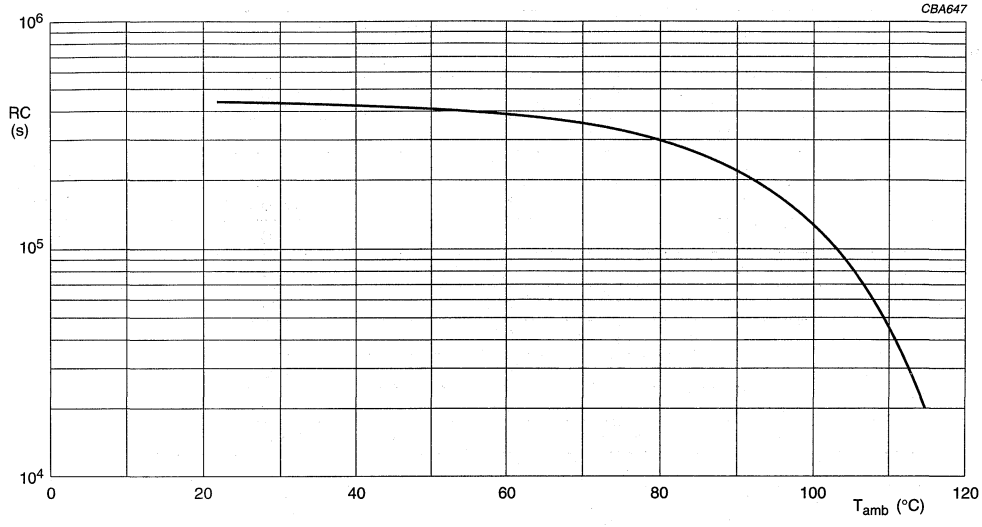


Fig.55 RC product as a function of ambient free air temperature; typical curve.

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

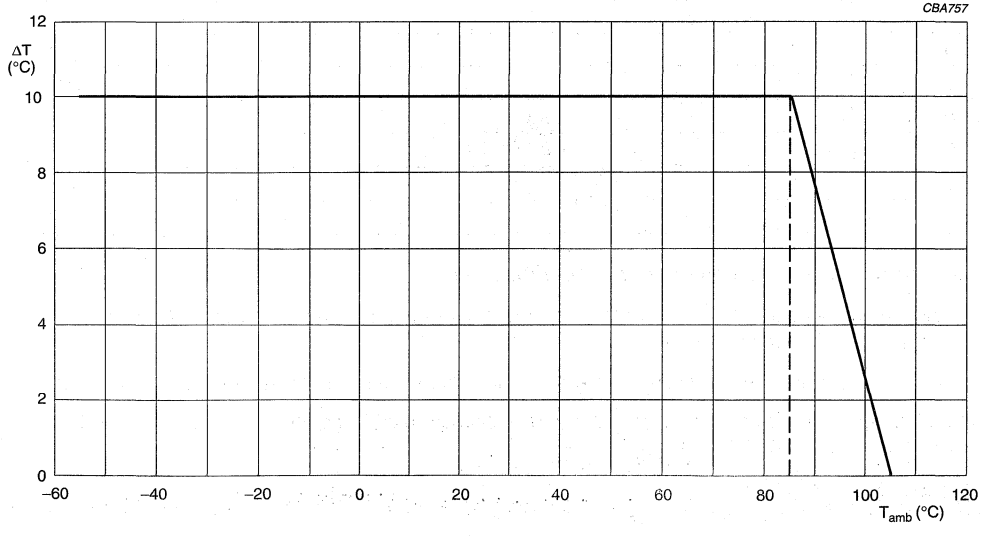


Fig.56 Maximum allowed component temperature rise as a function of the ambient temperature.

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)			
	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.

Power dissipation can be calculated in accordance with 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).

Measuring the component temperature

A thermocouple must be attached to the capacitor body; see Fig.57.

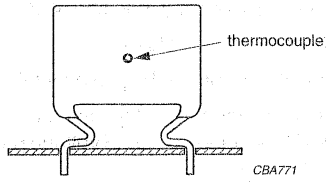


Fig.57 Mounting the thermocouple.

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.

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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 by safety standards and therefore electromagnetic interference suppression capacitors conforming to 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.56.
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	$T_{amb} \leq 85$ °C	85 °C < $T_{amb} \leq 105$ °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)	$1.6 \times U_{Rdc}$	$1.1 \times U_{Rdc}$

Example: 2222 479 42474

C = 470 nF, 250 V used for S-correction.

This is a signal as in Fig.58 with:

$U_{p\text{-}p}$ = 108 V; U_p = 170 V; T_1 = 12 µs; T_2 = 64 µs; $I_{p\text{-}p}$ = 5 A

The ambient temperature is 50 °C.

Checking the conditions:

1. The peak voltage U_p = 170 V is lower than 250 V (DC).
2. The peak-to-peak voltage 108 V is lower than $2 \times \sqrt{2} \times 160$ V (AC) = 450 U_{p-p}.
3. I_p = 2.5 A is lower than 0.47 µF × 60 V/µs = 28 A.
4. The dissipated power is about 40 mW as calculated with Fourier terms and tgδ maximum values.

   This gives a temperature rise of $\frac{40 \text{ mW}}{12 \text{ mW/°C}}$ = 3.3 °C which is permitted; see Fig.56.
5. Depends on actual application.
6. Not applicable.

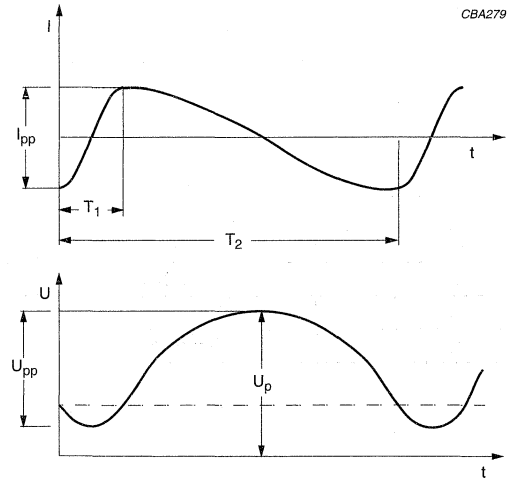

Fig.58 Voltage signal.

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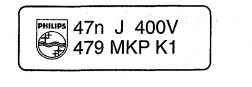
MARKING

Product marking

Capacitors are marked on top in black ink (see Fig.59) 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 = ±5%
4. Rated (DC) voltage (e.g. 400 V)
5. Manufacturer's type designation with code for dielectric material (479 MKP)
6. Year and month of manufacture in code (e.g. K1); see Table 2.



CBA365

Fig.59 Example of marking.

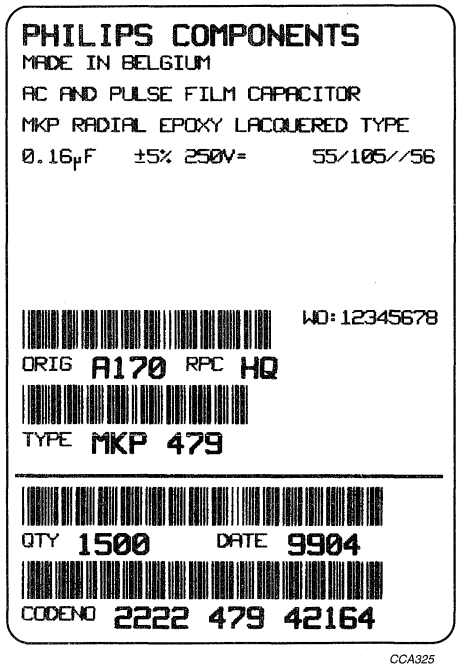
Table 2 Letter codes for year and numbers for month of production

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

Package marking

The package containing the capacitors is marked as shown in Fig.60.

Please note:
In due time BC COMPONENTS
will replace PHILIPS COMPONENTS



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	–
7	• 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.60 Barcode label.

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QUICK REFERENCE TEST REQUIREMENTS (see note 1)

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 × 90°	$\lvert\Delta C/C\rvert \leq 1\%$ for 250 to 2500 V: pitch = 22.5 or 27.5 mm $\lvert\Delta C/C\rvert \leq 2\%$ for 160 V: all pitches; for 250 V to 2000 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: *"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 kHz; amplitude 0.75 mm or acceleration 98 m/s^2; 6 hours	$\lvert\Delta C/C\rvert \leq 1\%$ for 250 to 2500 V: pitch = 22.5 or 27.5 mm $\lvert\Delta C/C\rvert \leq 2\%$ for 160 V: all pitches; for 250 V to 2000 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)
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	$\lvert\Delta C/C\rvert \leq 1\%$ for 250 to 2500 V: pitch = 22.5 or 27.5 mm $\lvert\Delta C/C\rvert \leq 3\%$ for 160 V: all pitches; for 250 V to 2000 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
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	$\lvert\Delta C/C\rvert \leq 1\%$ for 250 to 2500 V: pitch = 22.5 or 27.5 mm $\lvert\Delta C/C\rvert \leq 3\%$ for 160 V: all pitches; for 250 V to 2000 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

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TEST	PROCEDURE (quick reference)	REQUIREMENTS
Endurance (AC): *"IEC 60384-17"*	2000 hours; 85 °C $1.25 \times U_{Rac}$ (RMS); 50 Hz 2000 hours; 105 °C $0.875 \times U_{Rac}$ (RMS); 50 Hz	$\lvert\Delta C/C\rvert \leq 5\%$ $\Delta\tan\delta \leq 5 \times 10^{-4}$ ($C \leq 100$ 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	$\lvert\Delta C/C\rvert \leq 1\%$ for 250 to 2500 V: pitch = 22.5 or 27.5 mm $\lvert\Delta C/C\rvert \leq 3\%$ for 160 V: all pitches; for 250 V to 2000 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	$\lvert\Delta C/C\rvert \leq 1\%$ for 250 to 2500 V: pitch = 22.5 or 27.5 mm $\lvert\Delta C/C\rvert \leq 2\%$ for 160 V: all pitches; for 250 V to 2000 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"*	2000 hours: $1.25 \times U_{Rdc}$; 85 °C $0.875 \times U_{Rdc}$; 105 °C	$\lvert\Delta C/C\rvert \leq 1\%$ for 250 to 2500 V: pitch = 22.5 or 27.5 mm $\lvert\Delta C/C\rvert \leq 3\%$ for 160 V: all pitches; for 250 V to 2000 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

Note

1. For detailed information: see *"Type detail specification HQN-384-17/105"*.

AC and pulse metallized polypropylene film capacitors

MKP/MKP 378

MKP/MKP RADIAL POTTED TYPE **PITCH 15/22.5/27.5 mm**

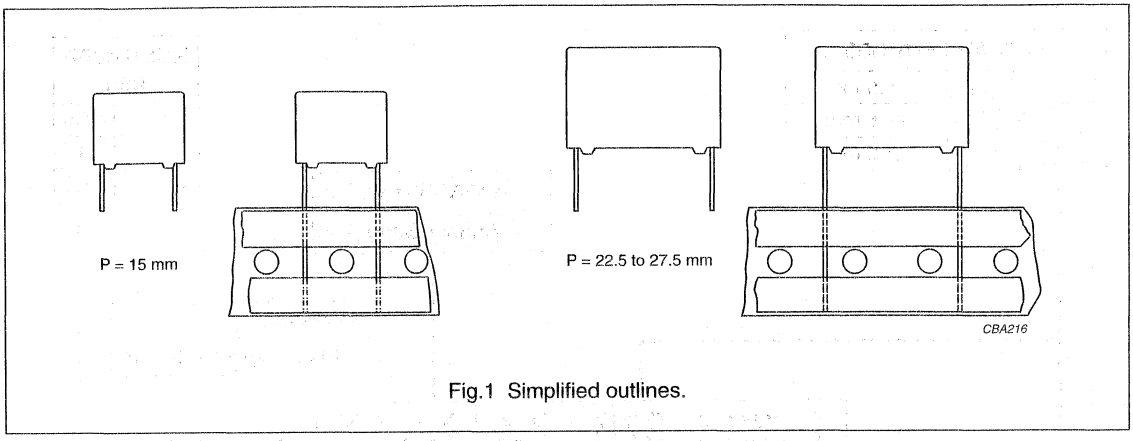


Fig.1 Simplified outlines.

FEATURES

- 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(1)

- Where steep pulses occur e.g. SMPS (switch mode power supplies)
- Motor control circuits
- S-correction.

DETAIL SPECIFICATION

For more detailed data and test requirements see *"Type detail specification HQN-384-17/102"*.

QUICK REFERENCE DATA

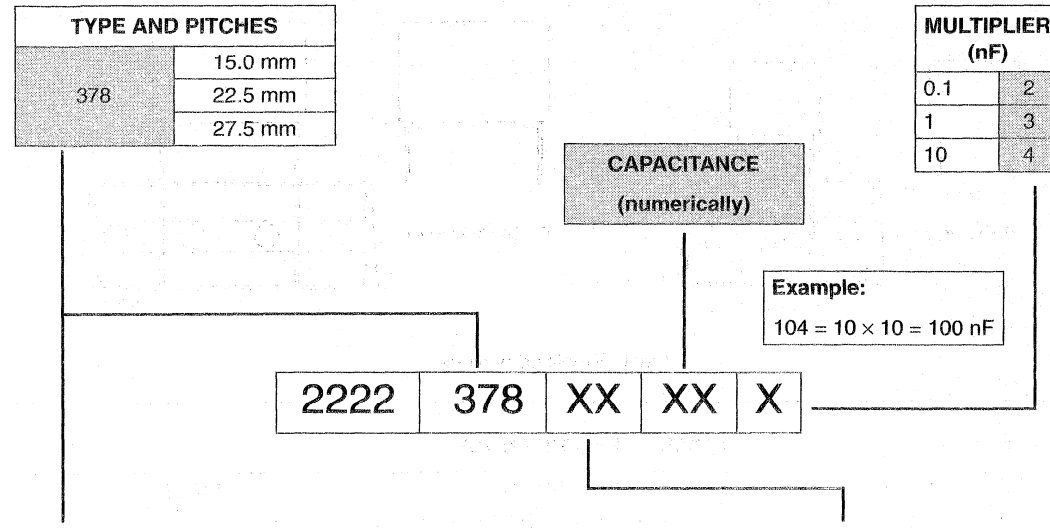
DESCRIPTION	VALUE
Capacitance range (E24 series)	0.001 to 0.68 µF
Capacitance tolerance	±5%
Rated (DC) voltage values available on request	630 V; 1000 V; 1600 V; 2000 V; 2500 V 3000 V; 4000 V; 5000 V
Rated (AC) voltage values available on request	300 V; 400 V; 500 V; 600 V; 675 V 800 V; 1000 V; 1200 V
Rated peak-to-peak voltage values available on request	850 V; 1130 V; 1400 V; 1700 V; 1900 V 2300 V; 2800 V; 3400 V
Climatic category	55/085/56
Rated temperature (DC)	85 °C
Rated temperature (AC)	70 °C
Maximum application temperature	85 °C
Reference specification	IEC 60384-17
Performance grade	grade 1 (long life)
Stability grade: pitch 15 mm pitch 22.5 and 27.5 mm	 grade 2 grade 1

(1) It is not advised to use these products as resonance capacitors in fly-back applications.

AC and pulse metallized polypropylene film capacitors

MKP/MKP 378

COMPOSITION OF CATALOGUE NUMBER



TYPE	PACKAGING	LEAD CONFIGURATION	C-TOL	630 V	1000 V	1600 V	2000 V
378	loose in box	lead length 3.5 mm	±5%	64	74	84	94
		lead length 5.0 mm	±5%	62	72	82	92
	taped on reel	H = 18.5 mm; P_0 = 12.7 mm	±5%	65	75	85	95

AC and pulse metallized polypropylene film capacitors

MKP/MKP 378

MKP/MKP 378 GENERAL DATA

PITCH 22.5/27.5 mm

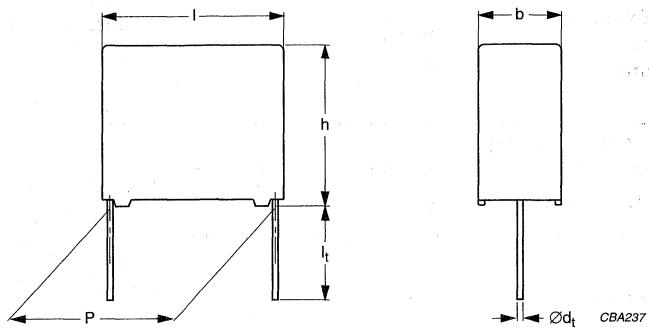


Fig.3 Outline.

Specific reference data for the 630 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
$C \leq 0.18\ \mu F$	$\leq 8 \times 10^{-4}$	$\leq 15 \times 10^{-4}$
$0.2\ \mu F \leq C \leq 0.3\ \mu F$	$\leq 10 \times 10^{-4}$	$\leq 25 \times 10^{-4}$
$0.33\ \mu F \leq C \leq 0.39\ \mu F$	$\leq 10 \times 10^{-4}$	$\leq 30 \times 10^{-4}$
$0.43\ \mu F \leq C \leq 0.51\ \mu F$	$\leq 10 \times 10^{-4}$	$\leq 40 \times 10^{-4}$
$C > 0.51\ \mu F$	$\leq 10 \times 10^{-4}$	$\leq 45 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 630 V (DC):		
P = 22.5 mm	370 V/µs	
P = 27.5 mm	230 V/µs (b < 15 mm)	
P = 27.5 mm	120 V/µs (b ≥ 15 mm)	
R between leads, for $C \leq 1\ \mu F$; 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	>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[1]	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	l_t = 3.5 ±0.3 mm	±5%	2222 378 64...	preferred
	l_t = 5.0 ±1.0 mm	±5%	2222 378 62...	on request
Taped on reel	H = 18.5 mm; note 2	±5%	2222 378 65...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*; taped on reel pitch = 27.5 mm is not available.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse metallized polypropylene film capacitors

MKP/MKP 378

U_{Rdc} = 630 V; U_{Rac} = 300 V/U_{p-p} = 850 V

C (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER[1] LOOSE IN BOX l_t = 3.5 ±0.3 mm C-tol = ±5%
Pitch = 22.5 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.056	6.0 × 15.5 × 26.0	2.6	2222 378 64563
0.062			2222 378 64623
0.068	7.0 × 16.5 × 26.0	3.2	2222 378 64683
0.075			2222 378 64753
0.082			2222 378 64823
0.091			2222 378 64913
0.1	8.5 × 18.0 × 26.0	4.4	2222 378 64104
0.11			2222 378 64114
0.12			2222 378 64124
0.13			2222 378 64134
0.15	10.0 × 19.5 × 26.0	5.5	2222 378 64154
0.16			2222 378 64164
0.18			2222 378 64184
Pitch = 27.5 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.2	11.0 × 21.0 × 31.0	7.8	2222 378 64204
0.22			2222 378 64224
0.24			2222 378 64244
0.27			2222 378 64274
0.3	13.0 × 23.0 × 31.0	10.4	2222 378 64304
0.33			2222 378 64334
0.36			2222 378 64364
0.39			2222 378 64394
0.43	15.0 × 25.0 × 31.0	12.8	2222 378 64434
0.47			2222 378 64474
0.51			2222 378 64514
0.56	18.0 × 28.0 × 31.0	17.2	2222 378 64564
0.62			2222 378 64624
0.68			2222 378 64684

Note

1. The shading indicates preferred types.

AC and pulse metallized polypropylene film capacitors

MKP/MKP 378

MKP/MKP 378 GENERAL DATA

PITCH 15 mm

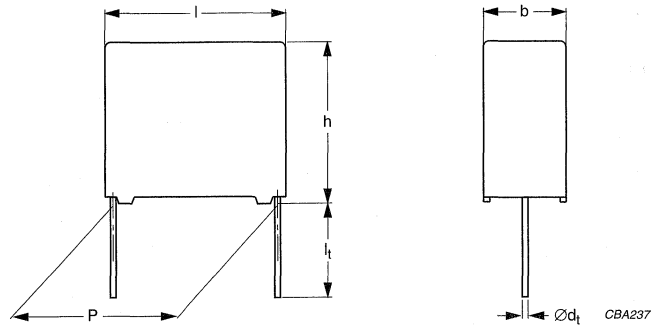


Fig.4 Outline.

Specific reference data for the 630 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: C ≤ 0.051 µF	$\leq 8 \times 10^{-4}$	$\leq 15 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 630 V (DC)	500 V/µs	
R between leads, for C ≤ 1 µF; 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	>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[1]	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	l_t = 3.5 ±0.3 mm	±5%	2222 378 64...	preferred
	l_t = 5.0 ±1.0 mm	±5%	2222 378 62...	on request
Taped on reel	H = 18.5 mm; note 2	±5%	2222 378 65...	on request

Available 630 V DC versions on request

C (µF)	Pitch = 15.0 ±0.4 mm; b × h × l = 8.5 mm × 15.0 mm × 17.5 mm[1]		
	LOOSE IN BOX		REEL
	l_t = 3.5 ±0.3 mm	l_t = 5.0 ±1.0 mm	H = 18.5 mm[2]
0.056	2222 378 90042	2222 378 90043	2222 378 90044
0.062	2222 378 90046	2222 378 90047	2222 378 90048

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse metallized polypropylene film capacitors

MKP/MKP 378

U_{Rdc} = 630 V; U_{Rac} = 300 V/U_{p-p} = 850 V

C (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER[1] LOOSE IN BOX l_t = 3.5 ±0.3 mm C-tol = ±5%
Pitch = 15.0 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.015	5.0 × 11.0 × 17.5	1.2	2222 378 64**153**
0.016			2222 378 64**163**
0.018			2222 378 64**183**
0.02			2222 378 64**203**
0.022			2222 378 64**223**
0.024	6.0 × 12.0 × 17.5	1.4	2222 378 64**243**
0.027			2222 378 64**273**
0.03			2222 378 64**303**
0.033			2222 378 64**333**
0.036	7.0 × 13.5 × 17.5	1.9	2222 378 64**363**
0.039			2222 378 64**393**
0.043			2222 378 64**433**
0.047	8.5 × 15.0 × 17.5	2.6	2222 378 64**473**
0.051			2222 378 64**513**

Note

1. The shading indicates preferred types.

AC and pulse metallized polypropylene film capacitors

MKP/MKP 378

MKP/MKP 378 GENERAL DATA

PITCH 15 mm

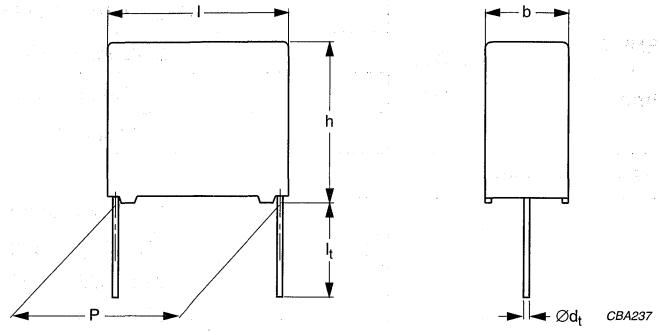


Fig.5 Outline.

Specific reference data for the 1000 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: C ≤ 0.011 µF	$\leq 6 \times 10^{-4}$	$\leq 15 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 1000 V (DC)	1300 V/µs	
R between leads, for C ≤ 1 µF; 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	>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(1)	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	l_t = 3.5 ±0.3 mm	±5%	2222 378 74...	preferred
	l_t = 5.0 ±1.0 mm	±5%	2222 378 72...	on request
Taped on reel	H = 18.5 mm; note 2	±5%	2222 378 75...	on request

Available 1000 V DC versions on request

C (µF)	Pitch = 15.0 ±0.4 mm; b × h × l = 8.5 mm × 15.0 mm × 17.5 mm(1)		
	LOOSE IN BOX		REEL
	l_t = 3.5 ±0.3 mm	l_t = 5.0 ±1.0 mm	H = 18.5 mm(2)
0.012	2222 378 90051	2222 378 90052	2222 378 90053
0.013	2222 378 90055	2222 378 90056	2222 378 90057
0.015	2222 378 90059	2222 378 90061	2222 378 90062
0.016	2222 378 90064	2222 378 90065	2222 378 90066
0.018	2222 378 90068	2222 378 90069	2222 378 90071

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse metallized polypropylene film capacitors

MKP/MKP 378

U_{Rdc} = 1000 V; U_{Rac} = 400 V/U_{p-p} = 1130 V

C (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER[1] LOOSE IN BOX l_t = 3.5 ±0.3 mm C-tol = ±5%
Pitch = 15.0 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.003	5.0 × 11.0 × 17.5	1.2	2222 378 74**302**
0.0033			2222 378 74**332**
0.0036			2222 378 74**362**
0.0039			2222 378 74**392**
0.0043			2222 378 74**432**
0.0047			2222 378 74**472**
0.0051			2222 378 74**512**
0.0056			2222 378 74**562**
0.0062			2222 378 74**622**
0.0068			2222 378 74**682**
0.0075			2222 378 74**752**
0.0082	6.0 × 12.0 × 17.5	1.4	2222 378 74**822**
0.0091			2222 378 74**912**
0.01			2222 378 74**103**
0.011			2222 378 74**113**

Note

1. The shading indicates preferred types.

AC and pulse metallized polypropylene film capacitors

MKP/MKP 378

MKP/MKP 378 GENERAL DATA

PITCH 22.5/27.5 mm

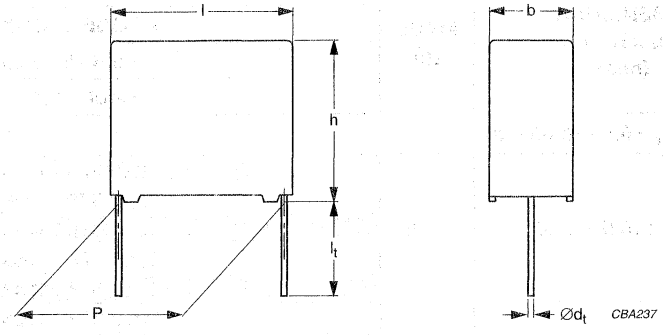


Fig.6 Outline.

Specific reference data for the 1000 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
$C \leq 0.051\ \mu F$	$\leq 6 \times 10^{-4}$	$\leq 15 \times 10^{-4}$
$0.056\ \mu F \leq C \leq 0.22\ \mu F$	$\leq 8 \times 10^{-4}$	$\leq 20 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 1000 V (DC):		
P = 22.5 mm	1200 V/µs	
P = 27.5 mm	600 V/µs (b < 15 mm)	
P = 27.5 mm	300 V/µs (b ≥ 15 mm)	
R between leads, for $C \leq 1\ \mu F$; 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	>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[1]	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	l_t = 3.5 ±0.3 mm	±5%	2222 378 74...	preferred
	l_t = 5.0 ±1.0 mm	±5%	2222 378 72...	on request
Taped on reel	H = 18.5 mm; note 2	±5%	2222 378 75...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*; taped on reel pitch = 27.5 mm is not available.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse metallized polypropylene film capacitors

MKP/MKP 378

U_{Rdc} = 1000 V; U_{Rac} = 400 V/U_{p-p} = 1130 V

C (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER[1] LOOSE IN BOX l_t = 3.5 ±0.3 mm C-tol = ±5%
Pitch = 22.5 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.012	6.0 × 15.5 × 26.0	2.6	2222 378 74**123**
0.013			2222 378 74**133**
0.015			2222 378 74**153**
0.016			2222 378 74**163**
0.018			2222 378 74**183**
0.02	7.0 × 16.5 × 26.0	3.2	2222 378 74**203**
0.022			2222 378 74**223**
0.024			2222 378 74**243**
0.027	8.5 × 18.0 × 26.0	4.4	2222 378 74**273**
0.03			2222 378 74**303**
0.033			2222 378 74**333**
0.036			2222 378 74**363**
0.039	10.0 × 19.5 × 26.0	5.5	2222 378 74**393**
0.043			2222 378 74**433**
0.047			2222 378 74**473**
0.051			2222 378 74**513**
Pitch = 27.5 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.056	11.0 × 21.0 × 31.0	7.8	2222 378 74**563**
0.062			2222 378 74**623**
0.068			2222 378 74**683**
0.075			2222 378 74**753**
0.082			2222 378 74**823**
0.091	13.0 × 23.0 × 31.0	10.4	2222 378 74**913**
0.1			2222 378 74**104**
0.11			2222 378 74**114**
0.12	15.0 × 25.0 × 31.0	12.8	2222 378 74**124**
0.13			2222 378 74**134**
0.15			2222 378 74**154**
0.16	18.0 × 28.0 × 31.0	17.5	2222 378 74**164**
0.18			2222 378 74**184**
0.2			2222 378 74**204**
0.22			2222 378 74**224**

Note

1. The shading indicates preferred types.

AC and pulse metallized polypropylene film capacitors

MKP/MKP 378

MKP/MKP 378 GENERAL DATA

PITCH 22.5/27.5 mm

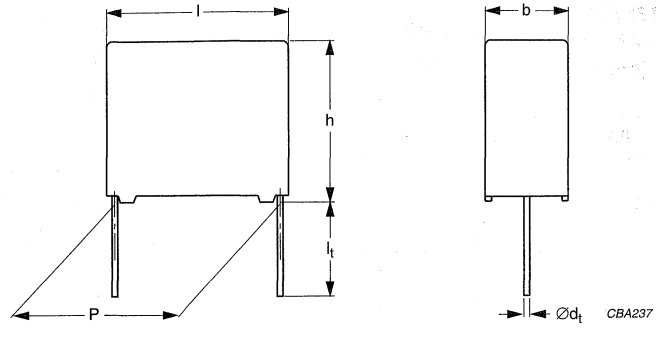


Fig.7 Outline.

Specific reference data for the 1600 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
$C \leq 0.022\ \mu F$	$\leq 5 \times 10^{-4}$	$\leq 10 \times 10^{-4}$
$0.024\ \mu F \leq C \leq 0.1\ \mu F$	$\leq 6 \times 10^{-4}$	$\leq 15 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 1600 V (DC):		
P = 22.5 mm	1600 V/µs	
P = 27.5 mm	900 V/µs (b < 15 mm)	
P = 27.5 mm	450 V/µs (b ≥ 15 mm)	
R between leads, for $C \leq 1\ \mu F$; 500 V; 1 minute	>100000 MΩ	
R between 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	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 ±0.3 mm	±5%	2222 378 84...	preferred
	l_t = 5.0 ±1.0 mm	±5%	2222 378 82...	on request
Taped on reel	H = 18.5 mm; note 2	±5%	2222 378 85...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*; taped on reel pitch = 27.5 mm is not available.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse metallized polypropylene film capacitors

U_{Rdc} = 1600 V; U_{Rac} = 500 V/U_{p-p} = 1400 V

C (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER[1] LOOSE IN BOX l_t = 3.5 ±0.3 mm C-tol = ±5%
Pitch = 22.5 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.0056	6.0 × 15.5 × 26.0	2.6	2222 378 84**562**
0.0062			2222 378 84**622**
0.0068			2222 378 84**682**
0.0075	7.0 × 16.5 × 26.0	3.2	2222 378 84**752**
0.0082			2222 378 84**822**
0.0091			2222 378 84**912**
0.01			2222 378 84**103**
0.011	8.5 × 18.0 × 26.0	4.4	2222 378 84**113**
0.012			2222 378 84**123**
0.013			2222 378 84**133**
0.015			2222 378 84**153**
0.016			2222 378 84**163**
0.018	10.0 × 19.5 × 26.0	5.5	2222 378 84**183**
0.02			2222 378 84**203**
0.022			2222 378 84**223**
Pitch = 27.5 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.024	11.0 × 21.0 × 31.0	7.8	2222 378 84**243**
0.027			2222 378 84**273**
0.03			2222 378 84**303**
0.033			2222 378 84**333**
0.036			2222 378 84**363**
0.039	13.0 × 23.0 × 31.0	10.4	2222 378 84**393**
0.043			2222 378 84**433**
0.047			2222 378 84**473**
0.051			2222 378 84**513**
0.056	15.0 × 25.0 × 31.0	12.8	2222 378 84**563**
0.062			2222 378 84**623**
0.068			2222 378 84**683**
0.075	18.0 × 28.0 × 31.0	17.2	2222 378 84**753**
0.082			2222 378 84**823**
0.091			2222 378 84**913**
0.1			2222 378 84**104**

Note

1. The shading indicates preferred types.

AC and pulse metallized polypropylene film capacitors

MKP/MKP 378

MKP/MKP 378 GENERAL DATA

PITCH 22.5/27.5 mm

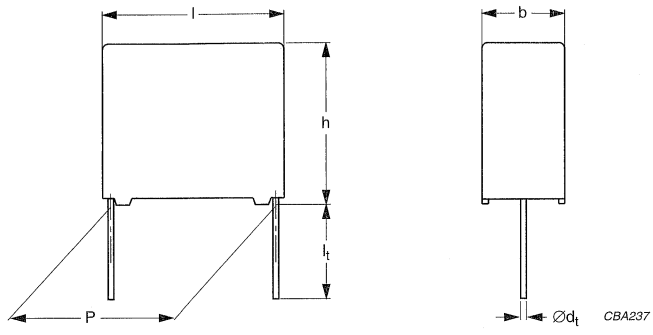


Fig.8 Outline.

Specific reference data for the 2000 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: C ≤ 0.051 µF	$\leq 5 \times 10^{-4}$	$\leq 10 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 2000 V (DC): P = 22.5 mm P = 27.5 mm P = 27.5 mm	 2000 V/µs 1200 V/µs (b < 15 mm) 600 V/µs (b 15 mm)	
R between leads, for C ≤ 1 µF; 500 V; 1 minute	>100000 MΩ	
R between 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

PACKAGING[1]	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	l_t = 3.5 ±0.3 mm	±5%	2222 378 94...	preferred
	l_t = 5.0 ±1.0 mm	±5%	2222 378 92...	on request
Taped on reel	H = 18.5 mm; note 2	±5%	2222 378 95...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*; taped on reel pitch = 27.5 mm is not available.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse metallized polypropylene film capacitors

MKP/MKP 378

U_{Rdc} = 2000 V; U_{Rac} = 600 V/U_{p-p} = 1700 V

C (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER[1] LOOSE IN BOX l_t = 3.5 ±0.3 mm C-tol = ±5%
Pitch = 22.5 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.0033	6.0 × 15.5 × 26.0	2.6	2222 378 94**332**
0.0036			2222 378 94**362**
0.0039	7.0 × 16.5 × 26.0	3.2	2222 378 94**392**
0.0043			2222 378 94**432**
0.0047			2222 378 94**472**
0.0051			2222 378 94**512**
0.0056	8.5 × 18.0 × 26.0	4.4	2222 378 94**562**
0.0062			2222 378 94**622**
0.0068			2222 378 94**682**
0.0075			2222 378 94**752**
0.0082			2222 378 94**822**
0.0091	10.0 × 19.5 × 26.0	5.5	2222 378 94**912**
0.01			2222 378 94**103**
0.011			2222 378 94**113**
0.012			2222 378 94**123**
Pitch = 27.5 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.013	11.0 × 21.0 × 31.0	7.8	2222 378 94**133**
0.015			2222 378 94**153**
0.016			2222 378 94**163**
0.018			2222 378 94**183**
0.02			2222 378 94**203**
0.022	13.0 × 23.0 × 31.0	10.4	2222 378 94**223**
0.024			2222 378 94**243**
0.027			2222 378 94**273**
0.030	15.0 × 25.0 × 31.0	12.8	2222 378 94**303**
0.033			2222 378 94**333**
0.036			2222 378 94**363**
0.039	18.0 × 28.0 × 31.0	17.5	2222 378 94**393**
0.043			2222 378 94**433**
0.047			2222 378 94**473**
0.051			2222 378 94**513**

Note

1. The shading indicates preferred types.

AC and pulse metallized polypropylene film capacitors

MKP/MKP 378

MKP/MKP 378 GENERAL DATA

PITCH 22.5/27.5 mm

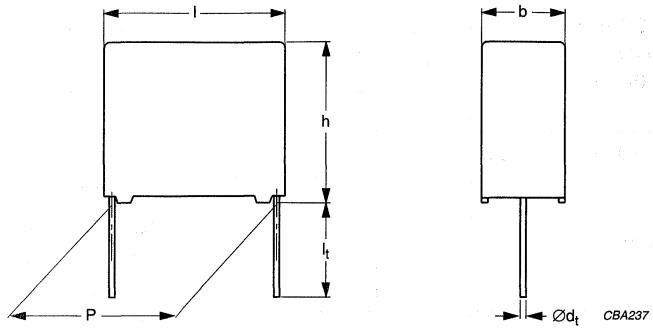


Fig.9 Outline.

Specific reference data for the 2500 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: C ≤ 0.03 µF	$\leq 5 \times 10^{-4}$	$\leq 10 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 2500 V_{dc}: P = 22.5 mm P = 27.5 mm P = 27.5 mm	2000 V/µs 2000 V/µs (b < 15 mm) 1000 V/µs (b 15 mm)	
R between leads, for C ≤ 1 µF; 500 V; 1 minute	>100000 MΩ	
R between leads and case; 500 V; 1 minute	>100000 MΩ	
Ionization (AC) voltage (typical value) at 5 pC peak discharge	>900 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 2500 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 378 04...	preferred
	l_t = 5.0 ±1.0 mm	±5%	2222 378 02...	on request
Taped on reel	H = 18.5 mm; note 2	±5%	2222 378 05...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*; taped on reel pitch = 27.5 mm is not available.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse metallized polypropylene film capacitors

MKP/MKP 378

U_{Rdc} = 2500 V; U_{Rac} = 675 V/U_{p-p} = 1900 V

C (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER[1] LOOSE IN BOX l_t = 3.5 ±0.3 mm C-tol = ±5%
Pitch = 22.5 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.002	6.0 × 15.5 × 26.0	2.6	2222 378 04**202**
0.0022			2222 378 04**222**
0.0024			2222 378 04**242**
0.0027			2222 378 04**272**
0.003	7.0 × 16.5 × 26.0	3.2	2222 378 04**302**
0.0033			2222 378 04**332**
0.0036			2222 378 04**362**
0.0039	8.5 × 18.0 × 26.0	4.4	2222 378 04**392**
0.0043			2222 378 04**432**
0.0047			2222 378 04**472**
0.0051			2222 378 04**512**
0.0056			2222 378 04**562**
0.0062	10.0 × 19.5 × 26.0	5.5	2222 378 04**622**
0.0068			2222 378 04**682**
0.0075			2222 378 04**752**
0.0082			2222 378 04**822**
Pitch = 27.5 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.0091	11.0 × 21.0 × 31.0	7.8	2222 378 04**912**
0.01			2222 378 04**103**
0.011			2222 378 04**113**
0.012	13.0 × 23.0 × 31.0	10.4	2222 378 04**123**
0.013			2222 378 04**133**
0.015			2222 378 04**153**
0.018	15.0 × 25.0 × 31.0	12.8	2222 378 04**183**
0.02			2222 378 04**203**
0.022	18.0 × 28.0 × 31.0	17.2	2222 378 04**223**
0.024			2222 378 04**243**
0.027			2222 378 04**273**
0.03			2222 378 04**303**

Note

1. The shading indicates preferred types.

AC and pulse metallized polypropylene film capacitors

MKP/MKP 378

Available on request **loose and taped**

PITCH	d_t	CAPACITANCE RANGE (μF)[1]
U_{Rdc} = 3000 V; U_{Rac} = 800 V/U_{p-p} = 2300 V		
22.5 ±0.4 mm	0.80 ±0.08 mm	0.0015 to 0.0047
27.5 ±0.4 mm; note 2		0.0051 to 0.018
U_{Rdc} = 4000 V; U_{Rac} = 1000 V/U_{p-p} = 2800 V		
27.5 ±0.4 mm; note 2	0.80 ±0.08 mm	0.0010 to 0.010
U_{Rdc} = 5000 V; U_{Rac} = 1200 V/U_{p-p} = 3400 V		
27.5 ±0.4 mm; note 2	0.80 ±0.08 mm	0.0010 to 0.0062

Notes

1. E24 series.
2. Taped products not available

AC and pulse metallized polypropylene film capacitors

MKP/MKP 378

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:
  - Copper clad steel wire for pitch = 15 mm
  - Copper wire for pitch = 22.5 and 27.5 mm
- Small stand-off pips allow removal of solder flux etc. during cleaning of the printed-circuit board.

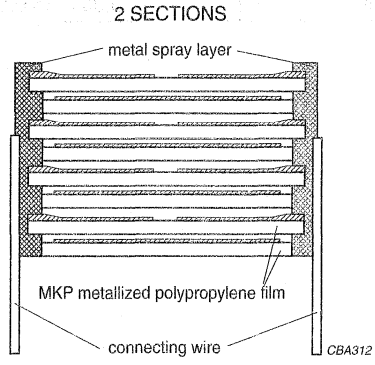


Fig.10 Construction: MKP/MKP 630-2000 V versions; 300-600 V (AC).

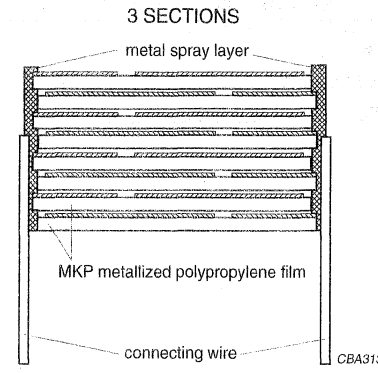


Fig.11 Construction: MKP/MKP 2500-3000 V versions; 675-800 V (AC).

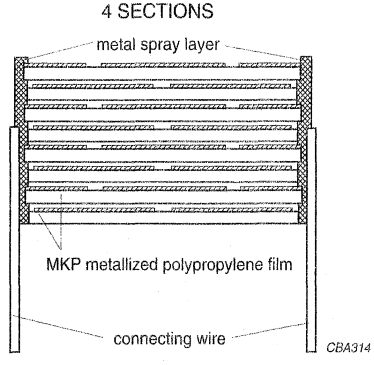


Fig.12 Construction: MKP/MKP 4000 V versions; 1000 V (AC).

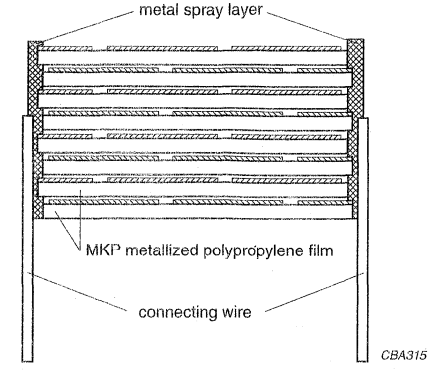


Fig.13 Construction: MKP/MKP 5000 V versions; 1200 V (AC).

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 this handbook, chapter *"Packaging"*.

SPECIFIC METHOD OF MOUNTING TO WITHSTAND VIBRATION AND SHOCK

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

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

SPACE REQUIREMENTS ON PRINTED-CIRCUIT BOARD

The maximum length and width of film capacitors is shown in Fig.14:

- Eccentricity as in Fig.14. 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.

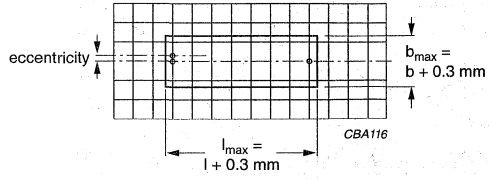


Fig.14 Lay-out.

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 ±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%.

CHARACTERISTICS

Capacitance

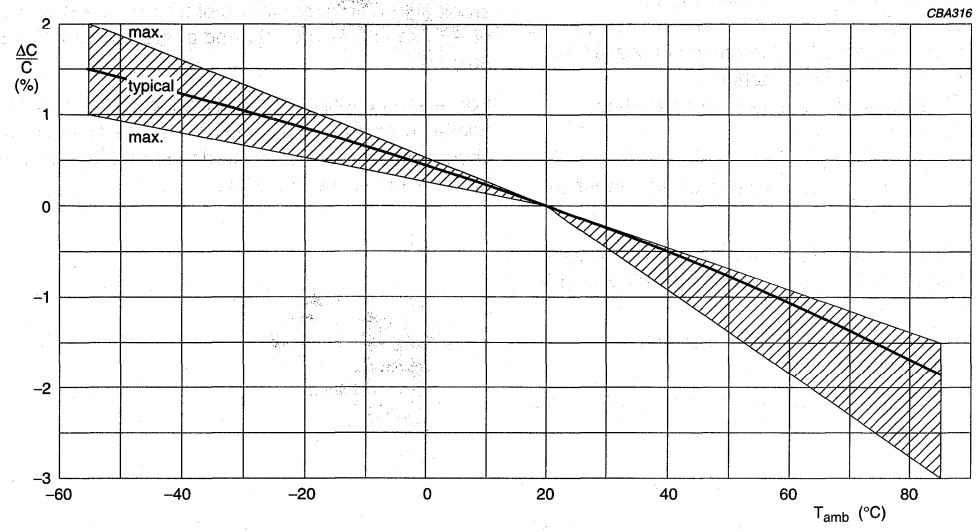


Fig.15 Capacitance change at 1 kHz as a function of ambient temperature.

Impedance

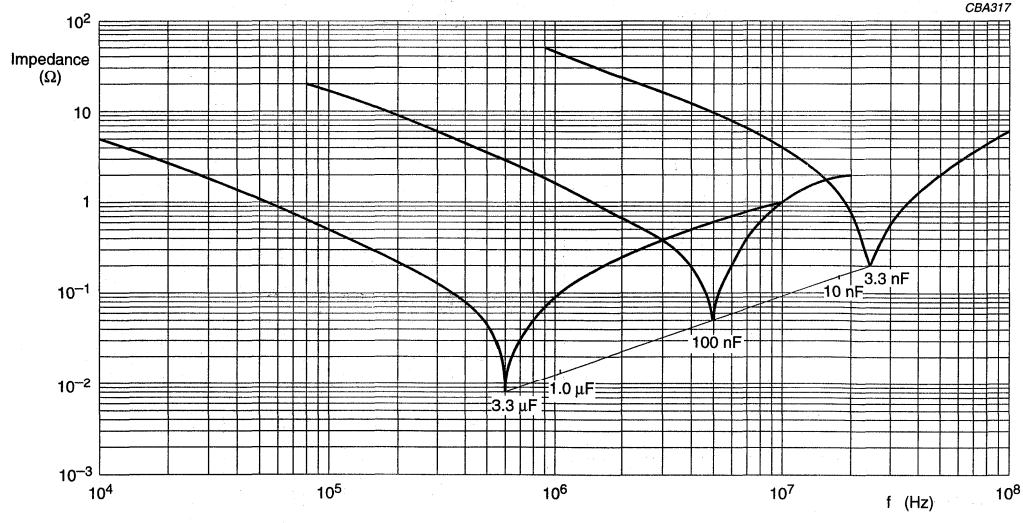


Fig.16 Impedance as a function of frequency: typical curves.

Maximum RMS voltage (sinewave) as a function of temperature

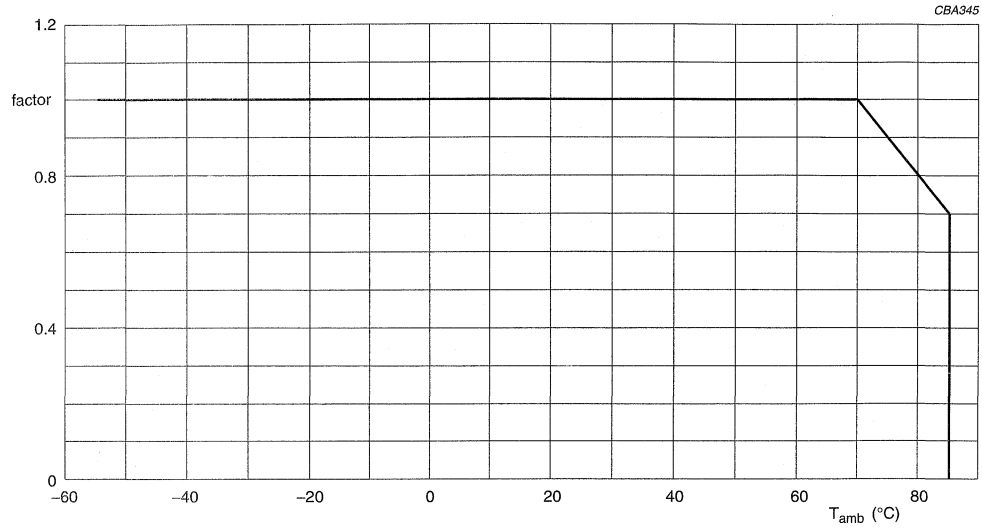


Fig.17 Multiplying factor as a function of temperature.

Maximum RMS voltage (sinewave) as a function of frequency for $T_{amb} \leq 70$ °C

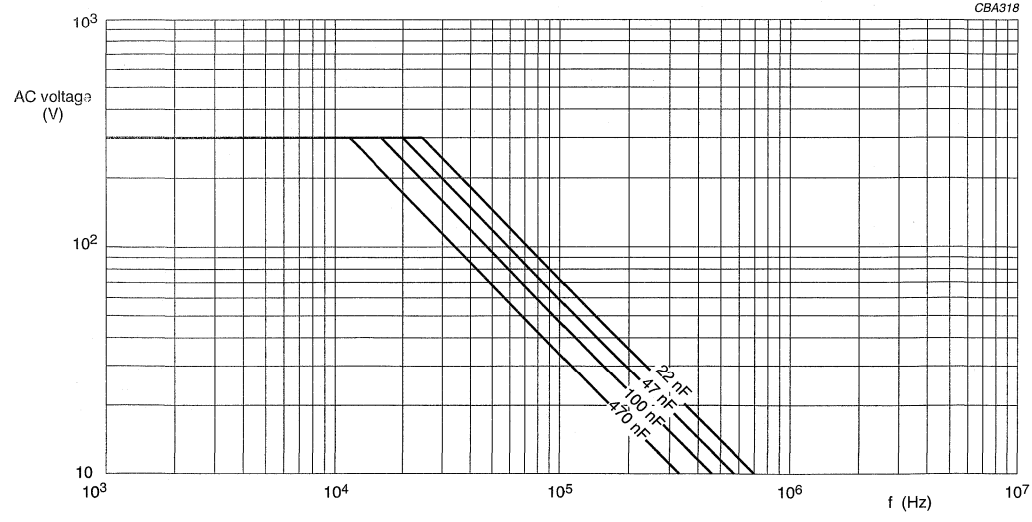


Fig.18 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 70$ °C for $U_{Rdc} = 630$ V.

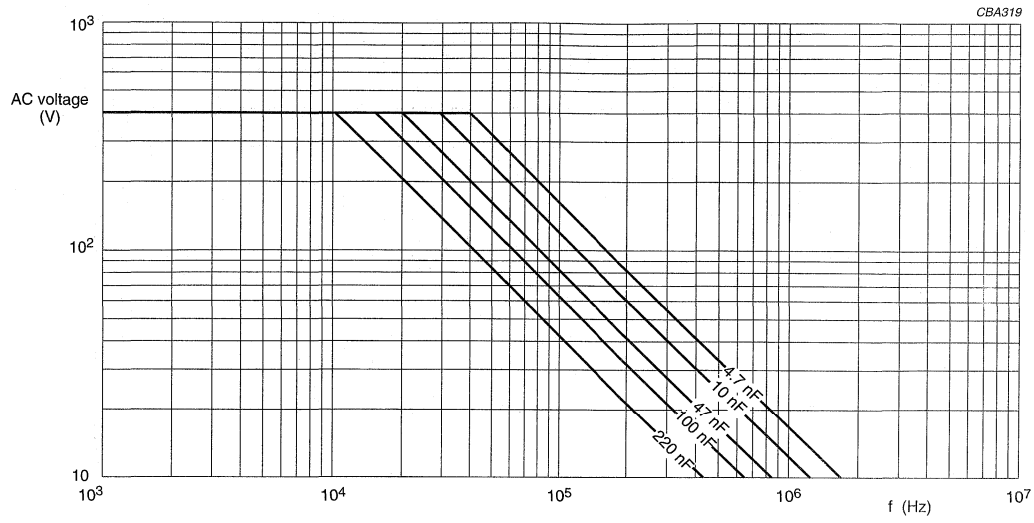


Fig.19 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 70$ °C for $U_{Rdc} = 1000$ V.

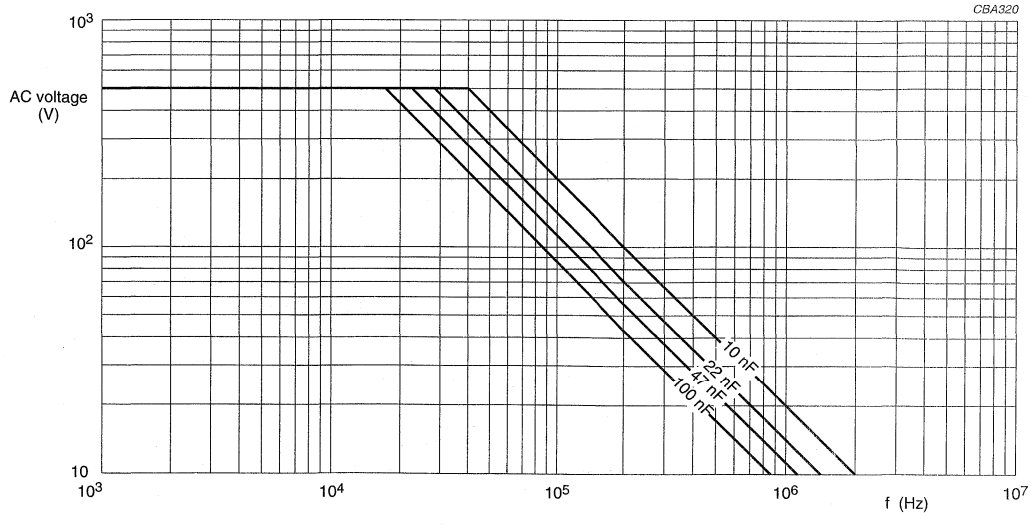


Fig.20 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 70$ °C for $U_{Rdc} = 1600$ V.

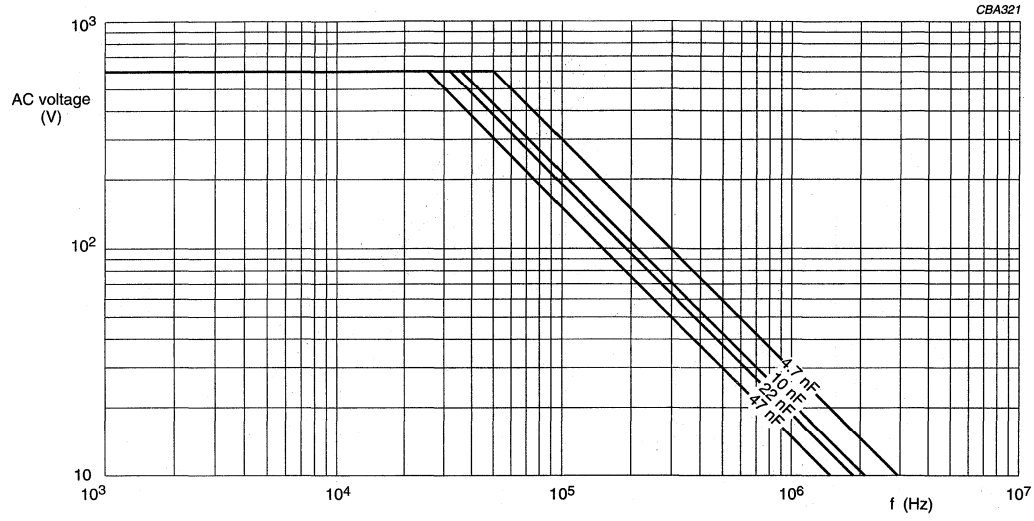


Fig.21 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 70$ °C for $U_{Rdc} = 2000$ V.

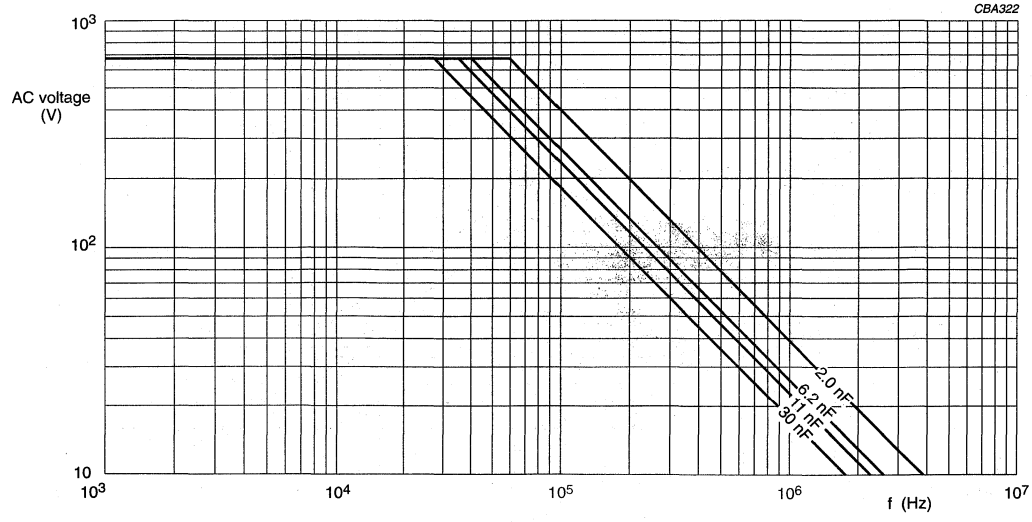


Fig.22 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 70$ °C for $U_{Rdc} = 2500$ V.

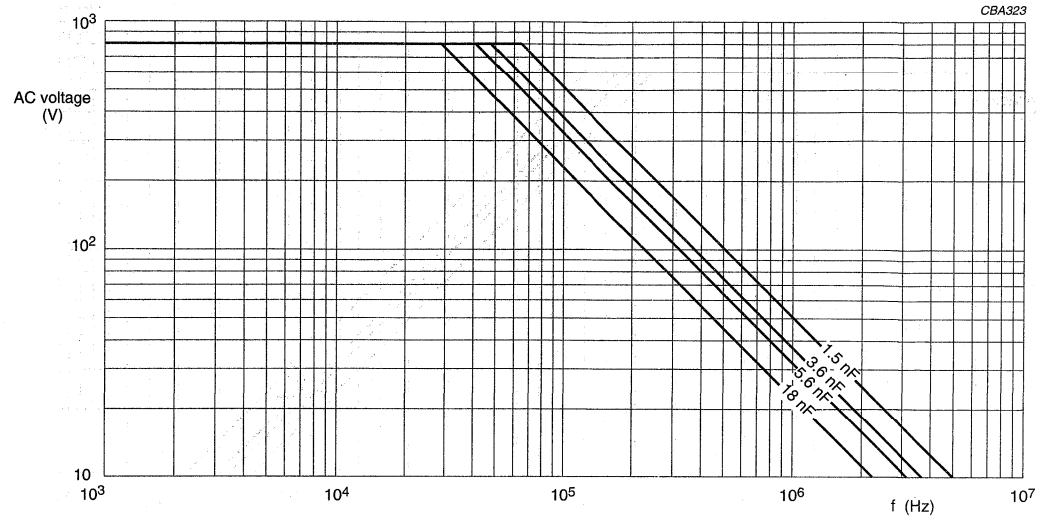


Fig.23 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 70$ °C for $U_{Rdc} = 3000$ V.

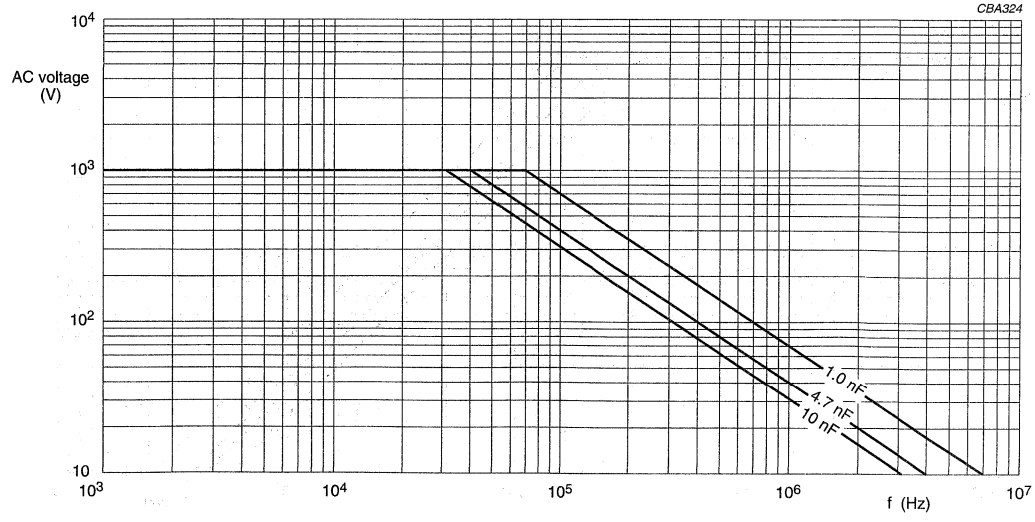


Fig.24 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 70$ °C for $U_{Rdc} = 4000$ V.

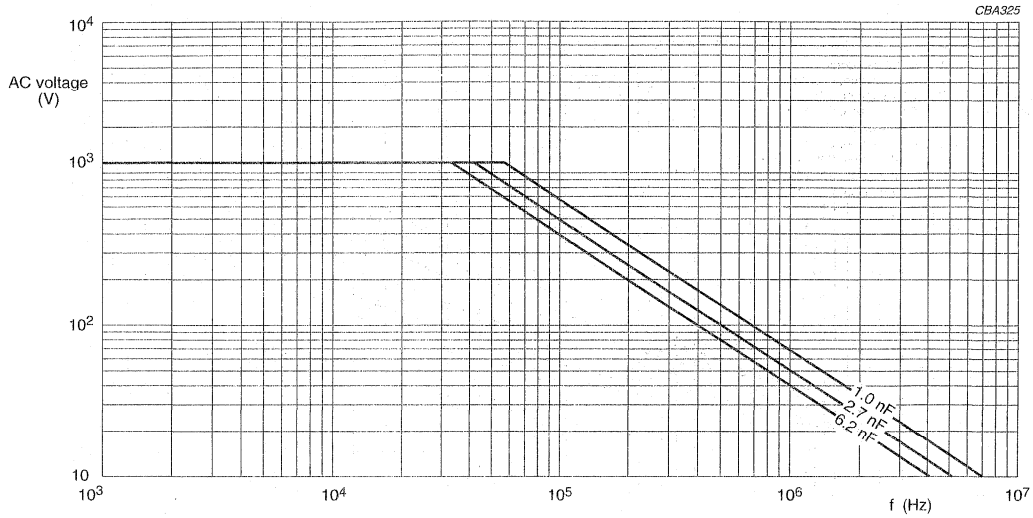


Fig.25 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 70$ °C for $U_{Rdc} = 5000$ V.

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 18 to 25.

Tangent of loss angle

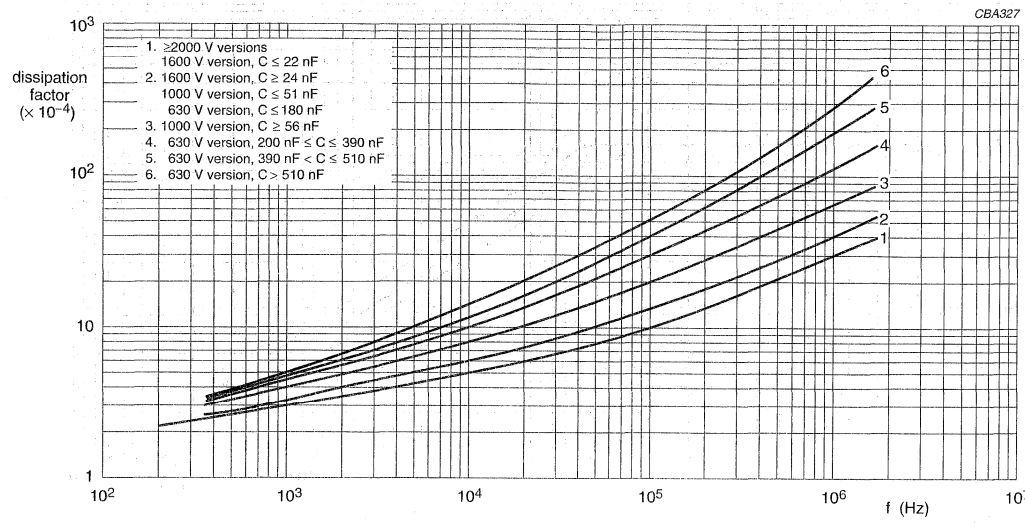


Fig.26 Tangent of loss angle as a function of frequency: typical curves.

Insulation resistance

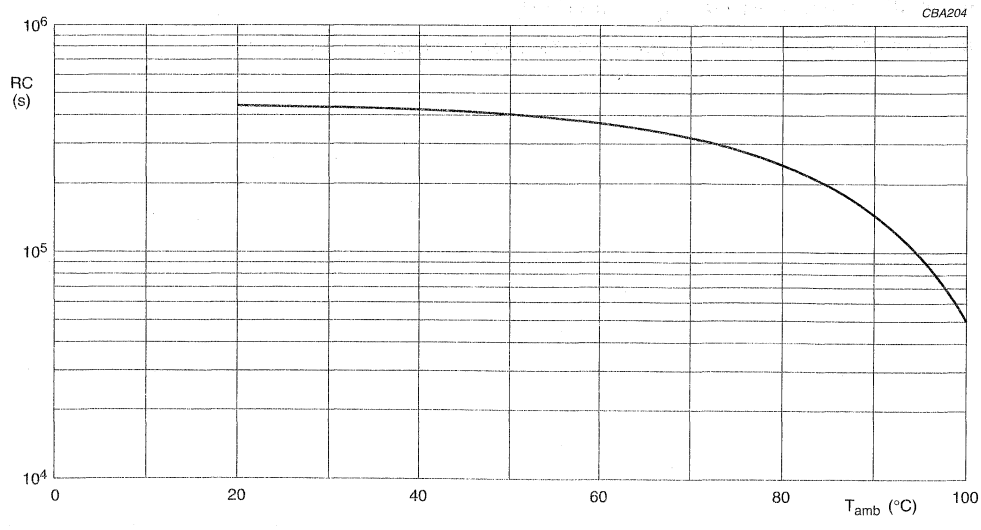


Fig.27 RC product as a function of ambient temperature: typical curve.

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

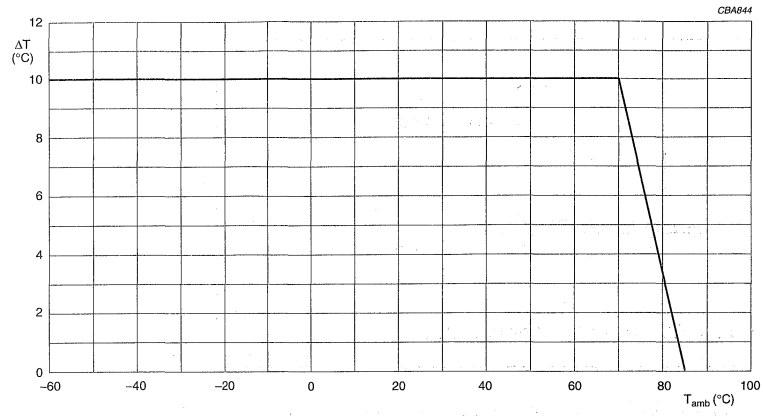


Fig.28 Maximum allowed component temperature rise as a function of the ambient temperature.

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

Table 1 Heat conductivity

b_{max} (mm)	PITCH (mm)		
	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.

Power dissipation can be calculated in accordance with 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 $\Delta T = P/G$:

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

Measuring the component temperature

A thermocouple must be attached to the capacitor body; see Fig.29.

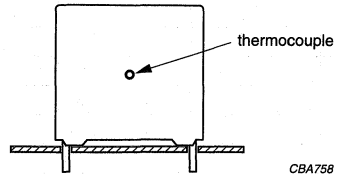


Fig.29 Attachment of thermocouple.

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

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 by safety standards and therefore electromagnetic interference suppression capacitors conforming to 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 70 °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.28.
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	$T_{amb} \leq 70$ °C	70 °C < $T_{amb} \leq 70$ °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)	$1.6 \times U_{Rdc}$	$1.1 \times U_{Rdc}$

Example

C = 470 nF, 630 V used for S-correction.

This is a signal as in Fig.30 with:

U_{p-p} = 108 V; U_p = 170 V; T_1 = 12 µs; T_2 = 64 µs; I_{p-p} = 5 A

The ambient temperature is 50 °C.

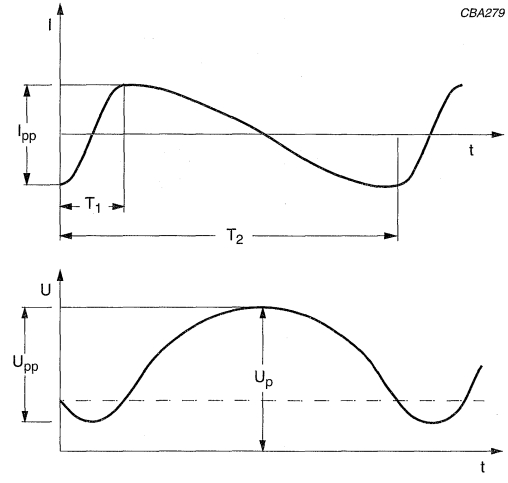


Fig.30 Voltage signal.

Checking the conditions:

1. The peak voltage U_p = 170 V is lower than 630 V (DC).
2. The peak-to-peak voltage 108 V is lower than $2 \times \sqrt{2} \times 300$ V (AC) = 850 U_{p-p}.
3. I_p = 2.5 A is lower than 0.47 µF × 370 V/µs = 174 A.
4. The dissipated power is about 40 mW as calculated with Fourier terms and tgδ maximum values.

   This gives a temperature rise of $\frac{40 \text{ mW}}{48 \text{ mW/°C}}$ = 0.8 °C which is allowed according Fig.28.
5. Depends on actual application.
6. Not applicable.

MARKING

Product marking

The capacitors are marked by laser print; on the top for pitch ≥ 22.5 mm (see Fig.32) or on the top and one side for pitch = 15 mm (see Fig.31), with the following information:

1. Rated capacitance code in accordance with *"IEC 60062"*
2. Tolerance on rated capacitance: J = ±5%
3. Rated voltage (DC) (e.g. 1000 V)
4. Code for dielectric material (MKP/MKP)
5. Code for factory of origin (HQ)
6. Manufacturer's type designation (378)
7. Manufacturer' name
8. Year and week of manufacture (e.g. 9225).

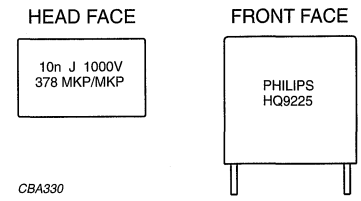


Fig.31 Example of marking for a capacitor with pitch = 15 mm.

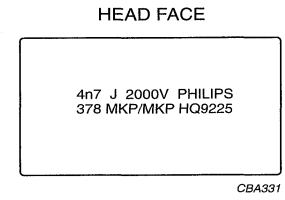
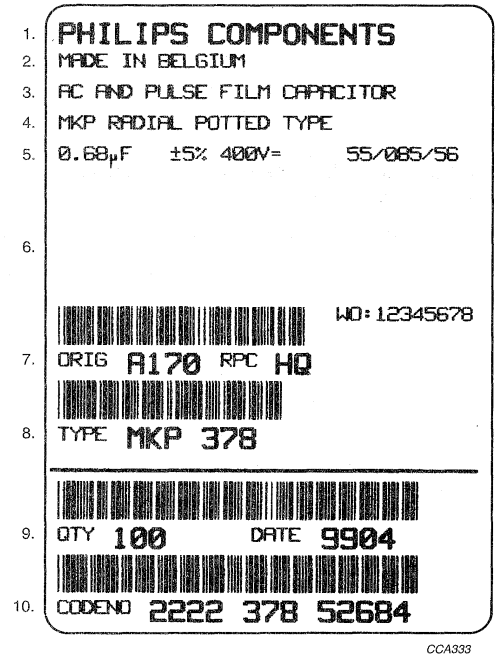


Fig.32 Example of marking for a capacitor with pitch = 22.5 or 27.5 mm.

Package marking

The package containing the capacitors is marked as shown in Fig.33.

Please note:
In due time BC COMPONENTS
will replace PHILIPS COMPONENTS



Barcode label marking

LINE	MARKING EXPLANATION
1	Manufacturer's name
2	Country of origin
3	Sub-family
4	Type description
5	Capacitance value, tolerance, voltage and climatic category *("IEC 60068-1")*
6	–
7	Preference origin code: A Country of origin in code: 170 (Belgium) Responsible production centre: HQ Work order: WO
8	Product type description
9	Quantity and production period, year and week code
10	Product code (12NC)

Fig.33 Barcode label.

QUICK REFERENCE TEST REQUIREMENTS (see note 1)

TEST	PROCEDURE (quick reference)	REQUIREMENTS
Robustness of leads		
Tensile strength: *"IEC 60068-2-21"*	load 10 N; 10 s	no visible damage legible marking $\lvert\Delta C/C\rvert \leq 1\%$ $\Delta\tan\delta \leq 5 \times 10^{-4}$ ($C \leq 100$ 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 × 90°	
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	$\lvert\Delta C/C\rvert \leq 1\%$ $\Delta\tan\delta \leq 5 \times 10^{-4}$ ($C \leq 100$ 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; 85 °C	$\lvert\Delta C/C\rvert \leq 1\%$ (pitch = 22.5 or 27.5 mm) $\lvert\Delta C/C\rvert \leq 2\%$ (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	$\lvert\Delta C/C\rvert \leq 1\%$ (pitch = 22.5 or 27.5 mm) $\lvert\Delta C/C\rvert \leq 2\%$ (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
Endurance (AC): *"IEC 60384-17"*	1000 hours: 85 °C 1.25 × U_{Rac} (RMS); 50 Hz	$\lvert\Delta C/C\rvert \leq 5\%$ $\Delta\tan\delta \leq 5 \times 10^{-4}$ ($C \leq 100$ 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

TEST	PROCEDURE (quick reference)	REQUIREMENTS
Heat storage: *"IEC 60384-17"*	2000 hours; 85 °C	$\|\Delta C/C\| \leq 1\%$ (pitch = 22.5 or 27.5 mm) $\|\Delta C/C\| \leq 2\%$ (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: 85 °C; bath temperature: 260 °C; dwell time: 10 s	$\|\Delta C/C\| \leq 1\%$ $\Delta\tan\delta \leq 5 \times 10^{-4}$ ($C \leq 100$ 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)
Passive flammability: *"IEC 60384-1"*	class C	no burning
Endurance (DC): *"IEC 60384-17"*	2000 hours; $1.25 \times U_{Rdc}$; 85 °C	$\|\Delta C/C\| \leq 1\%$ (pitch = 22.5 or 27.5 mm) $\|\Delta C/C\| \leq 2\%$ (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

Note

1. For detailed information: see *"Type detail specification HQN-384-17/102"*.

PRECISION CAPACITORS

Polypropylene film foil capacitors KP 460 to 464

KP AXIAL EPOXY LACQUERED TYPE

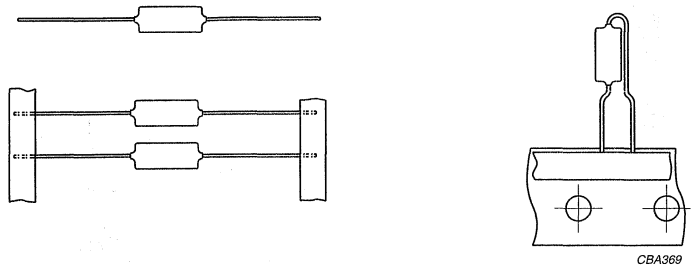


Fig.1 Simplified outlines.

FEATURES

- Supplied loose in box, taped on reel or unidirectional.

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 62000 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
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
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)

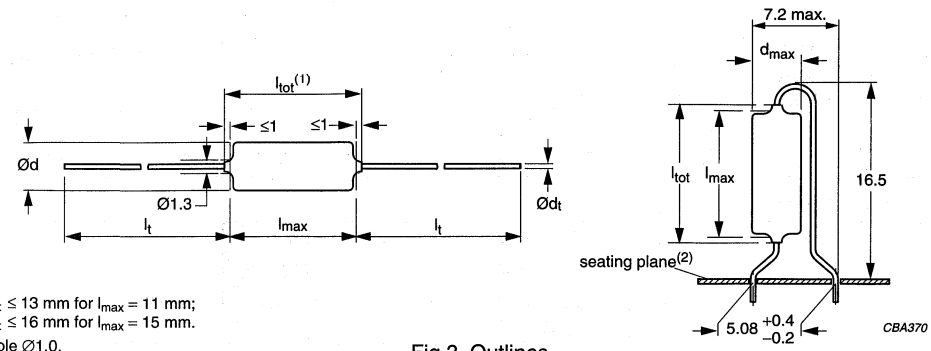
Example:
1003 = 100 × 0.1 = 10 nF

2222	XXX	X	XXX	X

PACKAGING	TAPE DISTANCE	C-TOL	
Taped on reel	tape distance = 63.5 mm	±1%	8
		±2%	7
		±5%	6
Loose in box	lead length 30.0 or 28.0 mm; see tables with catalogue numbers	±1%	4
		±2%	3
		±5%	2
Unidirectional	H = 16.5 mm	±1%	1
		±2%	0

Polypropylene film foil capacitors KP 460

KP 460 GENERAL DATA



(1) $l_{tot} \leq 13$ mm for $l_{max} = 11$ mm;
$l_{tot} \leq 16$ mm for $l_{max} = 15$ mm.
(2) Hole Ø1.0.

Fig.3 Outlines.

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; notes 1 and 2	±1%	2222 460 8....	preferred
	±2%	2222 460 7....	preferred
	±5%	2222 460 6....	on request
Loose in box; note 1	±1%	2222 460 4....	on request
	±2%	2222 460 3....	on request
	±5%	2222 460 2....	on request
Unidirectional; notes 1 and 2	±1%	2222 460 1....	on request
	±2%	2222 460 0....	on request

Available on request

PACKAGING	TAPE DISTANCE (mm)
Taped in ammopack	52.5; note 2
	63.5; note 2
Taped on reel	52.5; note 2

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. For detailed specifications refer to this handbook, chapter *"Packaging information"*.

Polypropylene film foil capacitors KP 460

U_{Rdc} = 63 V; U_{Rac} = 40 V

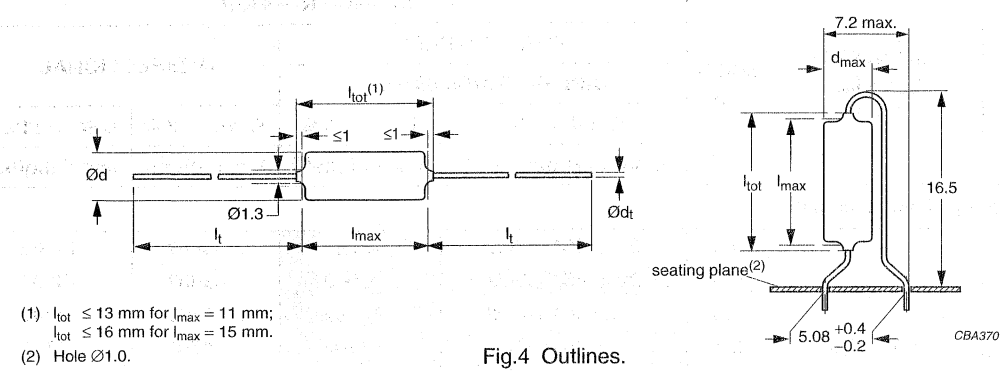
C[1] (E24) (pF)	DIMENSIONS $d_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER			
			TAPED ON REEL		UNIDIRECTIONAL	
			TAPE DISTANCE 63.5 mm			
			C-tol = ±2%	C-tol = ±1%	C-tol = ±2%	C-tol = ±1%
			catalogue number[2]	last 5 digits[2]	last 5 digits	last 5 digits
l_t = 30.0 mm; d_t = 0.60 ±0.06 mm						
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 mm; d_t = 0.60 ±0.06 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		

Notes

1. In addition to the values of the E24 series as quoted, intermediate values are available of the E48 series (with a tolerance of ±2% or ±1%) and the E96 series (with a tolerance of ±1%). The specifications of these intermediate values are equal to the specifications of the next higher value of the E24 series.
2. The shading indicates preferred types.

Polypropylene film foil capacitors KP 461

KP 461 GENERAL DATA



(1) l_{tot} ≤ 13 mm for l_{max} = 11 mm;
l_{tot} ≤ 16 mm for l_{max} = 15 mm.
(2) Hole Ø1.0.

Fig.4 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; notes 1 and 2	±1%	2222 461 8...	preferred
	±2%	2222 461 7...	preferred
	±5%	2222 461 6....	on request
Loose in box; note 1	±1%	2222 461 4....	on request
	±2%	2222 461 3....	on request
	±5%	2222 461 2....	on request
Unidirectional; notes 1 and 2	±1%	2222 461 1....	on request
	±2%	2222 461 0....	on request

Available on request

PACKAGING	TAPE DISTANCE (mm)
Taped in ammopack	52.5; note 2
	63.5; note 2
Taped on reel	52.5; note 2

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. For detailed specifications refer to this handbook, chapter *"Packaging information"*.

Polypropylene film foil capacitors KP 461

U_{Rdc} = 160 V; U_{Rac} = 63 V

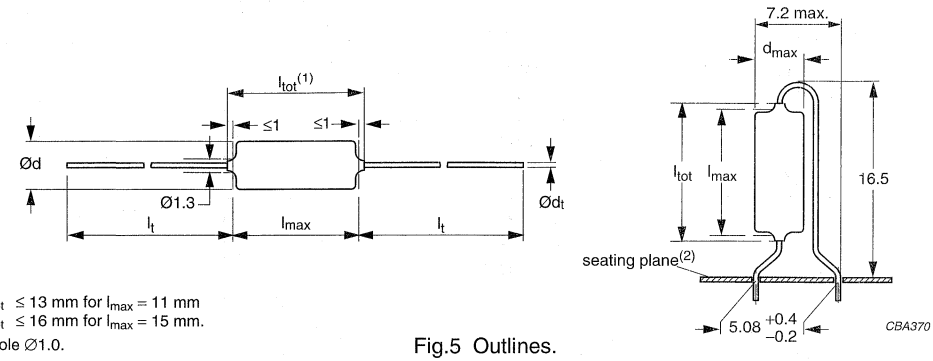
C(1) (E24) (pF)	DIMENSIONS $d_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER			
			TAPED ON REEL		UNIDIRECTIONAL	
			TAPE DISTANCE 63.5 mm			
			C-tol = ±2%	C-tol = ±1%	C-tol = ±2%	C-tol = ±1%
			catalogue number(2)	last 5 digits(2)	last 5 digits	last 5 digits
l_t = 30.0 mm; d_t = 0.60 ±0.06 mm						
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 mm; d_t = 0.60 ±0.06 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		

Notes

1. In addition to the values of the E24 series as quoted, intermediate values are available of the E48 series (with a tolerance of ±2% or ±1%) and the E96 series (with a tolerance of ±1%). The specifications of these intermediate values are equal to the specifications of the next higher value of the E24 series.
2. The shading indicates preferred types.

Polypropylene film foil capacitors KP 462

KP 462 GENERAL DATA



(1) l_{tot} ≤ 13 mm for l_{max} = 11 mm
l_{tot} ≤ 16 mm for l_{max} = 15 mm.
(2) Hole Ø1.0.

Fig.5 Outlines.

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	$\leq 5 \times 10^{-4}$	$\leq 15 \times 10^{-4}$
20 000 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; notes 1 and 2	±1%	2222 462 8....	preferred
	±2%	2222 462 7....	preferred
	±5%	2222 462 6....	on request
Loose in box; note 1	±1%	2222 462 4....	on request
	±2%	2222 462 3....	on request
	±5%	2222 462 2....	on request
Unidirectional; notes 1 and 2	±1%	2222 462 1....	on request
	±2%	2222 462 0....	on request

Available on request

PACKAGING	TAPE DISTANCE (mm)
Taped in ammopack	52.5; note 2
	63.5; note 2
Taped on reel	52.5; note 2

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. For detailed specifications refer to this handbook, chapter *"Packaging information"*.

Polypropylene film foil capacitors | KP 462

U_{Rdc} = 250 V; U_{Rac} = 125 V

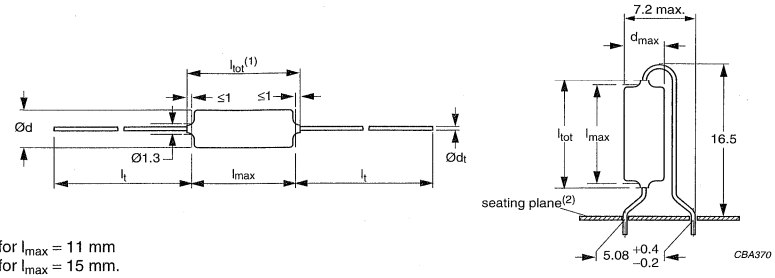
C[1] (E24) (pF)	DIMENSIONS $d_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER			
			TAPED ON REEL		UNIDIRECTIONAL	
			TAPE DISTANCE 63.5 mm			
			C-tol = ±2%	C-tol = ±1%	C-tol = ±2%	C-tol = ±1%
			catalogue number[2]	last 5 digits[2]	last 5 digits	last 5 digits
l_t = 30.0 mm; d_t = 0.60 ±0.06 mm						
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 mm; d_t = 0.60 ±0.06 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		

Notes

1. In addition to the values of the E24 series as quoted, intermediate values are available of the E48 series (with a tolerance of ±2% or ±1%) and the E96 series (with a tolerance of ±1%). The specifications of these intermediate values are equal to the specifications of the next higher value of the E24 series.
2. The shading indicates preferred types.

Polypropylene film foil capacitors KP 463

KP 463 GENERAL DATA



(1) l_{tot} ≤ 13 mm for l_{max} = 11 mm
l_{tot} ≤ 16 mm for l_{max} = 15 mm.
(2) Hole Ø1.0.

Fig.6 Outlines.

Specific reference data for the 400 V DC capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 100 kHz	at 1 MHz(1)
Tangent of loss angle: C ≤ 1000 pF 1000 pF < C ≤ 5000 pF	 $\leq 5 \times 10^{-4}$ $\leq 5 \times 10^{-4}$	 – $\leq 10 \times 10^{-4}$	 $\leq 10 \times 10^{-4}$ –
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; 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		

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 1 and 2	±1%	2222 463 8....	preferred
	±2%	2222 463 7....	preferred
	±5%	2222 463 6....	on request
Loose in box; note 1	±1%	2222 463 4....	on request
	±2%	2222 463 3....	on request
	±5%	2222 463 2....	on request
Unidirectional; notes 1 and 2	±1%	2222 463 1....	on request
	±2%	2222 463 0....	on request

Available on request

PACKAGING	TAPE DISTANCE (mm)
Taped in ammopack	52.5; note 2
	63.5; note 2
Taped on reel	52.5; note 2

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. For detailed specifications refer to this handbook, chapter *"Packaging information"*.

Polypropylene film foil capacitors KP 463

U_{Rdc} = 400 V; U_{Rac} = 160 V

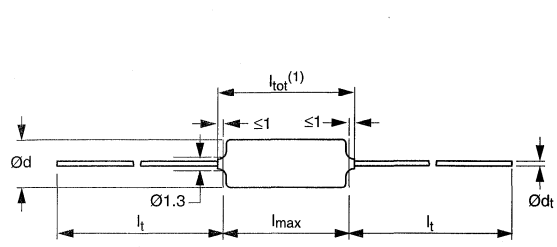
C[1] (E 24) (pF)	DIMENSIONS $d_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER			
			TAPED ON REEL		UNIDIRECTIONAL	
			TAPE DISTANCE 63.5 mm			
			C-tol = ±2%	C-tol = ±1%	C-tol = ±2%	C-tol = 1%
			catalogue number[2]	last 5 digits[2]	last 5 digits	last 5 digits
l_t = 30.0 mm; d_t = 0.60 ±0.06 mm						
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 mm; d_t = 0.60 ±0.06 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		

Notes

1. In addition to the values of the E24 series as quoted, intermediate values are available of the E48 series (with a tolerance of ±2% or ±1%) and the E96 series (with a tolerance of ±1%). The specifications of these intermediate values are equal to the specifications of the next higher value of the E24 series.
2. The shading indicates preferred types.

Polypropylene film foil capacitors KP 464

KP 464 GENERAL DATA



(1) l_{tot} ≤ 13 mm for l_{max} = 11 mm.
l_{tot} ≤ 16 mm for l_{max} = 15 mm.
(2) Hole Ø1.0.

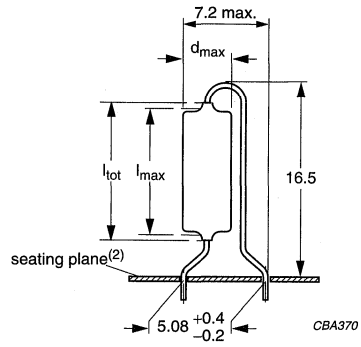


Fig.7 Outlines.

Specific reference data for the 630 V DC capacitors

DESCRIPTION	VALUE	
	at 1 kHz	at 1 MHz(1)
Tangent of loss angle: C ≤ 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/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	

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; notes 1 and 2	±1%	2222 464 8....	preferred
	±2%	2222 464 7....	preferred
	±5%	2222 464 6....	on request
Loose in box; note 1	±1%	2222 464 4....	on request
	±2%	2222 464 3....	on request
	±5%	2222 464 2....	on request
Unidirectional; notes 1 and 2	±1%	2222 464 1....	on request
	±2%	2222 464 0....	on request

Available on request

PACKAGING	TAPE DISTANCE (mm)
Taped in ammopack	52.5; note 2
	63.5; note 2
Taped on reel	52.5; note 2

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. For detailed specifications refer to this handbook, chapter *"Packaging information"*.

Polypropylene film foil capacitors KP 464

U_{Rdc} = 630 V; U_{Rac} = 200 V

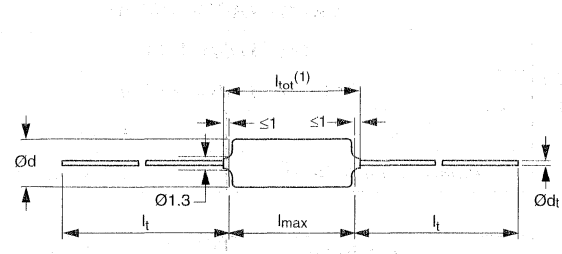
C[1] (E24) (pF)	DIMENSIONS $d_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER			
			TAPED ON REEL		UNIDIRECTIONAL	
			TAPE DISTANCE 63.5 mm			
			C-tol = ±2%	C-tol = ±1%	C-tol = ±2%	C-tol = ±1%
			catalogue number[2]	last 5 digits[2]	last 5 digits	last 5 digits
l_t = 30.0 mm; d_t = 0.60 ±0.06 mm						
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

Notes

1. In addition to the values of the E24 series as quoted, intermediate values are available of the E48 series (with a tolerance of ±2% or ±1%) and the E96 series (with a tolerance of ±1%). The specifications of these intermediate values are equal to the specifications of the next higher value of the E24 series.
2. The shading indicates preferred types.

Polypropylene film foil capacitors KP 464

KP 464 GENERAL DATA



(1) l_{tot} ≤ 13 mm for l_{max} = 11 mm.
l_{tot} ≤ 16 mm for l_{max} = 15 mm.
(2) Hole Ø1.0.

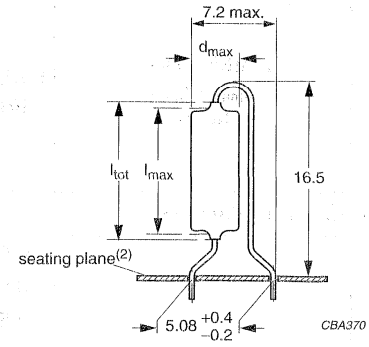


Fig.8 Outlines.

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 ≤ 1000 pF	$\leq 5 \times 10^{-4}$	–	$\leq 10 \times 10^{-4}$
1000 pF < C ≤ 4700 pF	$\leq 5 \times 10^{-4}$	$\leq 15 \times 10^{-4}$	–
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; notes 1 and 2	±1%	2222 464 8....	preferred
	±2%	2222 464 7....	preferred
	±5%	2222 464 6....	on request
Loose in box; note 1	±1%	2222 464 4....	on request
	±2%	2222 464 3....	on request
	±5%	2222 464 2....	on request
Unidirectional; notes 1 and 2	±1%	2222 464 1....	on request
	±2%	2222 464 0....	on request

Available on request

PACKAGING	TAPE DISTANCE (mm)
Taped in ammopack	52.5; note 2
	63.5; note 2
Taped on reel	52.5; note 2

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. For detailed specifications refer to this handbook, chapter *"Packaging information"*.

Polypropylene film foil capacitors KP464

U_{Rdc} = 630 V; U_{Rac} = 200 V

C[1] (E 24) (pF)	DIMENSIONS $d_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER	
			TAPED ON REEL	
			TAPE DISTANCE 63.5 mm	
			C-tol = ±2%	C-tol = ±1%
			catalogue number[2]	last 5 digits[2]
l_t = 28.0 mm; d_t = 0.60 ±0.06 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

Notes

1. In addition to the values of the E24 series as quoted, intermediate values are available of the E48 series (with a tolerance of ±2% or ±1%) and the E96 series (with a tolerance of ±1%). The specifications of these intermediate values are equal to the specifications of the next higher value of the E24 series.
2. The shading indicates preferred types.

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.

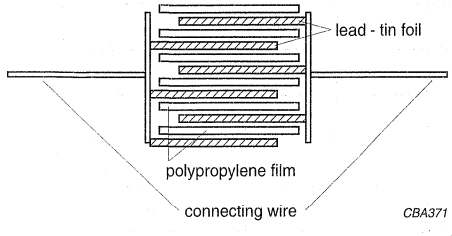


Fig.9 Construction.

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 10 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 ±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%.

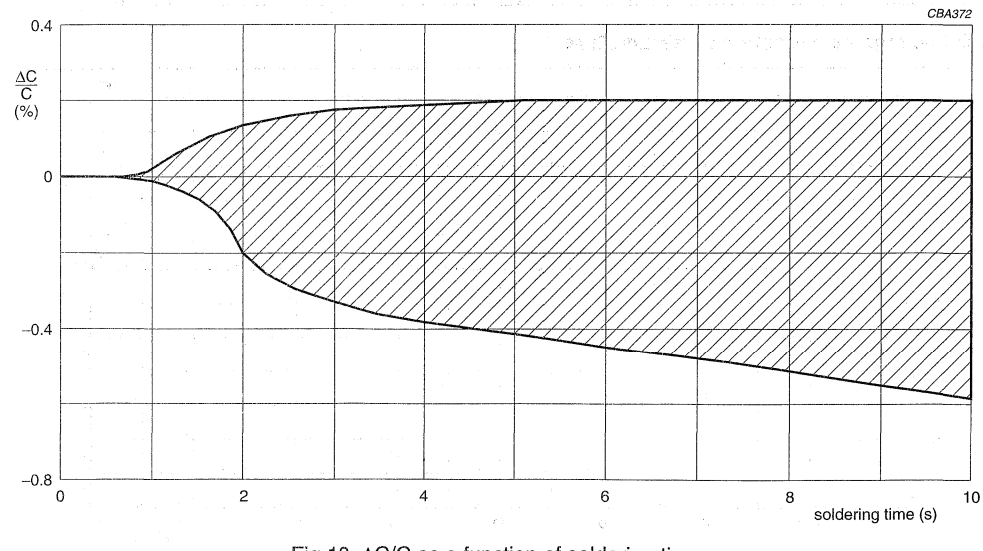


Fig.10 $\Delta C/C$ as a function of soldering time.

CHARACTERISTICS

Capacitance

- Temperature coefficient:
  - between –40 and +20 °C for C ≤ 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.

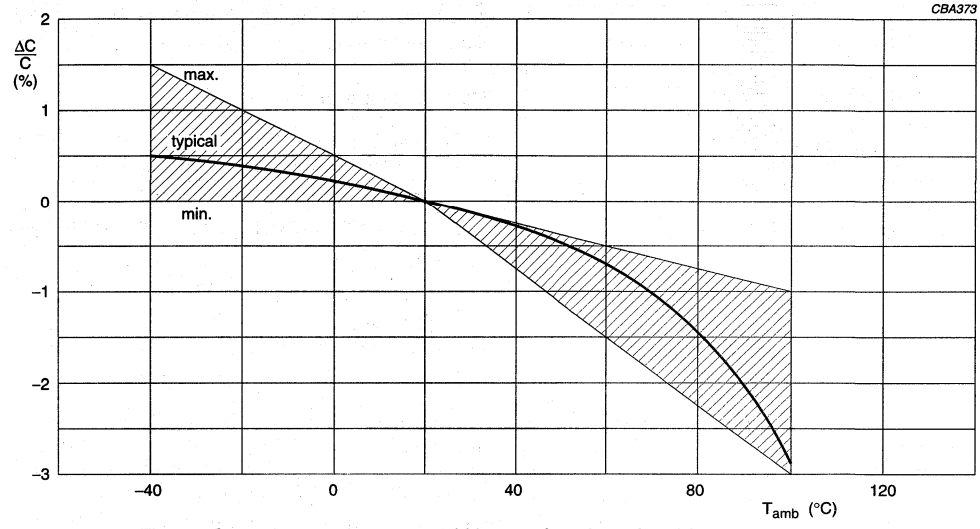


Fig.11 Capacitance change at 1 kHz as a function of ambient temperature.

Maximum DC voltage as a function of temperature

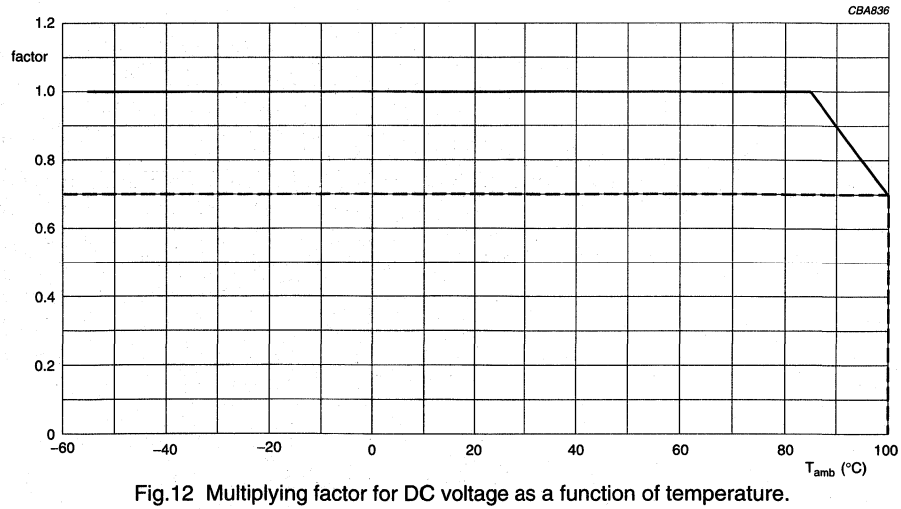


Fig.12 Multiplying factor for DC voltage as a function of temperature.

Maximum RMS voltage (sinewave) as a function of frequency

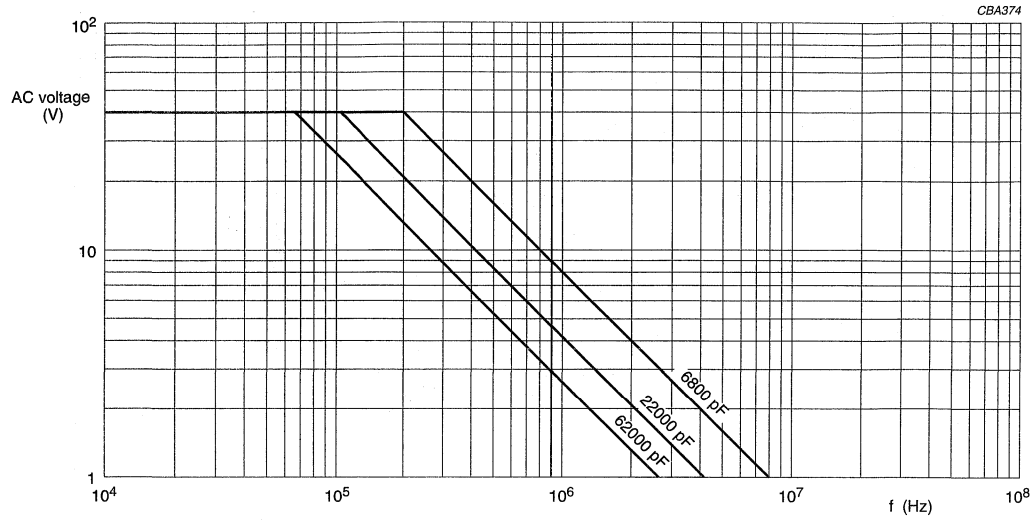


Fig.13 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 70$ °C for $U_{Rdc} = 63$ V.

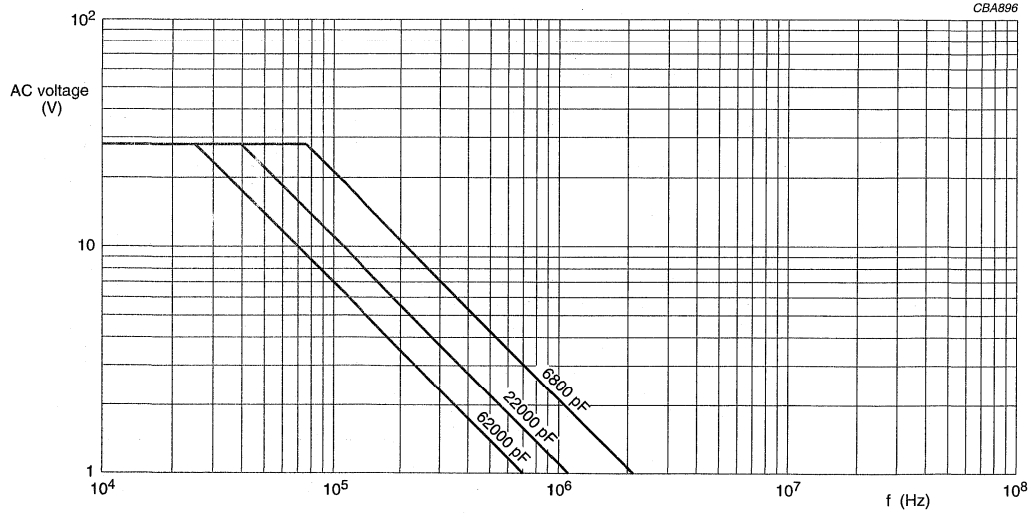


Fig.14 AC voltage (RMS value) as a function of frequency at 70 °C < $T_{amb} \leq 100$ °C for $U_{Rdc} = 63$ V.

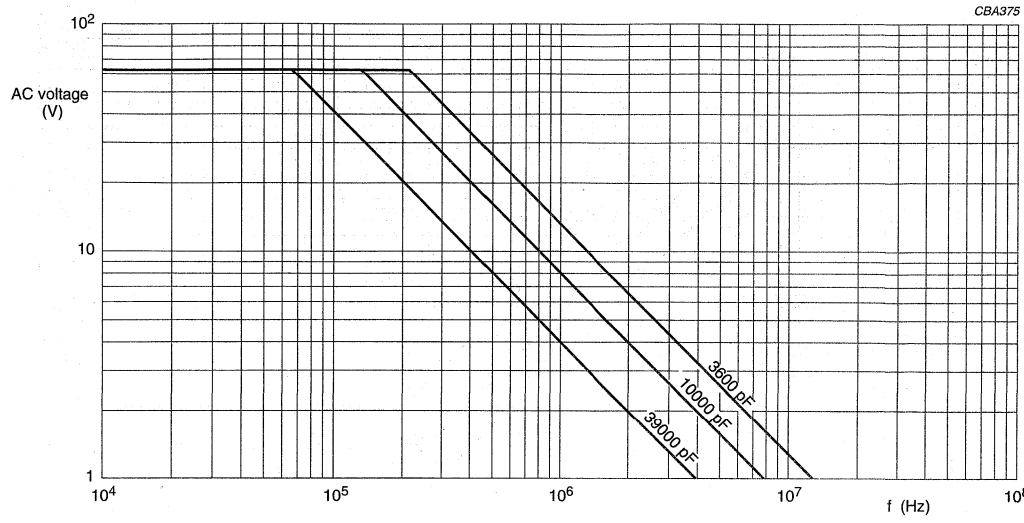


Fig.15 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 70$ °C for $U_{Rdc} = 160$ V.

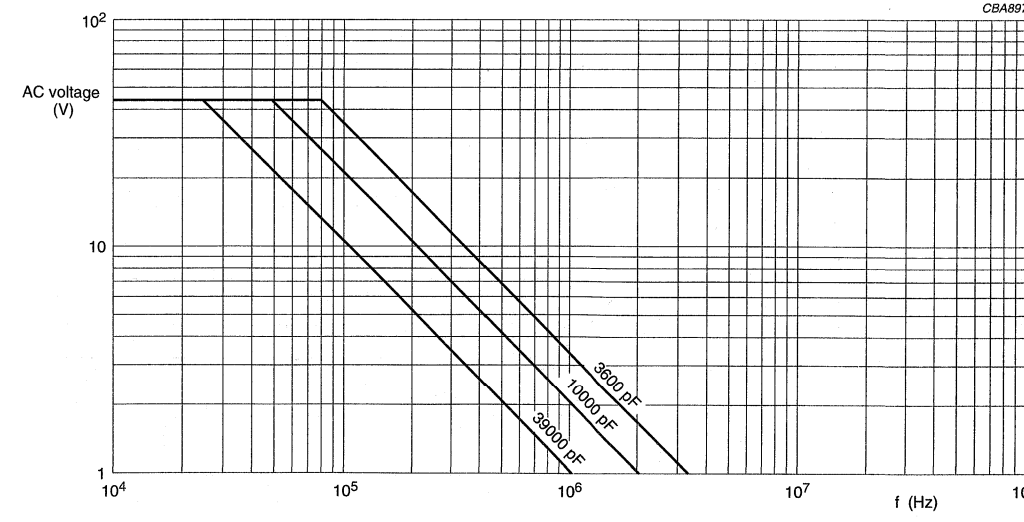


Fig.16 AC voltage (RMS value) as a function of frequency at 70 °C < $T_{amb} \leq 100$ °C for $U_{Rdc} = 160$ V.

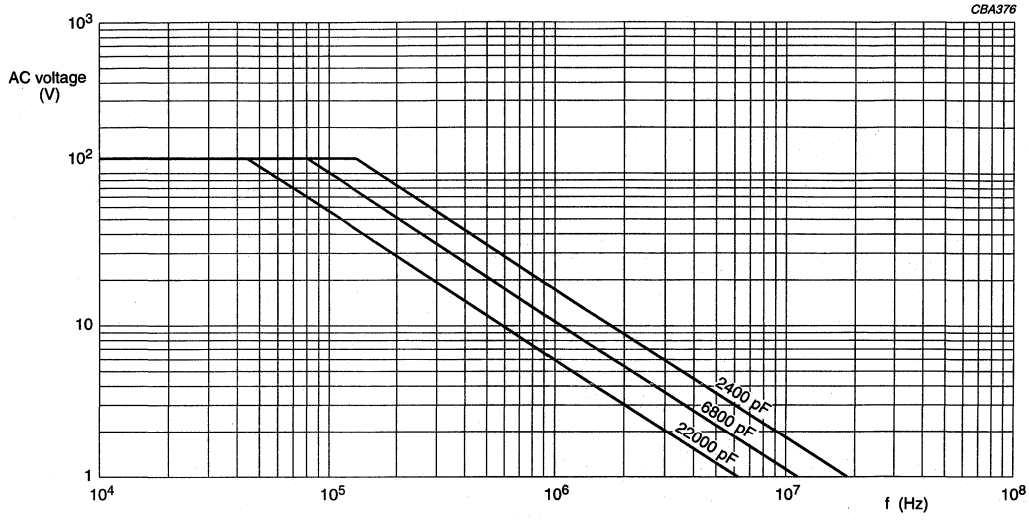


Fig.17 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 70$ °C for $U_{Rdc} = 250$ V.

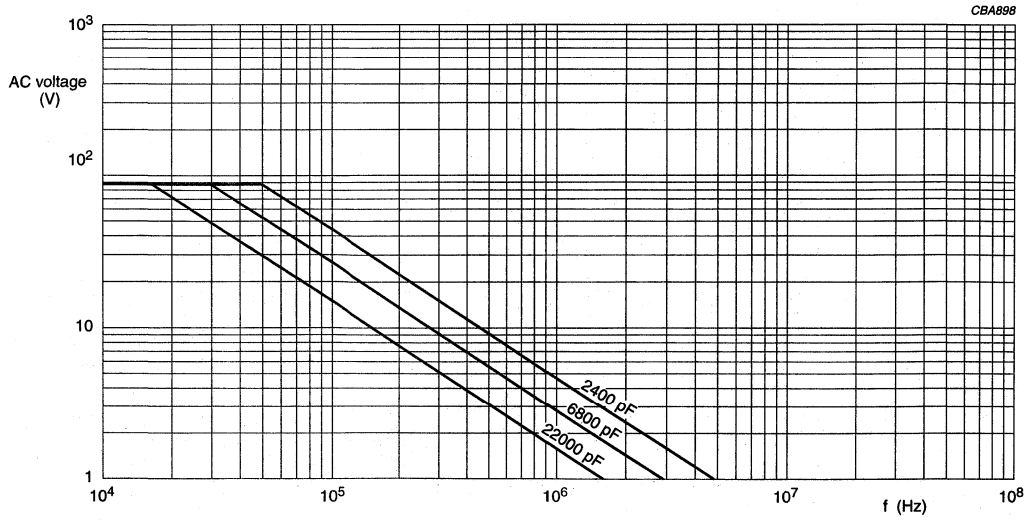


Fig.18 AC voltage (RMS value) as a function of frequency at 70 °C < $T_{amb} \leq 100$ °C for $U_{Rdc} = 250$ V.

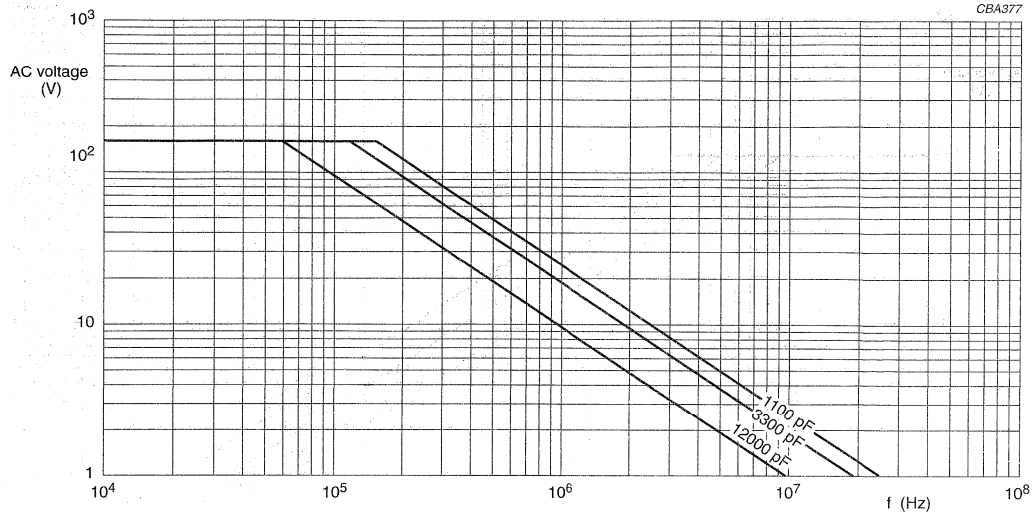


Fig.19 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 70$ °C for $U_{Rdc} = 400$ V.

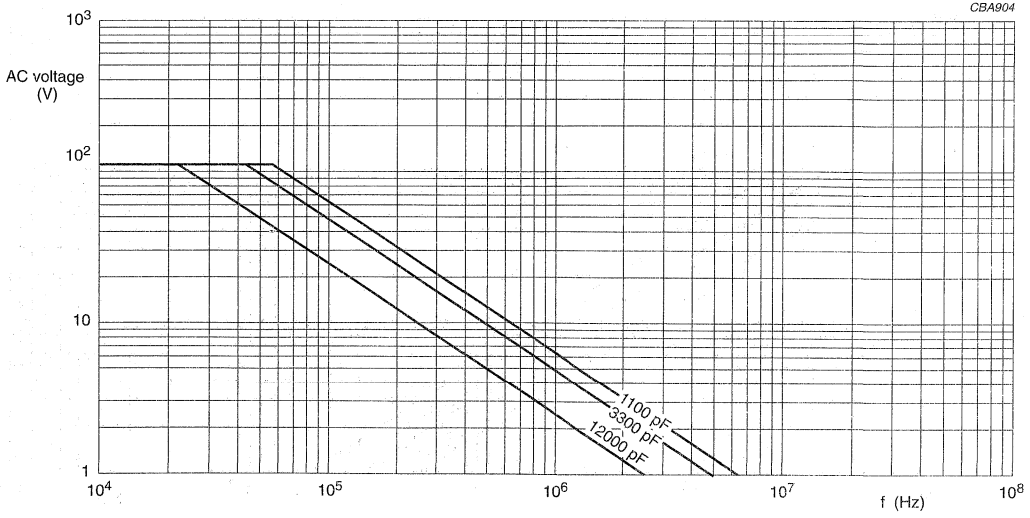


Fig.20 AC voltage (RMS value) as a function of frequency at 70 °C < $T_{amb} \leq 100$ °C for $U_{Rdc} = 400$ V.

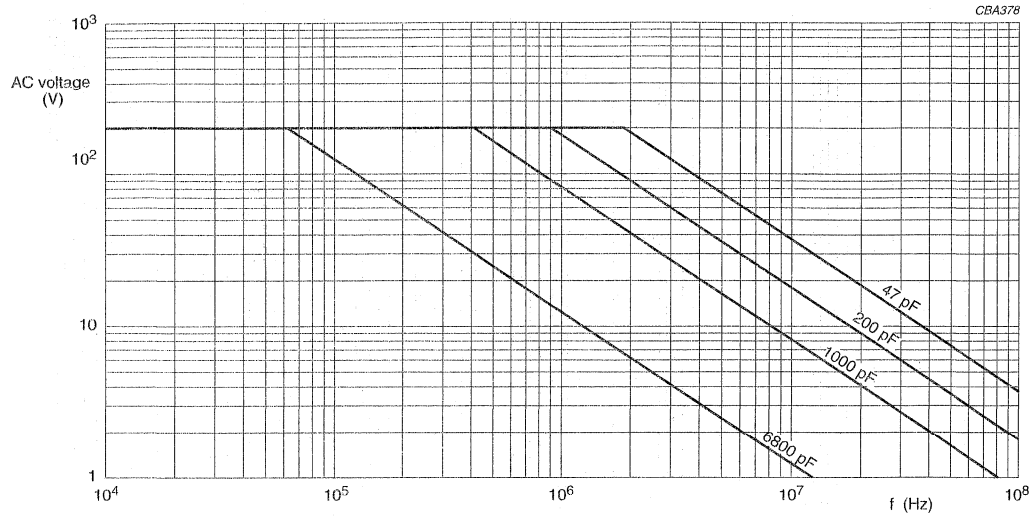


Fig.21 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 70$ °C for $U_{Rdc} = 630$ V.

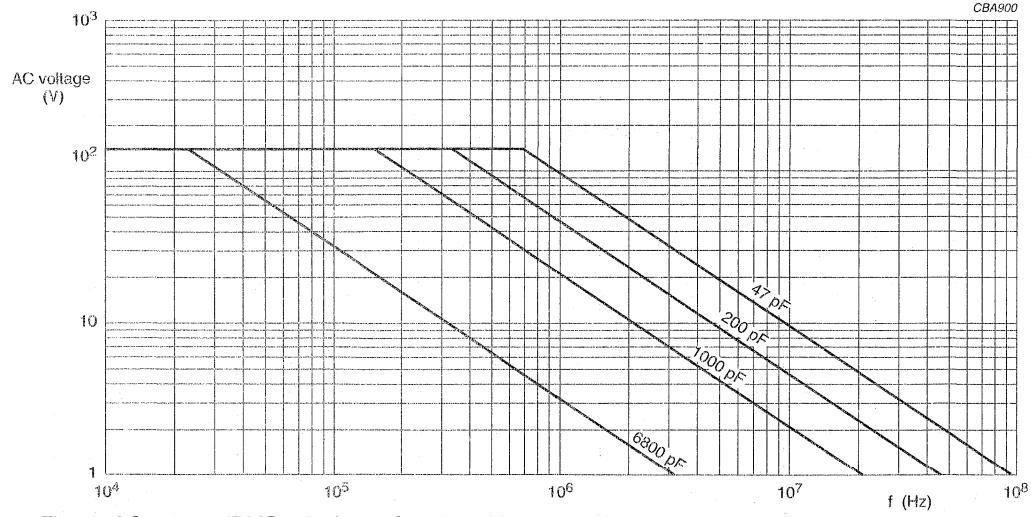


Fig.22 AC voltage (RMS value) as a function of frequency at 70 °C < $T_{amb} \leq 100$ °C for $U_{Rdc} = 630$ V.

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 22.

Tangent of loss angle

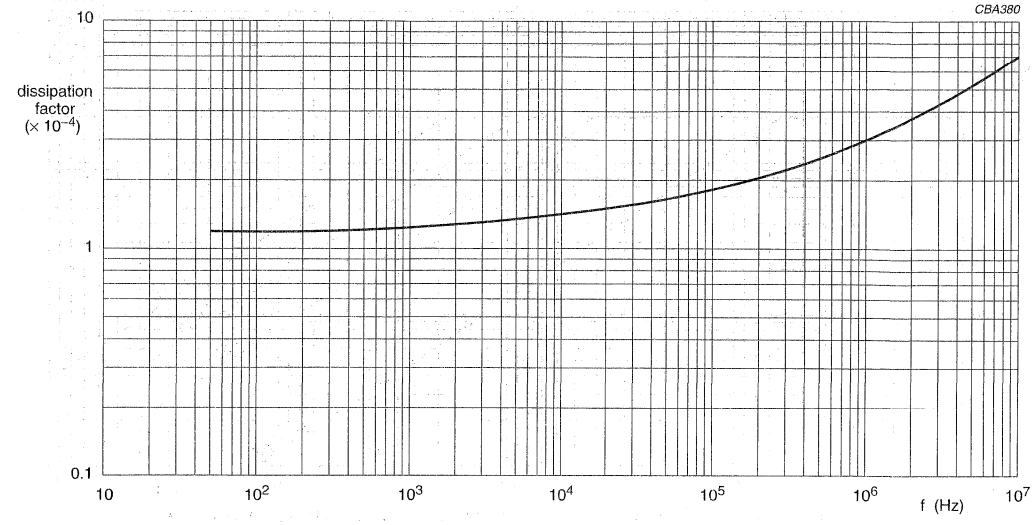


Fig.23 Tangent of loss angle as a function of frequency: typical curve.

Insulation resistance

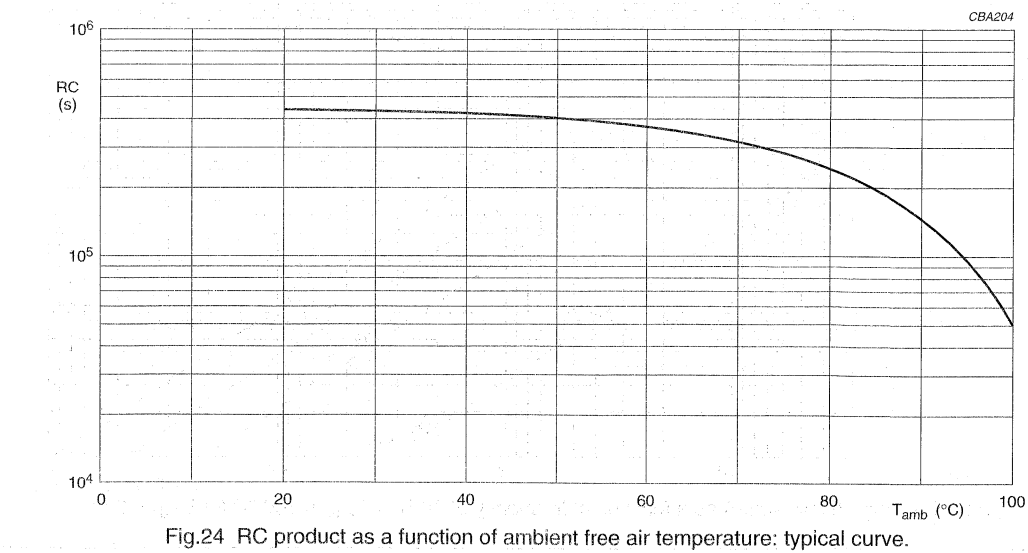


Fig.24 RC product as a function of ambient free air temperature: typical curve.

Inductance

- L dependent on lead and capacitor length: ≤10 nH/cm.

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

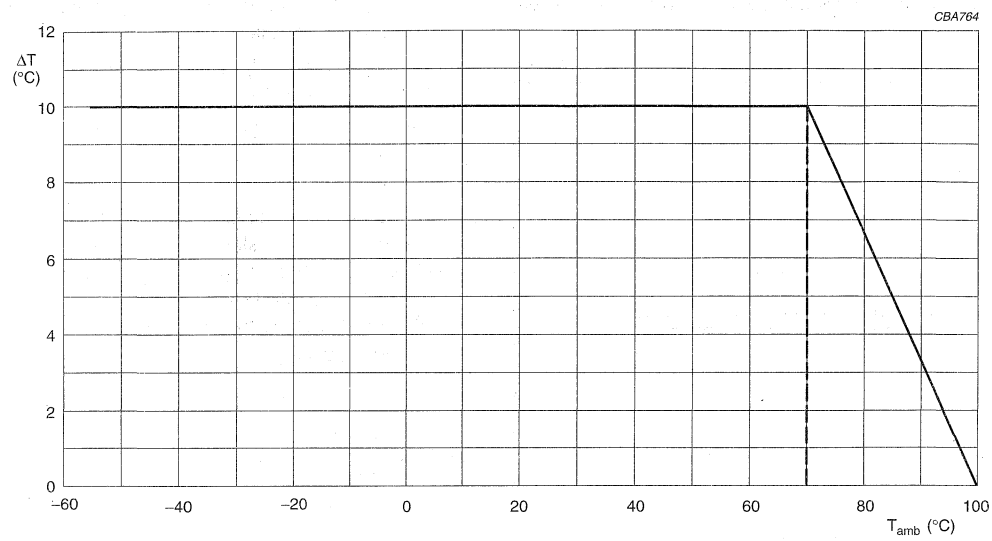


Fig.25 Maximum allowed component temperature rise as a function of the ambient temperature.

Heat conductivity (G) as a function of 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.

Power dissipation can be calculated in accordance with 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).

Measuring the component temperature

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

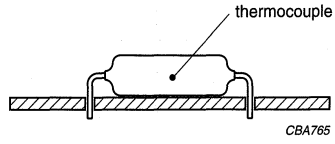


Fig.26 Mounting the thermocouple.

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 ($U_{p\text{-}p}$) shall not be greater than the maximum $U_{p\text{-}p}$ 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.25.
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).

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 = ±1%; G ±2%; J = ±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)
PHILIPS

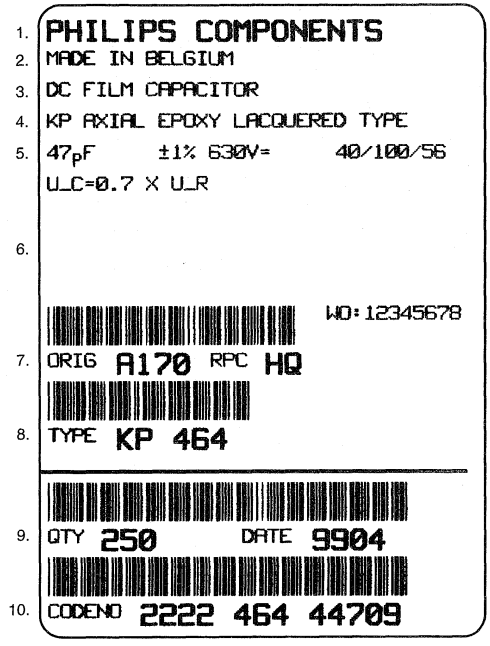
Table 2 Letter codes for year and numbers for month of production

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

Package marking

The package containing the capacitors is marked as shown in Fig.27.

Please note:
In due time BC COMPONENTS
will replace PHILIPS COMPONENTS



Barcode label marking

LINE	MARKING EXPLANATION
1	Manufacturer's name
2	Country of origin
3	Sub-family
4	Type description
5	Capacitance value, tolerance, voltage and climatic category (*"IEC 60068-1"*)
6	–
7	Preference origin code: A Country of origin in code: 170 (Belgium) Responsible production centre: HQ Work order: WO
8	Product type description
9	Quantity and production period, year and week code
10	Product code (12NC)

Fig.27 Barcode label.

Polypropylene film foil capacitors KP 460 to 464

QUICK REFERENCE TEST REQUIREMENTS (see note 1)

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 pF ($C \leq 1100$ pF) $\|\Delta C/C\| \leq 1\%$ ($C > 1100$ pF)
Bending: *"IEC 60068-2-21"*	load 5 N; 4 × 90°	
Torsion:	2 × 180 °	
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 pF ($C \leq 1100$ pF) $\|\Delta C/C\| \leq 1\%$ ($C > 1100$ pF) $R_{ins} \geq 50\%$ 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 pF ($C \leq 1100$ pF) $\|\Delta C/C\| \leq 1\%$ ($C > 1100$ pF) $R_{ins} \geq 50\%$ of specified value
Damp heat, cyclic, test Db, first cycle: *"IEC 60068-2-30"*		
Cold: *"IEC 60068-2-1"*	2 hours; –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 pF ($C \leq 1100$ pF) $\|\Delta C/C\| \leq 1\%$ ($C > 1100$ pF) $R_{ins} \geq 50\%$ of specified value
Endurance (DC): *"IEC 60384-13"*	1000 hours; 1.5 × U_{Rdc}; 85 °C 1.05 × U_{Rdc}; 100 °C	$\|\Delta C/C\| \leq 2\%$ +1 pF ($C \leq 1100$ pF) $\|\Delta C/C\| \leq 1\%$ ($C > 1100$ pF) $R_{ins} \geq 100\%$ of specified value
Variation of capacitance with temperature: *"IEC 60384-13"*	static method; one cycle	$\|\Delta C/C\| \leq 2\%$ +1 pF ($C \leq 1100$ pF) $\|\Delta C/C\| \leq 1\%$ ($C > 1100$ pF) $R_{ins} \geq 10000$ MΩ
Heat storage: *"IEC 60384-13"*	1000 hours; 100 °C	$\|\Delta C/C\| \leq 2\%$ +1 pF ($C \leq 1100$ pF) $\|\Delta C/C\| \leq 1\%$ ($C > 1100$ 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 pF ($C \leq 1100$ pF) $\|\Delta C/C\| \leq 1\%$ ($C > 1100$ pF)

Note

1. For detailed information: see *"Type detail specification HQN-384-13/101"*.

Metallized polypropylene filter capacitors MKP 416 to 420

MKP RADIAL POTTED TYPE PITCH 5/10 mm

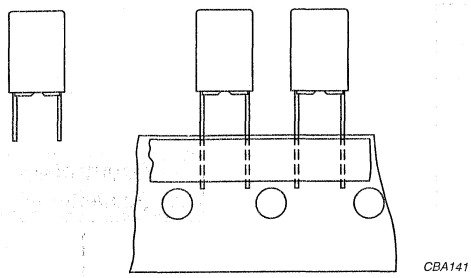


Fig.1 Simplified outlines.

FEATURES

- 5 and 10 mm lead pitch
- Supplied loose in box, in ammopack and taped on reel.

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)	0.0015 to 0.27 μF
Capacitance tolerance	±2%; ±5%
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 °C
Rated temperature (AC)	85 °C
Maximum application temperature	85 °C
Reference specification	IEC 60384-16
Performance grade	grade 1 (long life)
Stability grade	grade 1

Metallized polypropylene filter capacitors MKP 416 to 420

COMPOSITION OF CATALOGUE NUMBER

TYPE AND VOLTAGES	
416	63 V
417	160 V
418	250 V
419	400 V
420	630 V

MULTIPLIER (nF)	
0.01	2
0.1	3
1	4

CAPACITANCE (numerically)

Example:

1004 = 100 × 1 = 100 nF

2222	XXX	X	XXX	X

PACKAGING	LEAD CONFIGURATION	C-TOL	
Ammopack	H = 18.5 mm	±5%	0
		±2%	1
Loose in box	lead length 4.0 +1.0/−0.5 mm	±5%	3
		±2%	4

Metallized polypropylene filter capacitors MKP 416

MKP 416 GENERAL DATA PITCH 5/10 mm

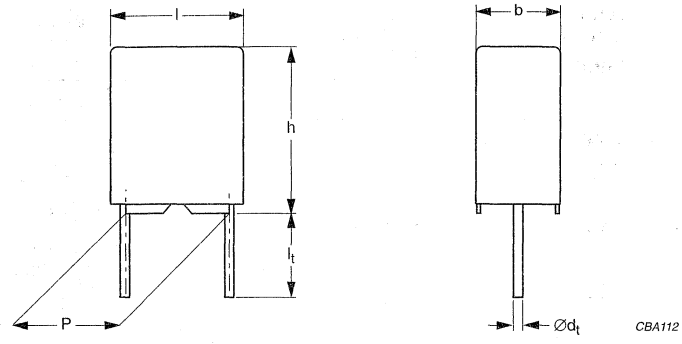


Fig.3 Outline.

Specific reference data for the 63 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
$C \leq 0.11\ \mu F$	$\leq 5 \times 10^{-4}$	$\leq 25 \times 10^{-4}$
$0.11\ \mu F < C \leq 0.18\ \mu F$	$\leq 10 \times 10^{-4}$	$\leq 30 \times 10^{-4}$
$0.18\ \mu F < C \leq 0.27\ \mu F$	$\leq 10 \times 10^{-4}$	$\leq 35 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 63 V (DC):		
P = 5 mm	50 V/µs	
P = 10 mm	20 V/µs	
R between leads at 50 V; 1 minute	>100000 MΩ	
R between interconnected leads and case at 50 V; 1 minute	>100000 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	2840 V; 1 minute	

Available 63 V DC versions

PACKAGING(1)	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Ammopack	H = 18.5 mm; note 2	±5%	2222 416 0....	on request
		±2%	2222 416 1....	preferred
Loose in box	l_t = 4.0 +1.0/–0.5 mm	±5%	2222 416 3....	on request
		±2%	2222 416 4....	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

Metallized polypropylene filter capacitors | MKP 416

U_{Rdc} = 63 V; U_{Rac} = 25 V/U_{p-p} = 70 V

C[1] (E24) (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER[2] AMMOPACK H = 18.5 mm C-tol = ±2%
Pitch = 5.0 ±0.3 mm; d_t = 0.50 ±0.05 mm			
0.036	4.5 × 9.0 × 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 × 11.0 × 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 ±0.4 mm; d_t = 0.60 ±0.06 mm			
0.13	5.0 × 11.0 × 12.5	0.85	2222 416 **11304**
0.15			2222 416 **11504**
0.16	6.0 × 12.0 × 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**

Notes

1. In addition to the values of the E24 series as quoted, intermediate values are available of the E96 series (with a tolerance of ±2%). The specifications of these intermediate values are usually equal to the specifications of the next higher value of the E24 series.
2. The shading indicates preferred types.

Metallized polypropylene filter capacitors MKP 417

MKP 417 GENERAL DATA PITCH 5/10 mm

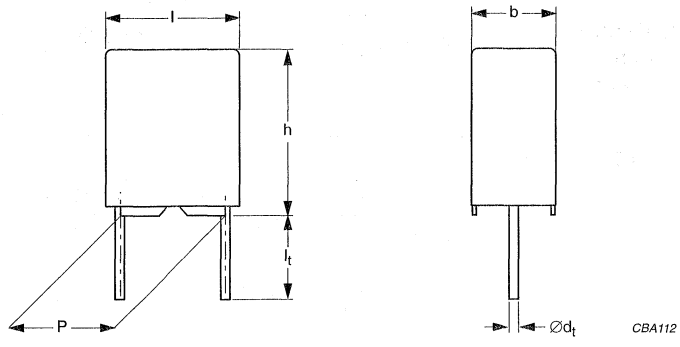


Fig.4 Outline.

Specific reference data for the 160 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
$C \leq 0.027$ µF	$\leq 5 \times 10^{-4}$	$\leq 15 \times 10^{-4}$
0.027 µF < C ≤ 0.075 µF	$\leq 5 \times 10^{-4}$	$\leq 20 \times 10^{-4}$
0.075 µF < C ≤ 0.11 µF	$\leq 5 \times 10^{-4}$	$\leq 25 \times 10^{-4}$
0.11 µF < C ≤ 0.18 µF	$\leq 10 \times 10^{-4}$	$\leq 30 \times 10^{-4}$
0.18 µF < C ≤ 0.24 µF	$\leq 10 \times 10^{-4}$	$\leq 35 \times 10^{-4}$
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 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	260 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
Ammopack	H = 18.5 mm; note 2	±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

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

Metallized polypropylene filter capacitors MKP 417

U_{Rdc} = 160 V; U_{Rac} = 63 V/U_{p-p} = 180 V

C[1] (E24) (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER[2] AMMOPACK H = 18.5 mm C-tol = ±2%
Pitch = 5.0 ±0.3 mm; d_t = 0.50 ±0.05 mm			
0.024	4.5 × 9.0 × 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 × 11.0 × 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 ±0.4 mm; d_t = 0.60 ±0.06 mm			
0.075	4.0 × 10.0 × 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 × 11.0 × 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 × 12.0 × 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

Notes

1. In addition to the values of the E24 series as quoted, intermediate values are available of the E96 series (with a tolerance of ±2%). The specifications of these intermediate values are usually equal to the specifications of the next higher value of the E24 series.
2. The shading indicates preferred types.

Metallized polypropylene filter capacitors MKP 418

MKP 418 GENERAL DATA PITCH 5/10 mm

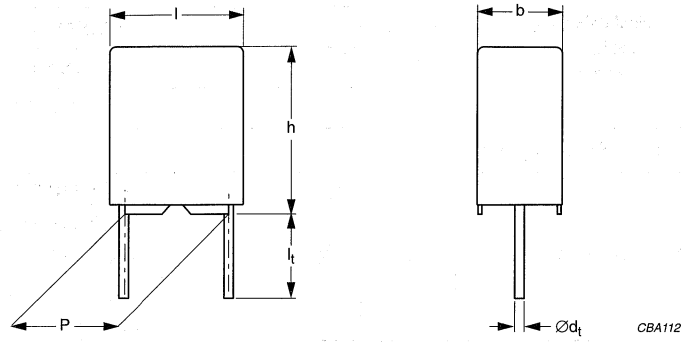


Fig.5 Outline.

Specific reference data for the 250 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
$C \leq 0.027\ \mu F$	$\leq 5 \times 10^{-4}$	$\leq 15 \times 10^{-4}$
$0.027\ \mu F < C \leq 0.075\ \mu F$	$\leq 5 \times 10^{-4}$	$\leq 20 \times 10^{-4}$
$0.075\ \mu F < C \leq 0.11\ \mu F$	$\leq 5 \times 10^{-4}$	$\leq 25 \times 10^{-4}$
$0.11\ \mu F < C \leq 0.13\ \mu F$	$\leq 10 \times 10^{-4}$	$\leq 30 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 250 V (DC):		
P = 5 mm	50 V/µs	
P = 10 mm	20 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	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
Ammopack	H = 18.5 mm; note 2	±5%	2222 418 0.....	on request
		±2%	2222 418 1.....	preferred
Loose in box	l_t = 4.0 +1.0/–0.5 mm	±5%	2222 418 3.....	on request
		±2%	2222 418 4.....	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

Metallized polypropylene filter capacitors MKP 418

U_{Rdc} = 250 V; U_{Rac} = 100 V/U_{p-p} = 280 V

C[1] (E24) (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER[2] AMMOPACK H = 18.5 mm C-tol = ±2%
Pitch = 5.0 ±0.3 mm; d_t = 0.50 ±0.05 mm			
0.01	3.5 × 8.0 × 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 × 9.0 × 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 × 11.0 × 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 ±0.4 mm; d_t = 0.60 ±0.06 mm			
0.047	4.0 × 10.0 × 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 × 11.0 × 12.5	0.85	2222 418 **17503**
0.082			2222 418 **18203**
0.091			2222 418 **19103**
0.1	6.0 × 12.0 × 12.5	1.10	2222 418 **11004**
0.11			2222 418 **11104**
0.12			2222 418 **11204**
0.13			2222 418 **11304**

Notes

1. In addition to the values of the E24 series as quoted, intermediate values are available of the E96 series (with a tolerance of ±2%). The specifications of these intermediate values are usually equal to the specifications of the next higher value of the E24 series.
2. The shading indicates preferred types.

Metallized polypropylene filter capacitors MKP 419

MKP 419 GENERAL DATA PITCH 5 mm

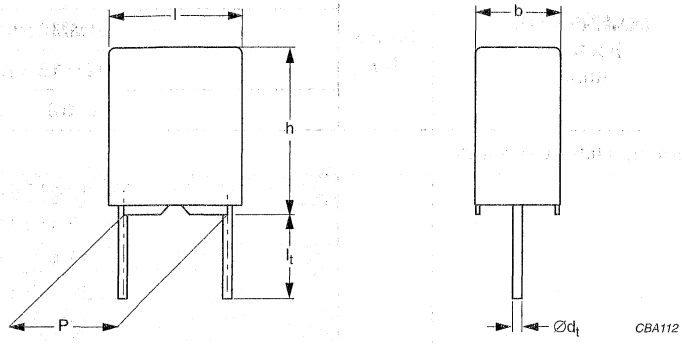


Fig.6 Outline.

Specific reference data for the 400 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
$C \leq 0.0091\ \mu F$	$\leq 5 \times 10^{-4}$	$\leq 10 \times 10^{-4}$
$0.0091\ \mu F < C \leq 0.02\ \mu F$	$\leq 5 \times 10^{-4}$	$\leq 15 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 400 V (DC)	50 V/µs	
R between leads at 100 V; 1 minute	>100000 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	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
Ammopack	H = 18.5 mm; note 2	±5%	2222 419 0.....	on request
		±2%	2222 419 1.....	preferred
Loose in box	l_t = 4.0 +1.0/–0.5 mm	±5%	2222 419 3.....	on request
		±2%	2222 419 4.....	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

Metallized polypropylene filter capacitors MKP 419

U_{Rdc} = 400 V; U_{Rac} = 125 V/U_{p-p} = 350 V

C(1) (E 24) (μF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER(2) AMMOPACK H = 18.5 mm C-tol = ±2%
Pitch = 5.0 ±0.3 mm; d_t = 0.50 ±0.05 mm			
0.0015	3.5 × 8.0 × 7.2	0.35	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**

Notes

1. In addition to the values of the E24 series as quoted, intermediate values are available of the E96 series (with a tolerance of ±2%). The specifications of these intermediate values are usually equal to the specifications of the next higher value of the E24 series.
2. The shading indicates preferred types.

Metallized polypropylene filter capacitors MKP 419

MKP 419 GENERAL DATA PITCH 10 mm

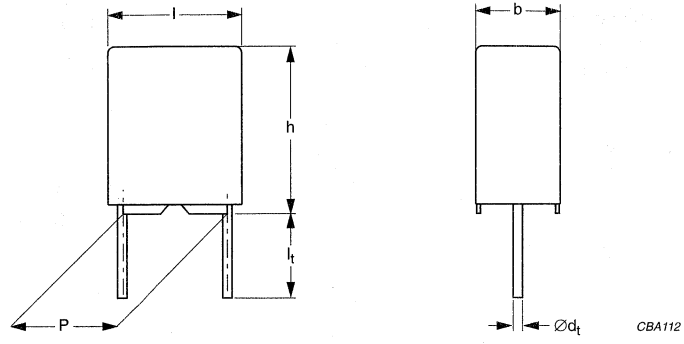


Fig.7 Outline.

Specific reference data for the 400 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
$C \leq 0.027$ µF	$\leq 5 \times 10^{-4}$	$\leq 15 \times 10^{-4}$
0.027 µF $< C \leq 0.068$ µF	$\leq 5 \times 10^{-4}$	$\leq 20 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 400 V (DC)	20 V/µs	
R between leads at 100 V; 1 minute	>100000 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	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
Ammopack	H = 18.5 mm; note 2	±5%	2222 419 0.....	on request
		±2%	2222 419 1.....	preferred
Loose in box	l_t = 4.0 +1.0/–0.5 mm	±5%	2222 419 3.....	on request
		±2%	2222 419 4.....	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

U_{Rdc} = 400 V; U_{Rac} = 125 V/U_{p-p} = 350 V

C[1] (E24) (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER[2] AMMOPACK H = 18.5 mm C-tol = ±2%
Pitch = 10.0 ±0.4 mm; d_t = 0.60 ±0.06 mm			
0.022	4.0 × 10.0 × 12.5	0.60	2222 419 1**2203**
0.024			2222 419 1**2403**
0.027			2222 419 1**2703**
0.03			2222 419 1**3003**
0.033			2222 419 1**3303**
0.036	5.0 × 11.0 × 12.5	0.85	2222 419 1**3603**
0.039			2222 419 1**3903**
0.043			2222 419 1**4303**
0.047	6.0 × 12.0 × 12.5	1.10	2222 419 1**4703**
0.051			2222 419 1**5103**
0.056			2222 419 1**5603**
0.062			2222 419 1**6203**
0.068			2222 419 1**6803**

Notes

1. In addition to the values of the E24 series as quoted, intermediate values are available of the E96 series (with a tolerance of ±2%). The specifications of these intermediate values are usually equal to the specifications of the next higher value of the E24 series.
2. The shading indicates preferred types.

Metallized polypropylene filter capacitors MKP 420

MKP 420 GENERAL DATA PITCH 5 mm

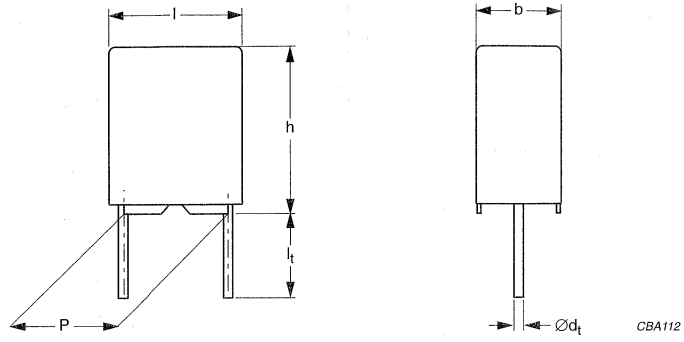


Fig.8 Outline.

Specific reference data for the 630 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: C ≤ 0.0068 µF	$\leq 5 \times 10^{-4}$	$\leq 10 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 630 V (DC)	50 V/µs	
R between leads at 500 V; 1 minute	>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	1000 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
Ammopack	H = 18.5 mm; note 2	±5%	2222 420 0.....	on request
		±2%	2222 420 1.....	preferred
Loose in box	l_t = 4.0 +1.0/–0.5 mm	±5%	2222 420 3.....	on request
		±2%	2222 420 4.....	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

Metallized polypropylene filter capacitors MKP 420

U_{Rdc} = 630 V; U_{Rac} = 160 V/U_{p-p} = 450 V

C[1] (E24) (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER[2] AMMOPACK H = 18.5 mm C-tol = ±2%
Pitch = 5.0 ±0.3 mm; d_t = 0.50 ±0.05 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**

Notes

1. In addition to the values of the E24 series as quoted, intermediate values are available of the E96 series (with a tolerance of ±2%). The specifications of these intermediate values are usually equal to the specifications of the next higher value of the E24 series.
2. The shading indicates preferred types.

Metallized polypropylene filter capacitors MKP 420

MKP 420 GENERAL DATA **PITCH 10 mm**

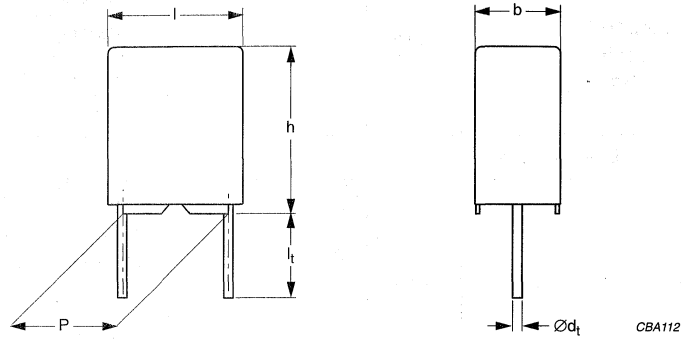


Fig.9 Outline.

Specific reference data for the 630 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
$C \leq 0.027\ \mu F$	$\leq 5 \times 10^{-4}$	$\leq 15 \times 10^{-4}$
$0.027\ \mu F < C \leq 0.047\ \mu F$	$\leq 5 \times 10^{-4}$	$\leq 20 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 630 V (DC)	50 V/µs	
R between leads at 500 V; 1 minute	>100000 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	1000 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
Ammopack	H = 18.5 mm; note 2	±5%	2222 420 0.....	on request
		±2%	2222 420 1.....	preferred
Loose in box	l_t = 4.0 +1.0/–0.5 mm	±5%	2222 420 3.....	on request
		±2%	2222 420 4.....	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

U_{Rdc} = 630 V; U_{Rac} = 160 V/U_{p-p} = 450 V

C[1] (E24) (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER[2] AMMOPACK H = 18.5 mm C-tol = ±2%
Pitch = 10.0 ±0.4 mm; d_t = 0.60 ±0.06 mm			
0.01	4.0 × 10.0 × 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 × 11.0 × 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 × 12.0 × 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**

Notes

1. In addition to the values of the E24 series as quoted, intermediate values are available of the E96 series (with a tolerance of ±2%). The specifications of these intermediate values are usually equal to the specifications of the next higher value of the E24 series.
2. The shading indicates preferred types.

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
- 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.

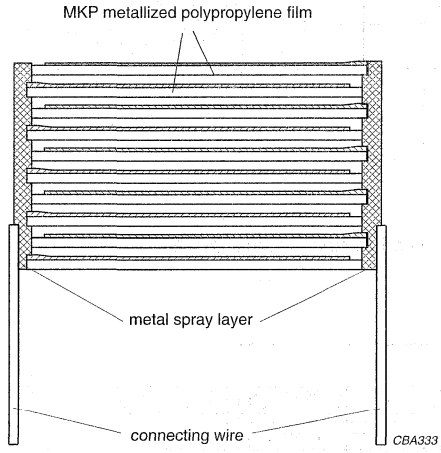


Fig.10 Construction.

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.11:

- Eccentricity as in Fig.11. 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.

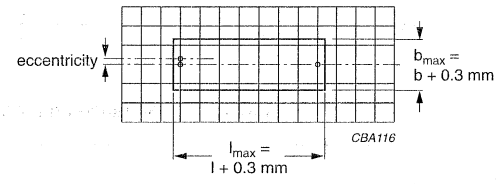


Fig.11 Lay-out.

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 ±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%.

CHARACTERISTICS

Capacitance

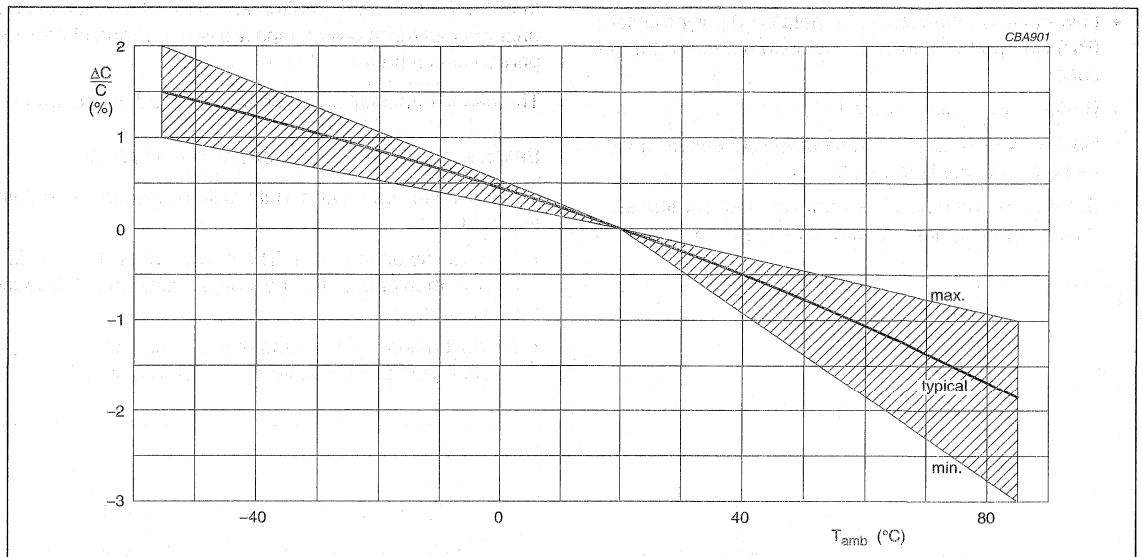


Fig.12 Capacitance change at 1 kHz as a function of temperature.

Impedance

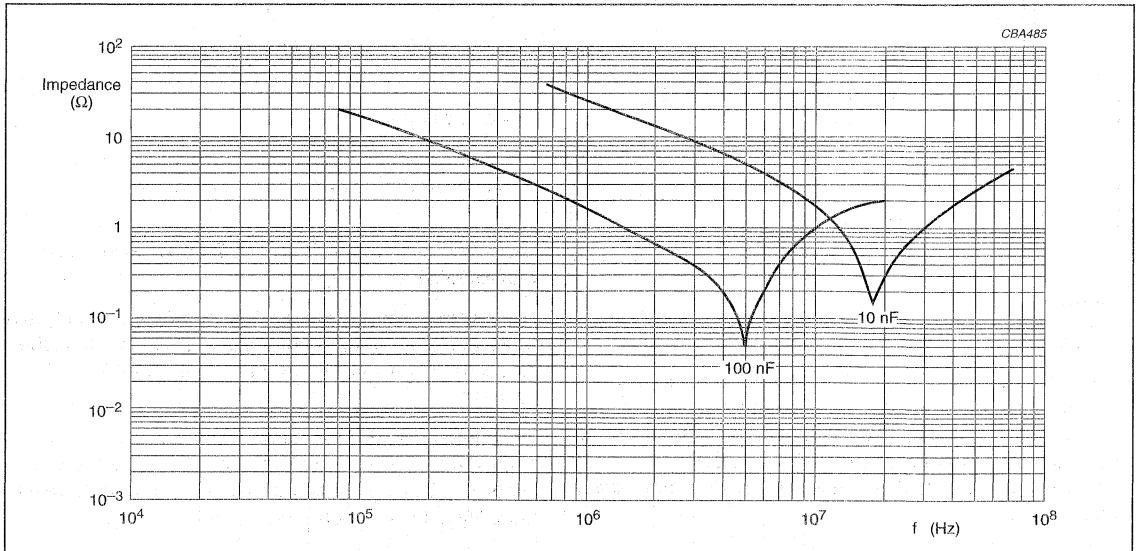


Fig.13 Impedance as a function of frequency; typical curves.

Maximum RMS voltage (sinewave) as a function of frequency

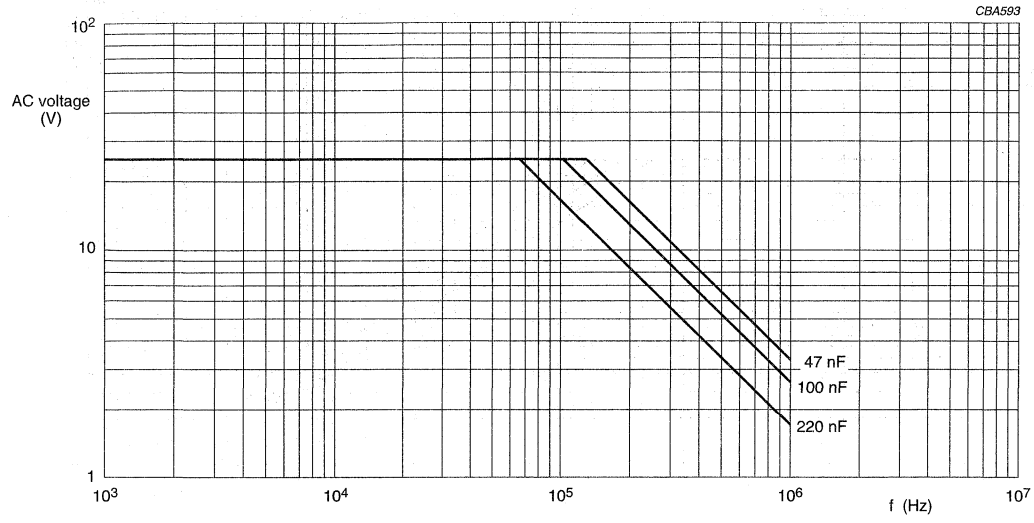


Fig.14 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C for $U_{Rdc} = 63$ V.

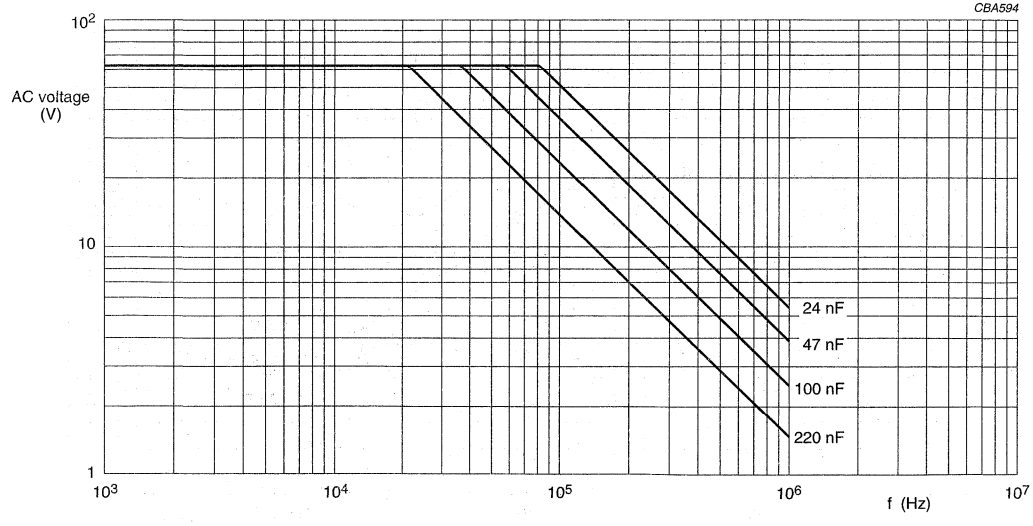


Fig.15 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C for $U_{Rdc} = 160$ V.

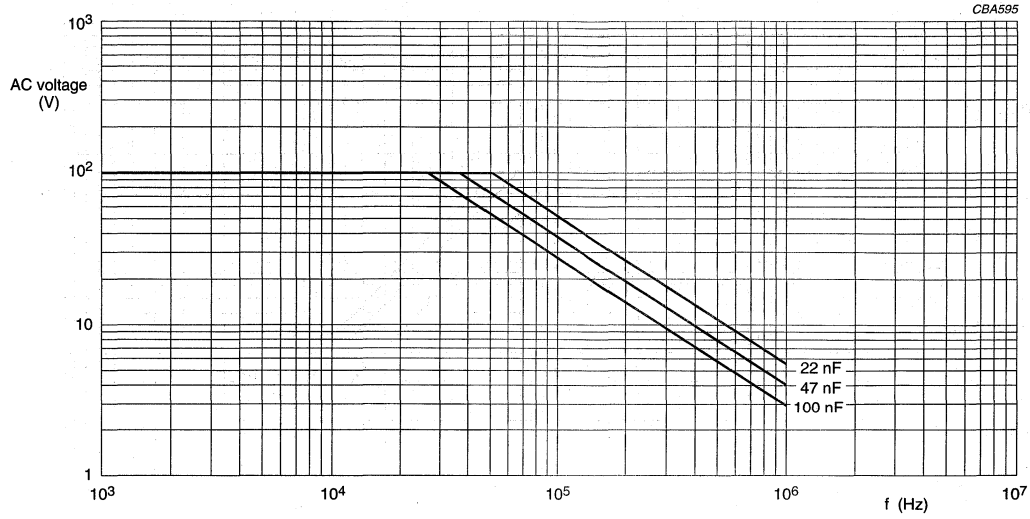


Fig.16 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C for $U_{Rdc} = 250$ V.

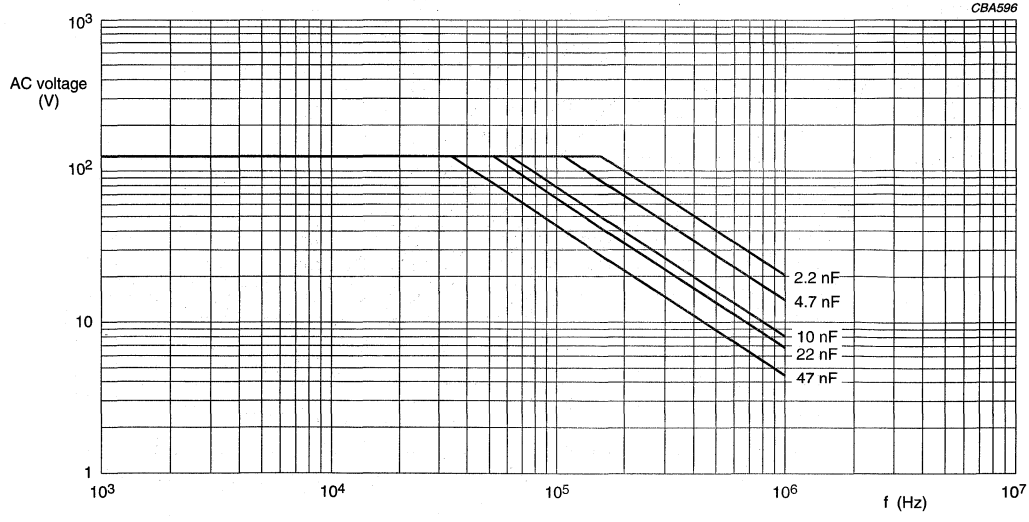


Fig.17 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C for $U_{Rdc} = 400$ V.

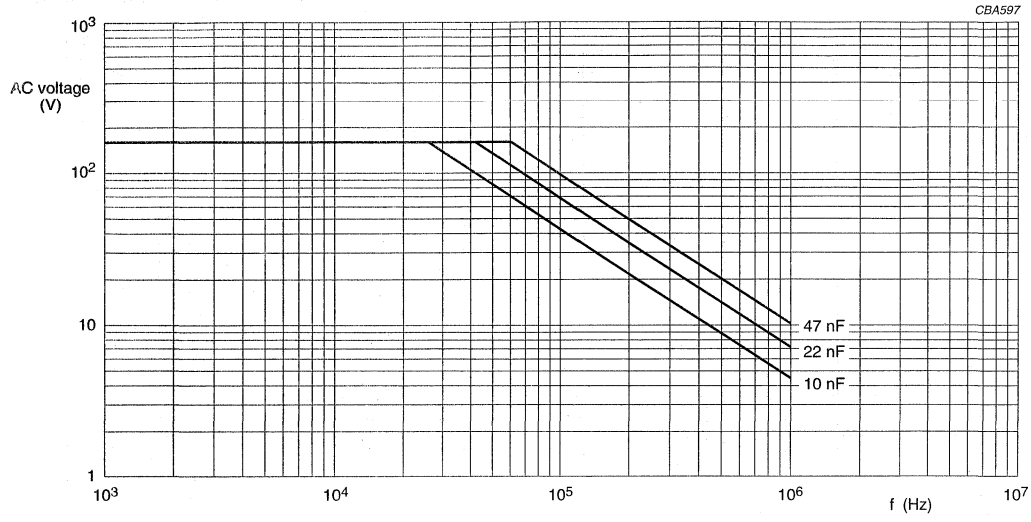


Fig.18 AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C for $U_{Rdc} = 630$ V.

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 14 to 18.

Tangent of loss angle

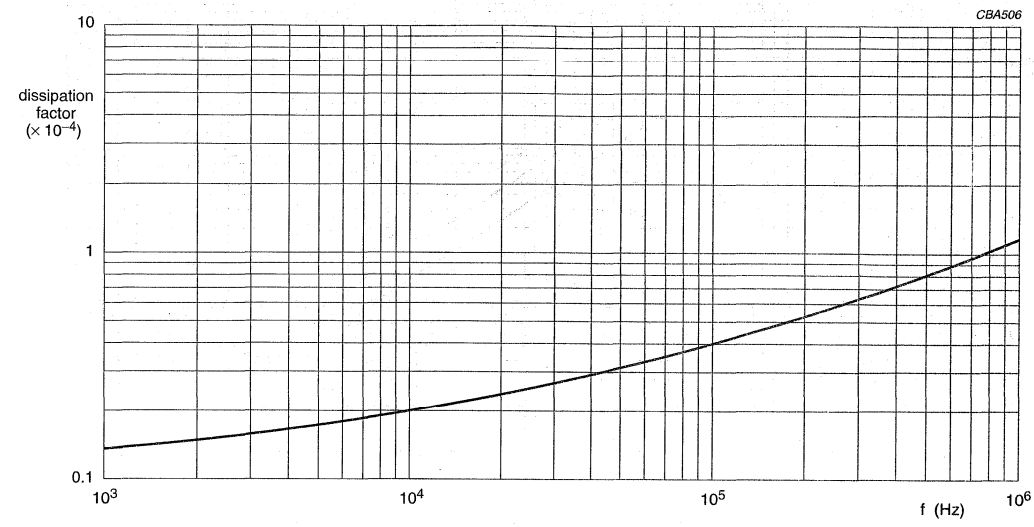


Fig.19 Tangent of loss angle as a function of frequency; typical curve.

Insulation resistance

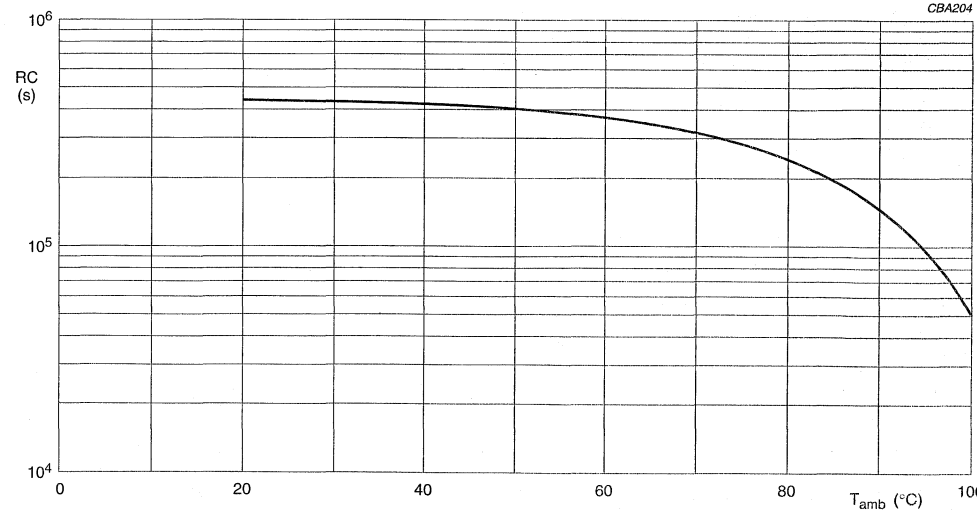


Fig.20 RC product as a function of ambient temperature; typical curve.

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

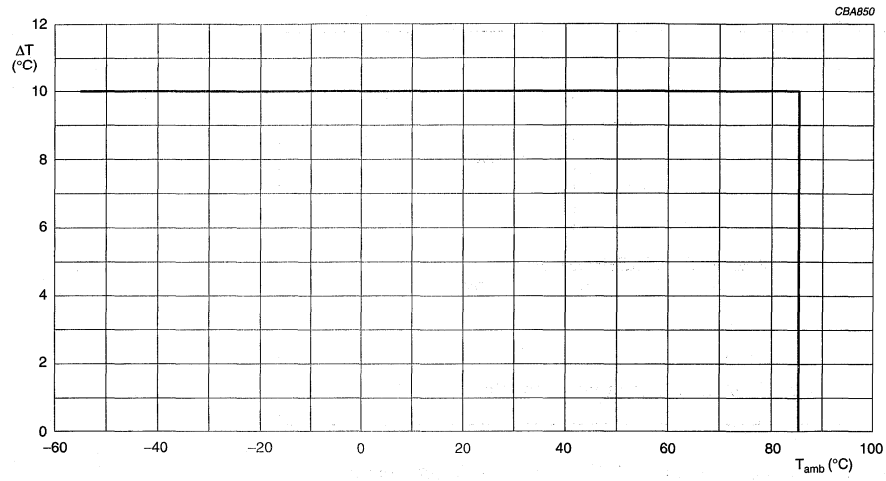


Fig.21 Maximum allowed component temperature rise as a function of the ambient temperature.

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	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.

Power dissipation can be calculated in accordance with 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).

Measuring the component temperature

A thermocouple must be attached to the capacitor body; see Fig.22.

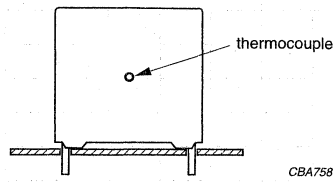


Fig.22 Mounting the thermocouple.

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

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 by safety standards and therefore electromagnetic interference suppression capacitors conforming to 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.21.
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	$T_{amb} \leq 85$ °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 µF - 250 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 V is lower than 250 V (DC).
2. The peak-to-peak voltage 5.6 V is lower than $2 \times \sqrt{2} \times 100$ 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.

MARKING

Product marking

CAPACITORS WITH PITCH = 5 mm

The capacitors are marked by YAG laser on the side (see Fig.23) with the following information:

1. Capacitance code in accordance with *"IEC 60062"*: n = nF
2. Tolerance on rated capacitance: G = ±2%; J = ±5%
3. Rated (DC) voltage (e.g. 250 V)
4. Code for manufacturer
5. Year and week of manufacture (e.g. 9801)
6. Manufacturers type designation.

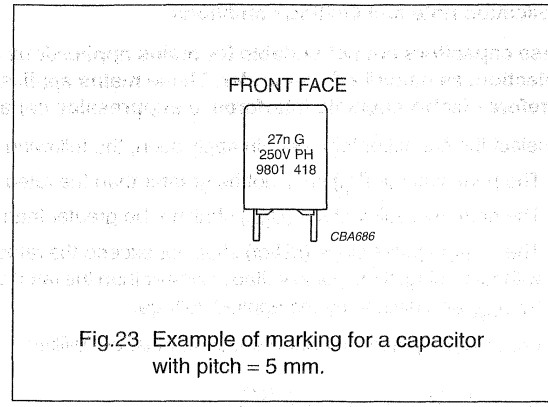


Fig.23 Example of marking for a capacitor with pitch = 5 mm.

CAPACITORS WITH PITCH = 10 mm

The capacitors are marked by laser print on the front face (see Fig.24) with the following information:

1. Year and week of manufacture (e.g. 9802)
2. Capacitance code in accordance with *"IEC 60062"*
   Tolerance on rated capacitance: G = ±2%; J = ±5%
   Rated (DC) voltage (e.g. 160 V)
3. Code for dielectric material (MKP)
   Manufacturer's type designation (e.g. 417)
4. Code for factory of origin (HQ)
   Code for manufacturer.

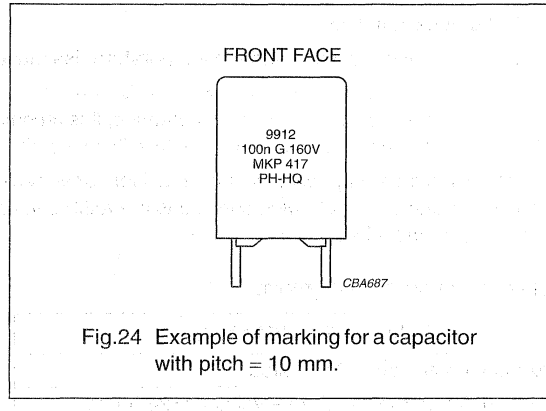
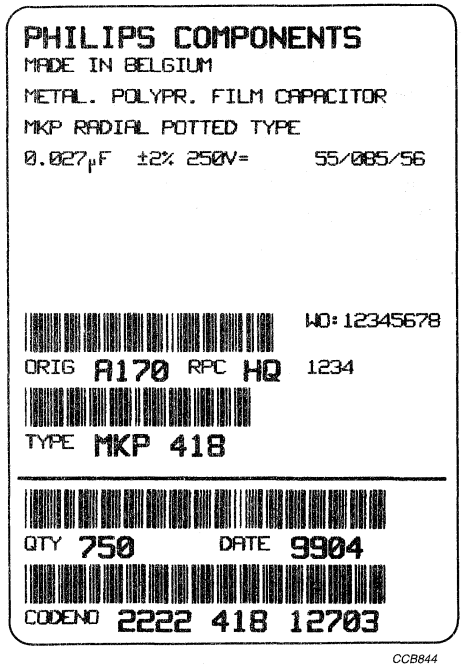


Fig.24 Example of marking for a capacitor with pitch = 10 mm.

Package marking

The package containing the capacitors is marked as shown in Fig.25.

Please note:
In due time BC COMPONENTS
will replace PHILIPS COMPONENTS



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	–
7	Preference origin code: A Country of origin in code: 170 (Belgium) Responsible production centre: HQ Work order: WO Wage number of final inspection
8	Product type description
9	Quantity and production period, year and week code
10	Product code (12NC)

Fig.25 Barcode label.

QUICK REFERENCE TEST REQUIREMENTS (see note 1)

TEST	PROCEDURE (quick reference)	REQUIREMENTS
Robustness of leads		
Tensile strength: *"IEC 60068-2-21"*	load 10 N; 10 s	no visible damage legible marking $\lvert\Delta C/C\rvert \leq 1\% + 5$ pF $\Delta\tan\delta \leq 5 \times 10^{-4}$
Bending: *"IEC 60068-2-21"*	load 5 N; 4 × 90°	
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	$\lvert\Delta C/C\rvert \leq 1\% + 5$ pF $\Delta\tan\delta \leq 5 \times 10^{-4}$
Shock: *"IEC 60068-2-27"*	half sinewave; 490 m/s^2; 11 ms	
Climatic sequence		
Dry heat: *"IEC 60068-2-2"*	16 hours; 85 °C	$\lvert\Delta C/C\rvert \leq 1\% + 5$ pF $\Delta\tan\delta \leq 5 \times 10^{-4}$ $R_{ins} \geq 50\%$ 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"*		
Other applicable tests		
Damp heat, steady state: *"IEC 60068-2-3"*	56 days; 40 °C; 90 to 95% RH	$\lvert\Delta C/C\rvert \leq 1\% + 5$ pF $\Delta\tan\delta \leq 5 \times 10^{-4}$ $R_{ins} \geq 50\%$ of specified value
Endurance (DC): *"IEC 60384-16"*	2000 hours: 1.25 × U_{Rdc}; 85 °C	$\lvert\Delta C/C\rvert \leq 1\% + 5$ pF $\Delta\tan\delta \leq 5 \times 10^{-4}$ $R_{ins} \geq 50\%$ of specified value
Heat storage: *"IEC 60384-16"*	2000 hours; 85 °C	$\lvert\Delta C/C\rvert \leq 1\% + 5$ 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	$\lvert\Delta C/C\rvert \leq 1\% + 5$ 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 × U_{Rac} (RMS); 50 Hz	$\lvert\Delta C/C\rvert \leq 2\% + 5$ pF $\Delta\tan\delta \leq 5 \times 10^{-4}$ $R_{ins} \geq 50\%$ of specified value

Note

1. For detailed information, see *"Type detail specification HQN-384-16/101"*.

FLUORESCENT LAMP STARTER CAPACITORS

Fluorescent lamp starter capacitors KT 311 90028

KT RADIAL TYPE

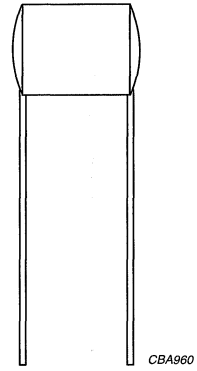


Fig.1 Simplified outlines.

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.

DETAIL SPECIFICATION

For more detailed data and test requirements see *"Type detail specification HQN-384-14/102"*.

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
Tangent of loss angle at 1 kHz	$\leq 60 \times 10^{-4}$
Reference specification	IEC 60155 and IEC 60384-14

Fluorescent lamp starter capacitors KT 311 90028

KT 311 90028 GENERAL DATA

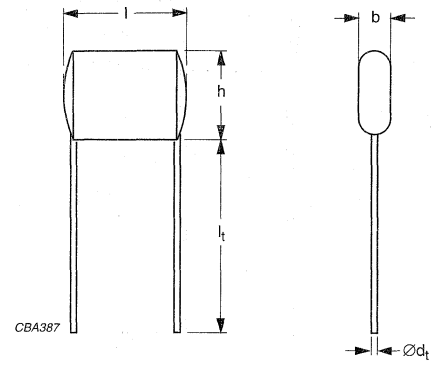


Fig.2 Outline.

Specific reference data

DESCRIPTION	VALUE at 1 kHz
Capacitance value	5.0 nF ≤ C ≤ 7.0 nF
Tangent of loss angle	$\leq 60 \times 10^{-4}$
R between terminations at 100 V; 1 minute	≥50000 MΩ
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 ±1.5 mm; l_t = 27.0 ±1.0 mm; d_t = 0.60 ±0.06 mm				
5.6	3.6 × 9.0 × 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 following additional requirements:

   Capacitors must fit a jig, consisting of a cylinder with an inside diameter of 19.3 –0.1 mm, containing a cylinder with an outside diameter of 12.6 +0.1 mm, which is fixed against the wall of the outer cylinder.

Fluorescent lamp starter capacitors KT 311 90028

CONSTRUCTION

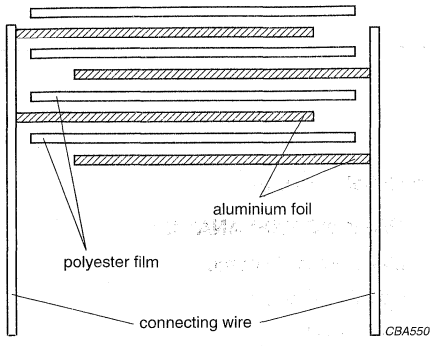


Fig.3 Construction.

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 ±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

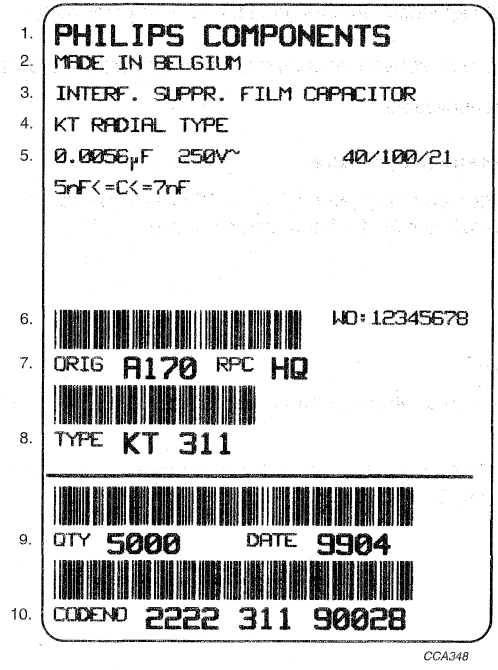
Product marking

The capacitors have no marking.

Package marking

The package containing the capacitors is marked as shown in Fig.4.

Please note:
In due time BC COMPONENTS
will replace PHILIPS COMPONENTS



Barcode label marking

LINE	MARKING EXPLANATION
1	Manufacturer's name
2	Country of origin
3	Sub-family
4	Type description
5	Capacitance value in pF, voltage and climatic category *("IEC 60068-1")*
6	–
7	Preference origin code: A Country of origin in code: 170 (Belgium) Responsible production centre: HQ WO: order number
8	Product type description
9	Quantity and production period, year and week code
10	Product code (12NC)

Fig.4 Barcode label.

Fluorescent lamp starter capacitors

KT 311 90032/90033
KT 311 90036

KT RADIAL EPOXY LACQUERED TYPE **PITCH 7.5 mm**

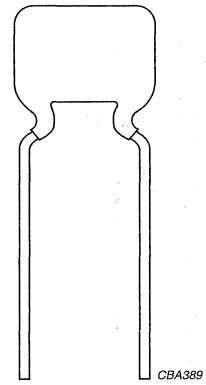


Fig.1 Simplified outlines.

FEATURES

- 7.5 mm lead pitch
- Supplied loose in box.

APPLICATIONS

- The capacitors are suitable for radio interference suppression and incorporation in starters for fluorescent lamp circuits.

DETAIL SPECIFICATION

For more detailed data and test requirements see *"Type detail specification HQN-384-14/104"*.

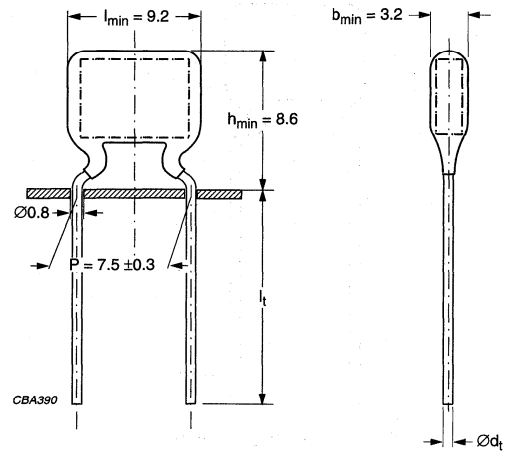
QUICK REFERENCE DATA

DESCRIPTION	VALUE
Capacitance value	1200 pF; 3000 pF
Capacitance tolerance	±20%
Rated (AC) voltage U_{Rac}, 50 to 60 Hz	250 V
Climatic category	40/125/56
Upper temperature	140 °C
Tangent of loss angle at 1 kHz	60×10^{-4}
Reference specification	IEC 60384-11

Fluorescent lamp starter capacitors

KT 311 90032/90033
KT 311 90036

KT 311 9003. GENERAL DATA



Dimensions in mm.

Fig.2 Outline.

Specific reference data

DESCRIPTION	VALUE
	at 1 kHz
Tangent of loss angle	$\leq 60 \times 10^{-4}$
R between terminations at 100 V; 1 minute	≥50000 MΩ
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)	2250 V; 1 s

Mechanical and ordering data

C (pF)	DIMENSIONS $b_{max} \times h_{max} \times l_{max}$ (mm)	MASS (g)	CATALOGUE NUMBER(1)	SMALLEST PACKAGING QUANTITIES	
				SPQ	PQ
			loose in box		
Pitch = 7.5 ±0.3 mm; l_t = 17 ±1 mm; d_t = 0.60 ±0.06 mm					
1200	4.2 × 10.0 × 10.0	0.44	2222 311 90032	5000	–
3000			2222 311 90036	–	25000 + rest box
Pitch = 7.5 ±0.3 mm; l_t = 23 ±1 mm; d_t = 0.60 ±0.06 mm					
1200	4.2 × 10.0 × 10.0	0.47	2222 311 90033	5000	–

Note

1. The shading indicates preferred types.

Fluorescent lamp starter capacitors

CONSTRUCTION

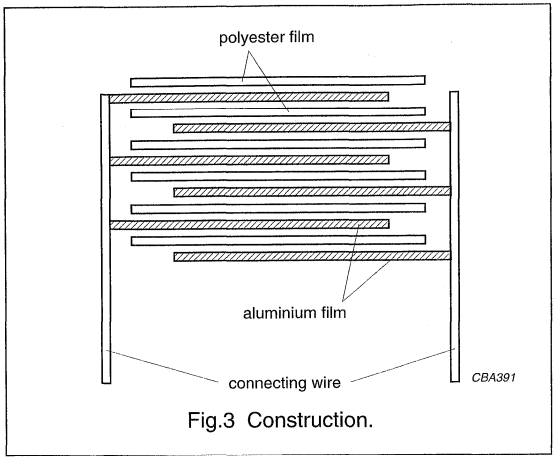


Fig.3 Construction.

Description

- Impregnated non-inductive wound cell of aluminium foil with a polyethylene terephthalate (PETP) film
- Radial copper leads, solder-coated
- Protected by a hard, water repellant, solvent resistant epoxy lacquer.

Mounting

NORMAL USE

The capacitors are designed for point-to-point wiring.

SPECIFIC METHOD OF MOUNTING FOR VIBRATION AND BUMP

Not applicable.

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 ±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%.

CHARACTERISTICS

Tangent of loss angle

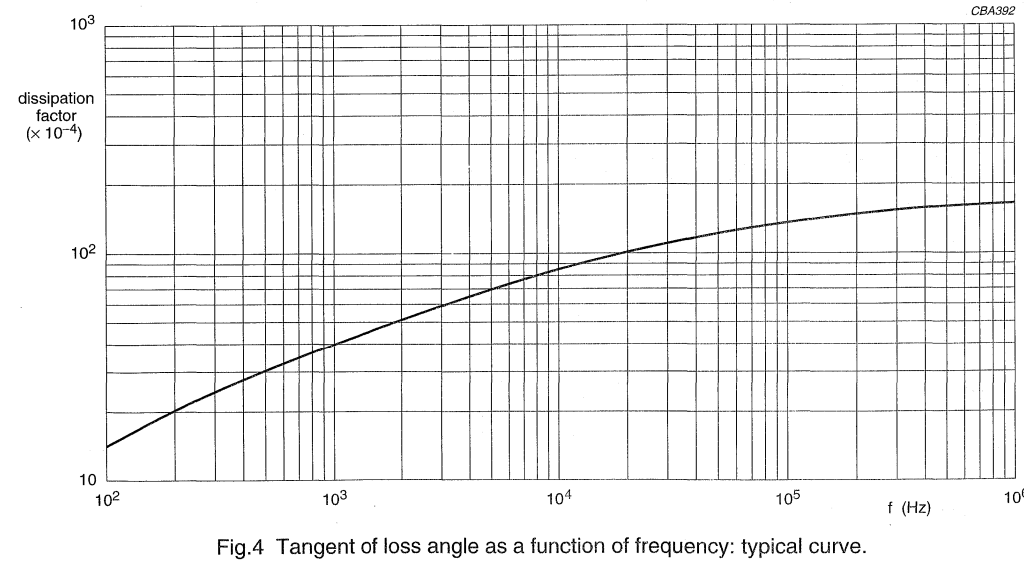


Fig.4 Tangent of loss angle as a function of frequency: typical curve.

MARKING

Product marking

STYLES KT 311 90032/90033

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

1. Rated capacitance in code according to *"IEC 60062"*
2. Tolerance on rated capacitance M: 20%
3. Rated (AC) voltage (250 V)
4. Marking: 1n2 M 250~.

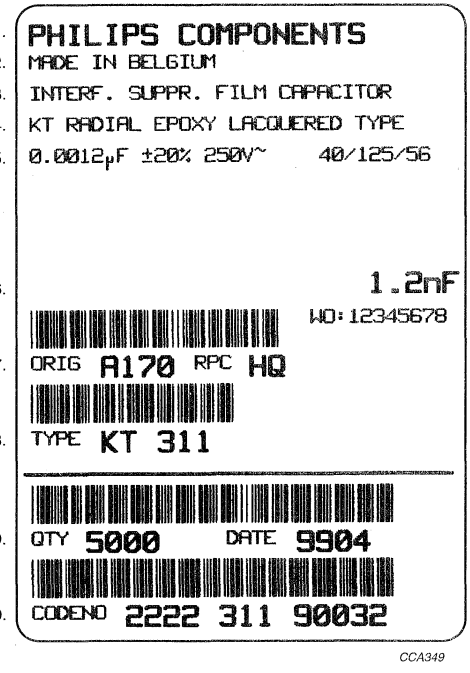
STYLES KT 311 90036

No marking.

Package marking

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

Please note:
In due time BC COMPONENTS
will replace PHILIPS COMPONENTS



Barcode label marking

LINE	MARKING EXPLANATION
1	Manufacturer's name
2	Country of origin
3	Sub-family
4	Type description
5	Capacitance value, tolerance, voltage and climatic category (*"IEC 60068-1"*)
6	Capacitance value (not for 2222 311 90033)
7	Preference origin code: A Country of origin in code: 170 (Belgium) Responsible production centre: HQ (Roeselare) Work order: WO
8	Product type description
9	Quantity and production period, year and week code
10	Product code (12NC)

Fig.5 Barcode label.

MAINTENANCE TYPES

Metallized polyester film capacitors MKT 368/369

MKT RADIAL EPOXY LACQUERED TYPE PITCH 10/15/22.5/27.5 mm

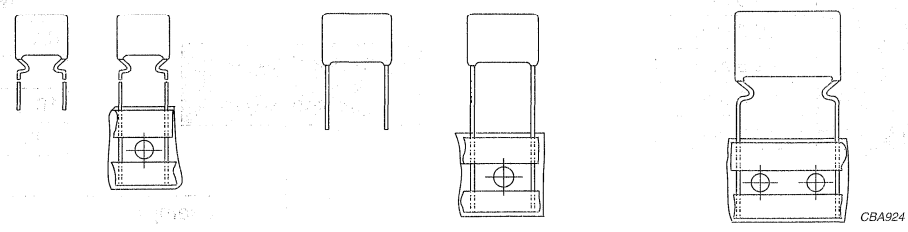


Fig.1 Simplified outlines.

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-384-02/101"*.

QUICK REFERENCE DATA

DESCRIPTION	VALUE
Capacitance range (E12 series)	0.001 to 6.8 μF
Capacitance tolerance	±10%; ±5%
Rated (DC) voltage	63 V; 100 V; 250 V; 400 V; 630 V
Climatic category	55/100/56
Rated temperature	85 °C
Maximum application temperature	100 °C
Tangent of loss angle at 10 kHz	100×10^{-4}
Reference specification	IEC 60384-2
Performance grade	grade 1 (long life)

Metallized polyester film capacitors MKT 368/369

COMPOSITION OF CATALOGUE NUMBER

TYPE AND PITCHES	
368	10.0 mm
	15.0 mm
	22.5 mm
	27.5 mm
369	10.0 mm

CAPACITANCE (numerically)

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

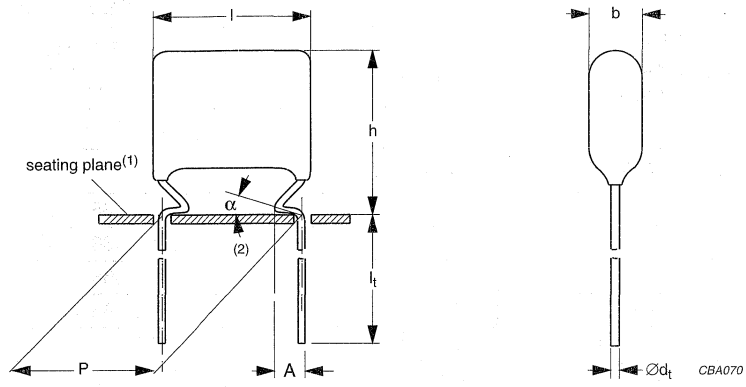
Example:
104 = 10 × 10 = 100 nF

2222	36.	XX	XX	X

TYPE	PACKAGING	LEAD CONFIGURATION	C-TOL	63 V	100 V	250 V	400 V	630 V
368	loose in box	lead length 4.0 mm	±10%	15	25	45	55	65
			±5%	16	26	46	56	66
		lead length 3.5 mm	±10%	13	23	43	53	63
			±5%	17	27	47	57	67
		long leads	±10%	11	21	41	51	61
			±5%	12	22	42	52	62
	taped on reel	H = 16.0 mm	±10%	18	28	48	58	68
			±5%	19	29	49	59	69
369	loose in box	lead length 4.0 mm	±10%	15	25	45	55	65
			±5%	16	26	46	56	66
		lead length 22.0 mm	±10%	11	21	41	51	61
			±5%	12	22	42	52	62
	taped on reel	H = 18.5 mm	±10%	18	28	48	58	68
			±5%	19	29	49	59	69

Metallized polyester film capacitors MKT 368

MKT 368 GENERAL DATA PITCH 10 mm



(1) Hole ∅1.0 for d_t = 0.6 mm.
(2) $0 \leq \alpha < 50°$.

Fig.3 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: 0.1 µF < C ≤ 0.47 µF 0.47 µF < C ≤ 1.0 µF	 $\leq 75 \times 10^{-4}$ $\leq 75 \times 10^{-4}$	 $\leq 130 \times 10^{-4}$ $\leq 130 \times 10^{-4}$	 $\leq 300 \times 10^{-4}$ –
Rated voltage pulse slope $(dU/dt)_R$ at 63 V (DC)	30 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 interconnecting leads and casing; 10 V; 1 minute	>30000 MΩ		
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	100 V; 1 minute		
Withstanding (AC) voltage between leads and case	200 V; 1 minute		

Available 63 V DC versions

PACKAGING(1)	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	l_t = 4.0 +1.0/–0.5 mm	±10%	2222 368 15...	on request
		±5%	2222 368 16...	on request
	l_t = 3.5 ±0.5 mm	±10%	2222 368 13...	on request
		±5%	2222 368 17...	on request
	l_t = 19.0 ±4.0 mm	±10%	2222 368 11...	on request
		±5%	2222 368 12...	on request
Taped on reel	H = 16.0 mm; note 2	±10%	2222 368 18...	on request
		±5%	2222 368 19...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

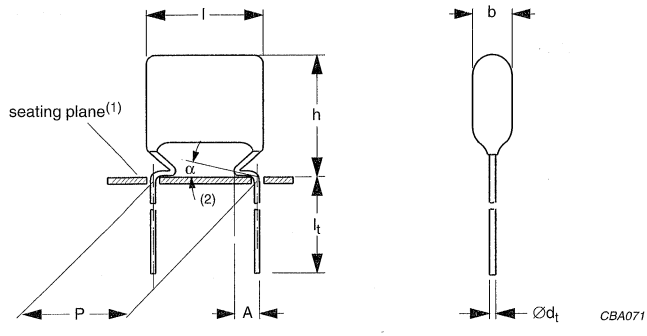
Metallized polyester film capacitors | MKT 368

U_{Rdc} = 63 V; U_{Rac} = 40 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 mm
			C-tol = ±10%
Pitch = 10.0 ±0.4 mm; d_t = 0.60 ±0.06 mm; A = 2.0 +1.0/–0.5 mm			
0.22	4.2 × 13.2 × 12.5	0.5	2222 368 15**224**
0.27	4.0 × 12.8 × 12.5	0.5	2222 368 15**274**
0.33	4.3 × 13.1 × 12.5	0.5	2222 368 15**334**
0.39	4.2 × 12.9 × 12.5	0.5	2222 368 15**394**
0.47	4.3 × 13.4 × 12.5	0.5	2222 368 15**474**
0.56	4.7 × 13.7 × 12.5	0.5	2222 368 15**564**
0.68	5.1 × 14.1 × 12.5	0.6	2222 368 15**684**
0.82	5.5 × 14.5 × 12.5	0.6	2222 368 15**824**
1	6.0 × 15.0 × 12.5	0.8	2222 368 15**105**

Metallized polyester film capacitors MKT 368

MKT 368 GENERAL DATA PITCH 10/15 mm



(1) Hole Ø1.0 for d_t = 0.6 mm.
Hole Ø1.3 for d_t = 0.8 mm.
(2) $0 \leq \alpha < 50°$.

Fig.4 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:			
$C \leq 0.1\ \mu F$	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 225 \times 10^{-4}$
$0.1\ \mu F < C \leq 0.47\ \mu F$	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 300 \times 10^{-4}$
$0.47\ \mu F < C \leq 1.0\ \mu F$	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	–
Rated voltage pulse slope $(dU/dt)_R$ at 100 V (DC):			
P = 10 mm	28 V/µs		
P = 15 mm	20 V/µs		
R between leads, for $C \leq 0.33\ \mu F$ at 10 V; 1 minute	>15000 MΩ		
RC between leads, for $C > 0.33\ \mu F$ at 100 V; 1 minute	>5000 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	160 V; 1 minute		
Withstanding (AC) 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 = 4.0 +1.0/–0.5 mm	±10%	2222 368 25...	on request
		±5%	2222 368 26...	on request
	l_t = 3.5 ±0.5 mm	±10%	2222 368 23...	on request
		±5%	2222 368 27...	on request
	l_t = 19.0 ±4.0 mm	±10%	2222 368 21...	on request
		±5%	2222 368 22...	on request
Taped on reel	H = 16.0 mm; note 2	±10%	2222 368 28...	on request
		±5%	2222 368 29...	on request

Notes

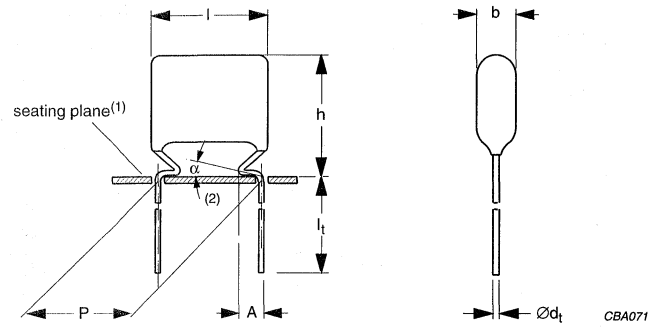
1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

U_{Rdc} = 100 V; U_{Rac} = 63 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 mm C-tol = ±10%
Pitch = 10.0 ±0.4 mm; d_t = 0.60 ±0.06 mm; A = 2.0 +1.0/–0.5 mm			
0.056 0.068	4.0 × 13.0 × 12.5	0.4	2222 368 25**563** 2222 368 25**683**
0.082	3.7 × 12.7 × 12.5	0.4	2222 368 25**823**
0.1	4.0 × 13.0 × 12.5	0.4	2222 368 25**104**
0.12	4.3 × 13.3 × 12.5	0.4	2222 368 25**124**
0.15	3.9 × 12.9 × 12.5	0.4	2222 368 25**154**
0.18	4.2 × 13.2 × 12.5	0.5	2222 368 25**184**
0.22	4.5 × 13.6 × 12.5	0.5	2222 368 25**224**
Pitch = 15.0 ±0.4 mm; d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/–0.5 mm			
0.27 0.33 0.39	5.0 × 14.0 × 17.5	0.6	2222 368 25**274** 2222 368 25**334** 2222 368 25**394**
0.47 0.56	5.5 × 14.5 × 17.5	0.7	2222 368 25**474** 2222 368 25**564**
0.68	6.0 × 15.0 × 17.5	0.9	2222 368 25**684**
0.82	6.5 × 15.5 × 17.5	1.0	2222 368 25**824**
1	7.5 × 16.5 × 17.5	1.3	2222 368 25**105**

Metallized polyester film capacitors MKT 368

MKT 368 GENERAL DATA PITCH 22.5/27.5 mm



(1) Hole Ø1.3 for d_t = 0.8 mm.
(2) $0 \leq \alpha < 50°$.

Fig.5 Outline.

Specific reference data for the 100 V DC capacitors

DESCRIPTION	VALUE	
	at 1 kHz	at 10 kHz
Tangent of loss angle: C > 1.0 µF	$\leq 75 \times 10^{-4}$	$\leq 150 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 100 V (DC): P = 22.5 mm P = 27.5 mm	8 V/µs 7 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 100 V; 1 minute	>5000 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	100 V; 1 minute	
Withstanding (AC) 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 = 4.0 +1.0/–0.5 mm	±10%	2222 368 25...	on request
		±5%	2222 368 26...	on request
	l_t = 3.5 ±0.5 mm	±10%	2222 368 23...	on request
		±5%	2222 368 27...	on request
	long leads; note 2	±10%	2222 368 21...	on request
		±5%	2222 368 22...	on request
Taped on reel	H = 16.0 mm; note 3	±10%	2222 368 28...	on request
		±5%	2222 368 29...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*; taped on reel pitch = 27.5 mm is not available.
2. Length of long leads:
   a) l_t = 25.0 ±4.0 mm for lead pitch 22.5 mm.
   b) l_t = 24.0 ±4.0 mm for lead pitch 27.5 mm.
3. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

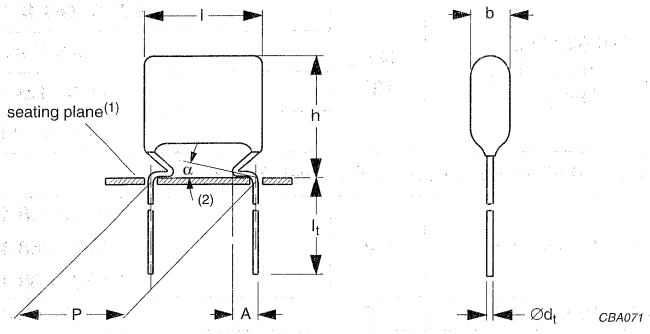
Metallized polyester film capacitors — MKT 368

U_{Rdc} = 100 V; U_{Rac} = 63 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 mm C-tol = ±10%
Pitch = 22.5 ±0.4 mm; d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/–0.5 mm			
1.2	6.0 × 18.0 × 26.0	2.5	2222 368 25**125**
1.5			2222 368 25**155**
1.8	7.0 × 19.0 × 26.0	3.2	2222 368 25**185**
2.2	7.5 × 19.5 × 26.0	3.5	2222 368 25**225**
2.7	8.5 × 21.5 × 26.0	4.1	2222 368 25**275**
3.3	9.0 × 22.0 × 26.0	4.5	2222 368 25**335**
Pitch = 27.5 ±0.4 mm; d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/–0.5 mm			
3.9	9.0 × 22.0 × 30.0	4.8	2222 368 25**395**
4.7	10.0 × 23.0 × 30.0	5.5	2222 368 25**475**
5.6	11.0 × 24.0 × 30.0	6.2	2222 368 25**565**
6.8	12.0 × 25.0 × 30.0	6.8	2222 368 25**685**

Metallized polyester film capacitors MKT 368

MKT 368 GENERAL DATA PITCH 10/15 mm



(1) Hole Ø1.0 for $d_t = 0.6$ mm.
Hole Ø1.3 for $d_t = 0.8$ mm.
(2) $0 \leq \alpha < 50°$.

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:			
$C \leq 0.1$ µF	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 225 \times 10^{-4}$
0.1 µF < C ≤ 0.33 µF	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 300 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 250 V (DC):			
P = 10 mm	70 V/µs		
P = 15 mm	28 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 (AC) 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 = 4.0 +1.0/–0.5 mm	±10%	2222 368 45...	on request
		±5%	2222 368 46...	on request
	l_t = 3.5 ±0.5 mm	±10%	2222 368 43...	on request
		±5%	2222 368 47...	on request
	l_t = 19.0 ±4.0 mm	±10%	2222 368 41...	on request
		±5%	2222 368 42...	on request
Taped on reel	H = 16 mm; note 2	±10%	2222 368 48...	on request
		±5%	2222 368 49...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

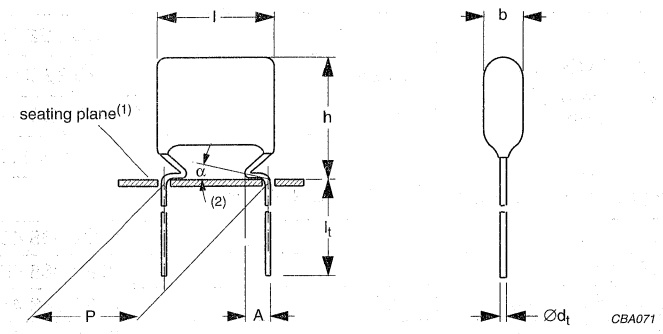
Metallized polyester film capacitors MKT 368

U_{Rdc} = 250 V; U_{Rac} = 160 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 mm C-tol = ±10%
Pitch = 10.0 ±0.4 mm; d_t = 0.60 ±0.06 mm; A = 2.0 +1.0/–0.5 mm			
0.027	4.0 × 13.0 × 12.5	0.4	2222 368 45**273**
0.033			2222 368 45**333**
0.039			2222 368 45**393**
0.047	4.5 × 13.5 × 12.5	0.5	2222 368 45**473**
0.056	4.6 × 13.5 × 12.5	0.5	2222 368 45**563**
0.068			2222 368 45683
0.082	4.4 × 13.4 × 12.5	0.5	2222 368 45**823**
0.1	4.7 × 13.7 × 12.5	0.5	2222 368 45**104**
Pitch = 15.0 ±0.4 mm; d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/–0.5 mm			
0.12	5.0 × 14.0 × 17.5	0.6	2222 368 45**124**
0.15			2222 368 45**154**
0.18	5.5 × 14.5 × 17.5	0.7	2222 368 45**184**
0.22	6.0 × 15.0 × 17.5	0.9	2222 368 45**224**
0.27	6.0 × 15.5 × 17.5	1.0	2222 368 45**274**
0.33	6.8 × 16.0 × 17.5	1.2	2222 368 45**334**

Metallized polyester film capacitors MKT 368

MKT 368 GENERAL DATA PITCH 22.5/27.5 mm



(1) Hole Ø1.3 for d_t = 0.8 mm.
(2) $0 \leq \alpha < 50°$.

Fig.7 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:			
0.33 µF < C ≤ 0.47 µF	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 300 \times 10^{-4}$
0.47 µF < C ≤ 1.0 µF	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	–
C > 1.0 µF	$\leq 75 \times 10^{-4}$	$\leq 150 \times 10^{-4}$	–
Rated voltage pulse slope $(dU/dt)_R$ at 250 V (DC):			
P = 22.5 mm	12 V/µs		
P = 27.5 mm	10 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 (AC) 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 = 4.0 +1.0/–0.5 mm	±10%	2222 368 45...	on request
		±5%	2222 368 46...	on request
	l_t = 3.5 ±0.5 mm	±10%	2222 368 43...	on request
		±5%	2222 368 47...	on request
	long leads; note 2	±10%	2222 368 41...	on request
		±5%	2222 368 42...	on request
Taped on reel	H = 16 mm; note 3	±10%	2222 368 48...	on request
		±5%	2222 368 49...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*; taped on reel pitch = 27.5 mm is not available.
2. Length of long leads:
   a) l_t = 25.0 ±4.0 mm for lead pitch 22.5 mm.
   b) l_t = 24.0 ±4.0 mm for lead pitch 27.5 mm.
3. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

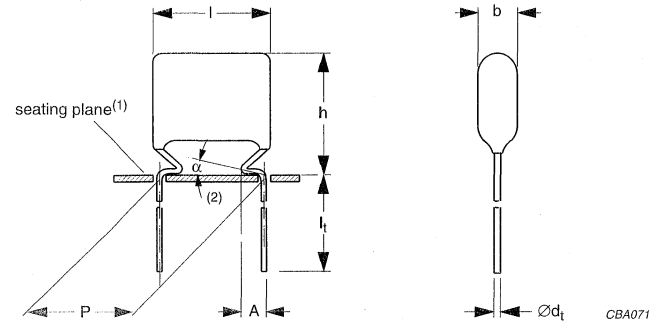
Metallized polyester film capacitors MKT 368

U_{Rdc} = 250 V; U_{Rac} = 160 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 mm
			C-tol = ±10%
Pitch = 22.5 ±0.4 mm; d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/–0.5 mm			
0.39	5.0 × 17.0 × 26.0	1.8	2222 368 45**394**
0.47	5.5 × 17.5 × 26.0	2.2	2222 368 45**474**
0.56	6.0 × 18.0 × 26.0	2.5	2222 368 45**564**
0.68	6.6 × 18.5 × 26.0	2.8	2222 368 45**684**
0.82	7.2 × 19.0 × 26.0	3.2	2222 368 45**824**
1	8.0 × 20.0 × 26.0	3.8	2222 368 45**105**
Pitch = 27.5 ±0.4 mm; d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/–0.5 mm			
1.2	8.0 × 21.0 × 30.0	4.1	2222 368 45**125**
1.5	9.0 × 22.0 × 30.0	4.8	2222 368 45**155**
1.8	10.0 × 23.0 × 30.0	5.5	2222 368 45**185**
2.2	11.0 × 24.0 × 30.0	6.2	2222 368 45**225**

Metallized polyester film capacitors MKT 368

MKT 368 GENERAL DATA PITCH 10/15 mm



(1) Hole Ø1.0 for $d_t = 0.6$ mm.
Hole Ø1.3 for $d_t = 0.8$ mm.
(2) $0 \leq \alpha < 50°$.

Fig.8 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:			
$C \leq 0.1$ µF	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 225 \times 10^{-4}$
0.1 µF < C ≤ 0.15 µF	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 300 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 400 V (DC):			
P = 10 mm	110 V/µs		
P = 15 mm	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	640 V; 1 minute		
Withstanding (AC) 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 = 4.0 +1.0/–0.5 mm	±10%	2222 368 55...	on request
		±5%	2222 368 56...	on request
	l_t = 3.5 ±0.5 mm	±10%	2222 368 53...	on request
		±5%	2222 368 57...	on request
	l_t = 19.0 ±4.0 mm	±10%	2222 368 51...	on request
		±5%	2222 368 52...	on request
Taped on reel	H = 16 mm; note 2	±10%	2222 368 58...	on request
		±5%	2222 368 59...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

Metallized polyester film capacitors MKT 368

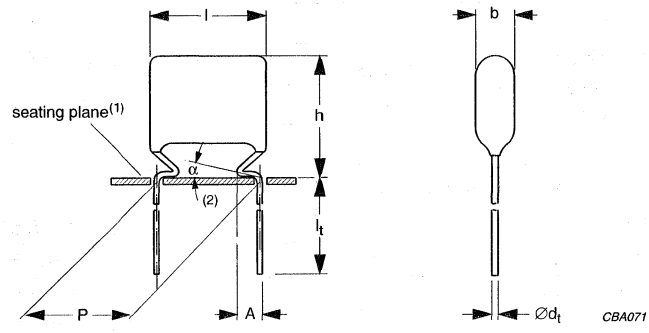
U_{Rdc} = 400 V; U_{Rac} = 220 V

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 mm C-tol = ±10%
Pitch = 10.0 ±0.4 mm; d_t = 0.60 ±0.06 mm; A = 2.0 +1.0/–0.5 mm			
0.001	4.5 × 13.5 × 12.5	0.5	2222 368 55102
0.0012			2222 368 55122
0.0015			2222 368 55152
0.0018			2222 368 55182
0.0022	4.0 × 13.0 × 12.5	0.5	2222 368 55222
0.0027	4.3 × 13.3 × 12.5	0.5	2222 368 55272
0.0033	4.6 × 13.6 × 12.5	0.5	2222 368 55332
0.0039	4.0 × 13.0 × 12.5	0.5	2222 368 55392
0.0047	4.1 × 13.2 × 12.5	0.5	2222 368 55472
0.0056	4.6 × 13.6 × 12.5	0.5	2222 368 55562
0.0068			2222 368 55682
0.0082			2222 368 55822
0.01			2222 368 55103
0.012	4.0 × 13.0 × 12.5	0.5	2222 368 55123
0.015			2222 368 55153
0.018			2222 368 55183
0.022	4.0 × 12.9 × 12.5	0.5	2222 368 55223
0.027	4.2 × 13.2 × 12.5	0.5	2222 368 55273
0.033	4.6 × 13.7 × 12.5	0.5	2222 368 55333
Pitch = 15.0 ±0.4 mm; d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/–0.5 mm			
0.039	5.0 × 13.9 × 17.5	0.6	2222 368 55393
0.047	5.4 × 14.5 × 17.5	0.7	2222 368 55473
0.056	5.0 × 13.7 × 17.5	0.6	2222 368 55563
0.068	5.0 × 13.5 × 17.5	0.6	2222 368 55683
0.082	4.8 × 14.0 × 17.5	0.6	2222 368 55823
0.1	5.3 × 14.5 × 17.5	0.7	2222 368 55104
0.12	5.7 × 15.0 × 17.5	0.9	2222 368 55124
0.15	6.4 × 15.5 × 17.5	1.0	2222 368 55154

Metallized polyester film capacitors MKT 368

MKT 368 GENERAL DATA

PITCH 22.5/27.5 mm



(1) Hole Ø1.3 for $d_t = 0.8$ mm.
(2) $0 \leq \alpha < 50°$.

Fig.9 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: 0.15 µF < C ≤ 0.47 µF 0.47 µF < C ≤ 1.0 µF	 $\leq 75 \times 10^{-4}$ $\leq 75 \times 10^{-4}$	 $\leq 130 \times 10^{-4}$ $\leq 130 \times 10^{-4}$	 $\leq 300 \times 10^{-4}$ –
Rated voltage pulse slope $(dU/dt)_R$ at 400 V (DC): P = 22.5 mm P = 27.5 mm	 20 V/µs 16 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	640 V; 1 minute		
Withstanding (AC) 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 = 4.0 +1.0/–0.5 mm	±10%	2222 368 55...	on request
		±5%	2222 368 56...	on request
	l_t = 3.5 ±0.5 mm	±10%	2222 368 53...	on request
		±5%	2222 368 57...	on request
	long leads; note 2	±10%	2222 368 51...	on request
		±5%	2222 368 52...	on request
Taped on reel	H = 16 mm; note 3	±10%	2222 368 58...	on request
		±5%	2222 368 59...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*; taped on reel pitch = 27.5 mm is not available.
2. Length of long leads:
   a) l_t = 25.0 ±4.0 mm for lead pitch 22.5 mm.
   b) l_t = 24.0 ±4.0 mm for lead pitch 27.5 mm.
3. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

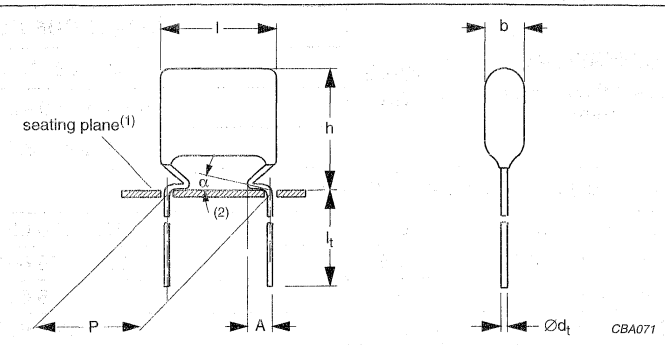
Metallized polyester film capacitors MKT 368

U_{Rdc} = 400 V; U_{Rac} = 220 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 mm
			C-tol = ±10%
Pitch = 22.5 ±0.4 mm; d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/–0.5 mm			
0.18	5.6 × 17.5 × 26.0	2.2	2222 368 55184
0.22	6.3 × 18.5 × 26.0	2.8	2222 368 55224
0.27	6.0 × 18.0 × 26.0	2.5	2222 368 55274
0.33	6.4 × 18.5 × 26.0	2.8	2222 368 55334
0.39	7.1 × 19.0 × 26.0	2.8	2222 368 55394
0.47	8.0 × 20.0 × 26.0	3.8	2222 368 55474
Pitch = 27.5 ±0.4 mm; d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/–0.5 mm			
0.56	7.5 × 20.5 × 30.0	3.8	2222 368 55564
0.68	8.5 × 21.5 × 30.0	4.5	2222 368 55684
0.82	9.5 × 22.5 × 30.0	5.2	2222 368 55824
1	10.5 × 23.5 × 30.0	5.8	2222 368 55105

Metallized polyester film capacitors MKT 368

MKT 368 GENERAL DATA PITCH 10/15 mm



(1) Hole Ø1.0 for d_t = 0.6 mm.
Hole Ø1.3 for d_t = 0.8 mm.
(2) $0 \leq \alpha < 50°$.

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 ≤ 0.068 μF	≤75 × 10^{-4}	≤130 × 10^{-4}	≤225 × 10^{-4}
Rated voltage pulse slope $(dU/dt)_R$ at 630 V (DC): P = 10 mm P = 15 mm	70 V/μs 70 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; 500 V; 1 minute	>30000 MΩ		
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	1008 V; 1 minute		
Withstanding (AC) 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 = 4.0 +1.0/−0.5 mm	±10%	2222 368 65...	on request
		±5%	2222 368 66...	on request
	l_t = 3.5 ±0.5 mm	±10%	2222 368 63...	on request
		±5%	2222 368 67...	on request
	l_t = 19.0 ±4.0 mm	±10%	2222 368 61...	on request
		±5%	2222 368 62...	on request
Taped on reel	H = 16 mm; note 2	+10%	2222 368 68...	on request
		±5%	2222 368 69...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

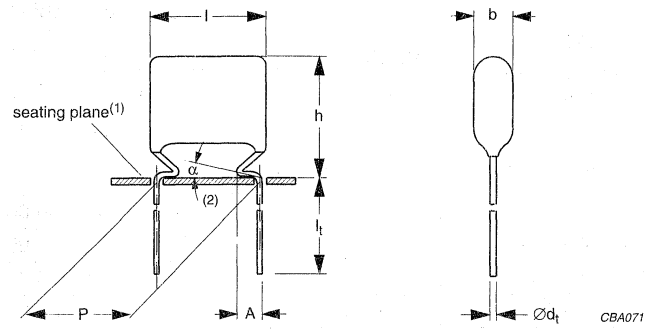
Metallized polyester film capacitors MKT 368

U_{Rdc} = 630 V; U_{Rac} = 250 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 mm
			C-tol = ±10%
Pitch = 10.0 ±0.4 mm; d_t = 0.60 ±0.06 mm; A = 2.0 +1.0/–0.5 mm			
0.01	4.3 × 13.1 × 12.5	0.5	2222 368 65**103**
0.012	4.6 × 13.4 × 12.5	0.5	2222 368 65**123**
0.015	4.9 × 13.9 × 12.5	0.6	2222 368 65**153**
0.018	5.3 × 14.3 × 12.5	0.6	2222 368 65**183**
0.022	5.9 × 14.9 × 12.5	0.8	2222 368 65**223**
Pitch = 15.0 ±0.4 mm; d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/–0.5 mm			
0.027	5.5 × 14.5 × 17.5	0.7	2222 368 65**273**
0.033	6.0 × 15.0 × 17.5	0.9	2222 368 65**333**
0.039	6.3 × 15.5 × 17.5	1.0	2222 368 65**393**
0.047	7.0 × 16.0 × 17.5	1.2	2222 368 65**473**
0.056	7.5 × 16.5 × 17.5	1.3	2222 368 65**563**
0.068	8.0 × 17.0 × 17.5	1.4	2222 368 65**683**

Metallized polyester film capacitors MKT 368

MKT 368 GENERAL DATA PITCH 22.5/27.5 mm



(1) Hole Ø1.3 for d_t = 0.8 mm.
(2) $0 \leq \alpha < 50°$.

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:			
0.068 µF < C ≤ 0.1 µF	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 225 \times 10^{-4}$
0.1 µF < C ≤ 0.47 µF	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 300 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 630 V (DC):			
P = 22.5 mm	28 V/µs		
P = 27.5 mm	24 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; 500 V; 1 minute	>30000 MΩ		
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	1008 V; 1 minute		
Withstanding (AC) 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 = 4.0 +1.0/–0.5 mm	±10%	2222 368 65...	on request
		±5%	2222 368 66...	on request
	l_t = 3.5 ±0.5 mm	±10%	2222 368 63...	on request
		±5%	2222 368 67...	on request
	long leads; note 2	±10%	2222 368 61...	on request
		±5%	2222 368 62...	on request
Taped on reel	H = 16 mm; note 3	±10%	2222 368 68...	on request
		±5%	2222 368 69...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*; taped on reel pitch = 27.5 mm is not available.
2. Length of long leads:
   a) l_t = 25.0 ±4.0 mm for lead pitch 22.5 mm.
   b) l_t = 24.0 ±4.0 mm for lead pitch 27.5 mm.
3. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

Metallized polyester film capacitors MKT 368

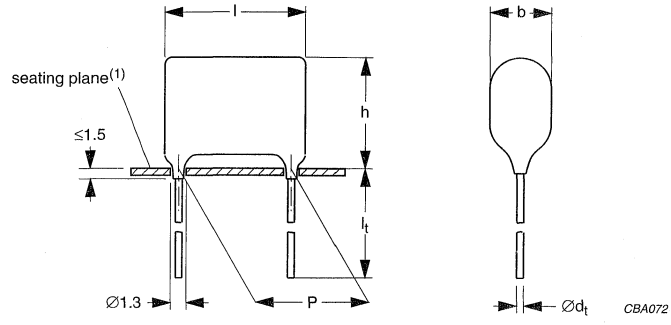
U_{Rdc} = 630 V; U_{Rac} = 250 V

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 mm C-tol = ±10%
Pitch = 22.5 ±0.4 mm; d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/–0.5 mm			
0.082	6.1 × 18.0 × 26.0	2.5	2222 368 65**823**
0.1	7.0 × 19.0 × 26.0	3.2	2222 368 65**104**
0.12	7.2 × 19.5 × 26.0	3.5	2222 368 65**124**
0.15	8.0 × 21.0 × 26.0	3.8	2222 368 65**154**
0.18	9.0 × 22.0 × 26.0	4.5	2222 368 65**184**
0.22	10.0 × 23.0 × 26.0	5.2	2222 368 65 **224**
Pitch = 27.5 ±0.4 mm; d_t = 0.80 ±0.08 mm; A = 2.5 +1.4/–0.5 mm			
0.27	10.0 × 23.0 × 30.0	5.5	2222 368 65**274**
0.33	11.5 × 24.5 × 30.0	6.5	2222 368 65**334**
0.39	12.5 × 25.5 × 30.0	7.1	2222 368 65**394**
0.47	14.0 × 27.0 × 30.0	8.2	2222 368 65**474**

Metallized polyester film capacitors MKT 369

MKT 369 GENERAL DATA

PITCH 10 mm



(1) Hole Ø1.0 for d_t = 0.6 mm.

Fig.12 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:			
0.1 µF < C ≤ 0.47 µF	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 300 \times 10^{-4}$
0.47 µF < C ≤ 1.0 µF	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	–
Rated voltage pulse slope $(dU/dt)_R$ at 63 V (DC)	30 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 interconnecting leads and casing; 10 V; 1 minute	>30000 MΩ		
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	100 V; 1 minute		
Withstanding (AC) voltage between leads and case	200 V; 1 minute		

Available 63 V DC versions

PACKAGING(1)	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	l_t = 4.0 +1.0/–0.5 mm	±10%	2222 369 15...	on request
		±5%	2222 369 16...	on request
	l_t = 22.0 ±4.0 mm	±10%	2222 369 11...	on request
		±5%	2222 369 12...	on request
Taped on reel	H = 18.5 mm; note 2	±10%	2222 369 18...	on request
		±5%	2222 369 19...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

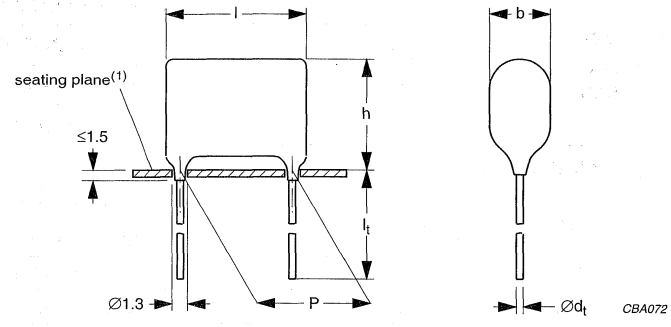
Metallized polyester film capacitors MKT 369

U_{Rdc} = 63 V; U_{Rac} = 40 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 mm
			C-tol = ±10%
Pitch = 10.0 ±0.4 mm; d_t = 0.60 ±0.06 mm			
0.22	4.2 × 9.3 × 12.5	0.4	2222 369 15**224**
0.27	3.8 × 9.0 × 12.5	0.4	2222 369 15**274**
0.33	4.1 × 9.3 × 12.5	0.4	2222 369 15**334**
0.39	4.0 × 9.2 × 12.5	0.4	2222 369 15**394**
0.47	4.3 × 9.5 × 12.5	0.4	2222 369 15**474**
0.56	4.7 × 9.8 × 12.5	0.4	2222 369 15**564**
0.68	5.1 × 10.2 × 12.5	0.5	2222 369 15684
0.82	5.5 × 10.7 × 12.5	0.6	2222 369 15**824**
1	6.0 × 11.1 × 12.5	0.7	2222 369 15**105**

Metallized polyester film capacitors MKT 369

MKT 369 GENERAL DATA PITCH 10 mm



(1) Hole Ø1.0 for d_t = 0.6 mm.

Fig.13 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:			
$C \leq 0.1\ \mu F$	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 225 \times 10^{-4}$
$C \geq 0.1\ \mu F$	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 300 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 100 V (DC)	28 V/µs		
R between leads, for $C \leq 0.33\ \mu F$ at 100 V; 1 minute	>15000 MΩ		
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	160 V; 1 minute		
Withstanding (AC) 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 = 4.0 +1.0/–0.5 mm	±10%	2222 369 25...	on request
		±5%	2222 369 26...	on request
	l_t = 22.0 ±4.0 mm	±10%	2222 369 21...	on request
		±5%	2222 369 22...	on request
Taped on reel	H = 18.5 mm; note 2	±10%	2222 369 28...	on request
		±5%	2222 369 29...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

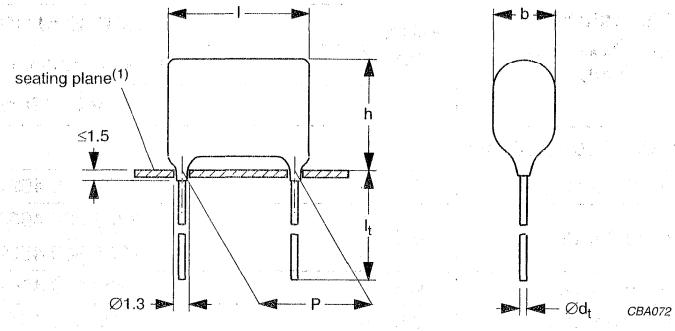
Metallized polyester film capacitors MKT 369

U_{Rdc} = 100 V; U_{Rac} = 63 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 mm C-tol = ±10%
Pitch = 10.0 ±0.4 mm; d_t = 0.60 ±0.06 mm			
0.056	4.0 × 9.1 × 12.5	0.4	2222 369 25**563**
0.068			2222 369 25**683**
0.082	3.7 × 8.8 × 12.5	0.4	2222 369 25**823**
0.1	4.0 × 9.0 × 12.5	0.4	2222 369 25**104**
0.12	4.3 × 9.3 × 12.5	0.4	2222 369 25**124**
0.15	3.9 × 8.9 × 12.5	0.4	2222 369 25**154**
0.18	4.2 × 9.2 × 12.5	0.5	2222 369 25**184**
0.22	4.5 × 9.4 × 12.5	0.5	2222 369 25**224**

Metallized polyester film capacitors MKT 369

MKT 369 GENERAL DATA PITCH 10 mm



(1) Hole Ø1.0 for d_t = 0.6 mm.

Fig.14 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 ≤ 0.1 µF	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 225 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 250 V (DC)	70 V/µs		
R between leads, for C ≤ 0.33 µF at 10 V; 1 minute	>30000 MΩ		
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 (AC) 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 = 4.0 +1.0/−0.5 mm	±10%	2222 369 45...	on request
		±5%	2222 369 46...	on request
	l_t = 22.0 ±4.0 mm	±10%	2222 369 41...	on request
		±5%	2222 369 42...	on request
Taped on reel	H = 18.5 mm; note 2	±10%	2222 369 48...	on request
		±5%	2222 369 49...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

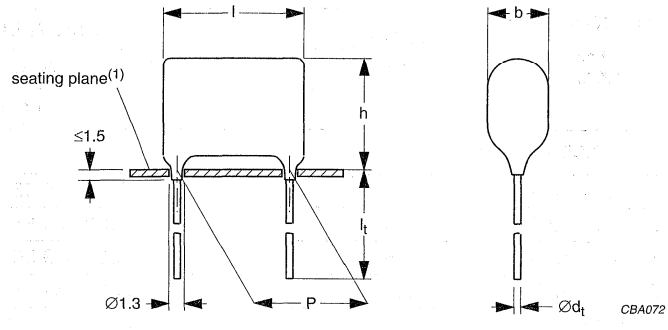
Metallized polyester film capacitors MKT 369

U_{Rdc} = 250 V; U_{Rac} = 160 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 mm C-tol = ±10%
Pitch = 10.0 ±0.4 mm; d_t = 0.60 ±0.06 mm			
0.027	4.0 × 8.7 × 12.5	0.4	2222 369 45**273**
0.033	4.0 × 8.8 × 12.5	0.4	2222 369 45**333**
0.039			2222 369 45**393**
0.047	4.5 × 9.0 × 12.5	0.5	2222 369 45**473**
0.056	4.6 × 8.8 × 12.5	0.5	2222 369 45**563**
0.068	4.6 × 9.2 × 12.5	0.5	2222 369 45**683**
0.082	4.4 × 9.4 × 12.5	0.5	2222 369 45**823**
0.1	4.7 × 9.7 × 12.5	0.5	2222 369 45**104**

Metallized polyester film capacitors MKT 369

MKT 369 GENERAL DATA PITCH 10 mm



(1) Hole Ø1.0 for d_t = 0.6 mm.

Fig.15 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 ≤ 0.1 µF	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 225 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 400 V (DC)	110 V/µs		
R between leads, for C ≤ 0.33 µF at 100 V; 1 minute	>30000 MΩ		
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	640 V; 1 minute		
Withstanding (AC) 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 = 4.0 +1.0/–0.5 mm	±10%	2222 369 55...	on request
		±5%	2222 369 56...	on request
	l_t = 22.0 ±4.0 mm	±10%	2222 369 51...	on request
		±5%	2222 369 52...	on request
Taped on reel	H = 18.5 mm; note 2	±10%	2222 369 58...	on request
		±5%	2222 369 59...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

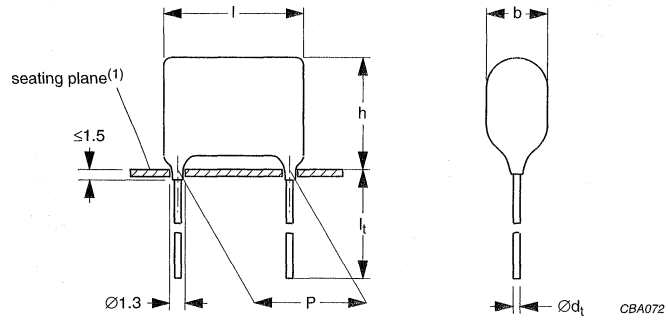
Metallized polyester film capacitors MKT 369

U_{Rdc} = 400 V; U_{Rac} = 220 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 mm C-tol = ±10%
Pitch = 10.0 ±0.4 mm; d_t = 0.60 ±0.06 mm			
0.001	4.5 × 8.7 × 12.5	0.5	2222 369 55**102**
0.0012	4.5 × 9.0 × 12.5	0.5	2222 369 55**122**
0.0015	4.5 × 8.8 × 12.5	0.5	2222 369 55**152**
0.0018	4.5 × 8.7 × 12.5	0.5	2222 369 55**182**
0.0022	4.0 × 8.6 × 12.5	0.5	2222 369 55**222**
0.0027	4.3 × 8.9 × 12.5	0.5	2222 369 55**272**
0.0033	4.6 × 9.1 × 12.5	0.5	2222 369 55**332**
0.0039	4.0 × 8.7 × 12.5	0.5	2222 369 55**392**
0.0047	4.1 × 8.8 × 12.5	0.5	2222 369 55**472**
0.0056	4.6 × 9.1 × 12.5	0.5	2222 369 55**562**
0.0068			2222 369 55**682**
0.0082			2222 369 55**822**
0.01			2222 369 55**103**
0.012	4.0 × 8.7 × 12.5	0.5	2222 369 55**123**
0.015	4.0 × 8.8 × 12.5	0.5	2222 369 55**153**
0.018			2222 369 55**183**
0.022	3.9 × 8.8 × 12.5	0.5	2222 369 55**223**
0.027	4.2 × 9.1 × 12.5	0.5	2222 369 55**273**
0.033	4.6 × 9.4 × 12.5	0.5	2222 369 55**333**

Metallized polyester film capacitors MKT 369

MKT 369 GENERAL DATA PITCH 10 mm



(1) Hole Ø1.0 for d_t = 0.6 mm.

Fig.16 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 ≤ 0.1 µF	≤75 × 10^{-4}	≤130 × 10^{-4}	≤225 × 10^{-4}
Rated voltage pulse slope $(dU/dt)_R$ at 630 V (DC)	70 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; 500 V; 1 minute	>30000 MΩ		
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	1008 V; 1 minute		
Withstanding (AC) 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 = 4.0 +1.0/–0.5 mm	±10%	2222 369 65...	on request
		±5%	2222 369 66...	on request
	l_t = 22.0 ±4.0 mm	±10%	2222 369 61...	on request
		±5%	2222 369 62...	on request
Taped on reel	H = 18.5 mm; note 2	±10%	2222 369 68...	on request
		±5%	2222 369 69...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

Metallized polyester film capacitors MKT 369

U_{Rdc} = 630 V; U_{Rac} = 250 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 mm
			C-tol = ±10%
Pitch = 10.0 ±0.4 mm; d_t = 0.60 ±0.06 mm			
0.01	4.1 × 8.7 × 12.5	0.4	2222 369 65**103**
0.012	4.4 × 8.9 × 12.5	0.5	2222 369 65**123**
0.015	4.9 × 9.2 × 12.5	0.5	2222 369 65**153**
0.018	5.3 × 9.5 × 12.5	0.6	2222 369 65**183**
0.022	5.9 × 9.9 × 12.5	0.7	2222 369 65**223**

Metallized polycarbonate film capacitors MKC 344

MKC RADIAL POTTED CAPACITORS PITCH 10/15/22.5/27.5 mm

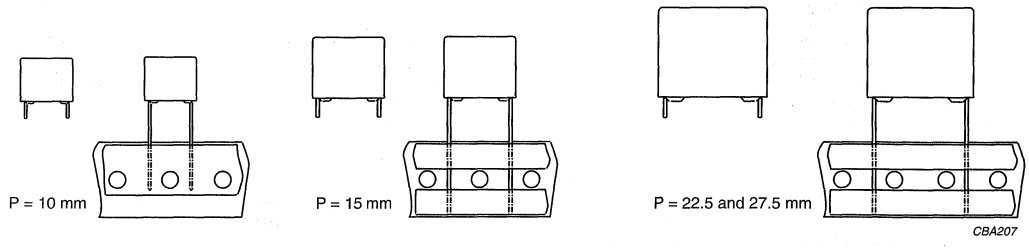


Fig.1 Simplified outlines.

FEATURES

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

APPLICATIONS

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

DETAIL SPECIFICATION

For more detailed data and test requirements see *"Type detail specification HQN-384-06/101"*.

QUICK REFERENCE DATA

DESCRIPTION	VALUE
Capacitance range (E12 series)	0.01 to 6.8 μF
Capacitance tolerance	±10%; ±5%
Rated (DC) voltage	100 V; 250 V; 400 V; 630 V
Climatic category	55/100/56
Rated temperature	85 °C
Maximum application temperature	100 °C
Tangent of loss angle at 10 kHz	20×10^{-4}
Reference specification	IEC 60384-6
Performance grade	grade 1 (long life)

Metallized polycarbonate film capacitors MKC 344

COMPOSITION OF CATALOGUE NUMBER

TYPE AND PITCHES	
344	10.0 mm
	15.0 mm
	22.5 mm
	27.5 mm

MULTIPLIER (nF)	
1	3
10	4
100	5

CAPACITANCE (numerically)

Example:
104 = 10 × 10 = 100 nF

2222	344	XX	XX	X

TYPE	PACKAGING	LEAD CONFIGURATION	C-TOL	100 V	250 V	400 V	630 V
344	loose in box	lead length 5.0 mm	±10%	21	45	51	61
			±5%	22	43	51	62
	taped on reel	H = 18.5 mm	±10%	28	48	58	68
			±5%	29	49	59	69

Metallized polycarbonate film capacitors MKC 344

MKC 344 GENERAL DATA PITCH 10/15/22.5/27.5 mm

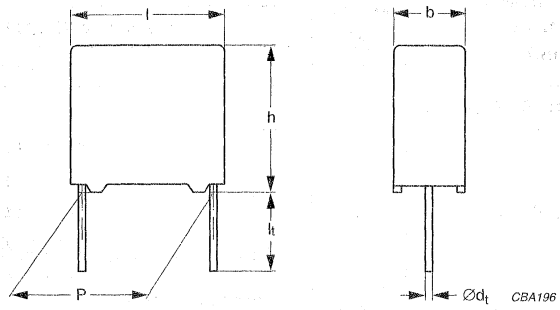


Fig.3 Outline.

Specific reference data for the 100 V DC capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle:			
$C \leq 0.1\ \mu F$	$\leq 30 \times 10^{-4}$	$\leq 60 \times 10^{-4}$	$\leq 130 \times 10^{-4}$
$0.1\ \mu F < C \leq 1.0\ \mu F$	$\leq 30 \times 10^{-4}$	$\leq 60 \times 10^{-4}$	–
$C > 1.0\ \mu F$	$\leq 30 \times 10^{-4}$	$\leq 75 \times 10^{-4}$	–
Rated voltage pulse slope $(dU/dt)_R$ at 100 V (DC):			
P = 10.0 mm	60 V/µs		
P = 15.0 mm	26 V/µs		
P = 22.5 mm	12 V/µs		
P = 27.5 mm	9 V/µs		
R between leads, for $C \leq 0.33\ \mu F$ at 100 V; 1 minute	>15000 MΩ		
RC between leads, for $C > 0.33\ \mu F$ at 100 V; 1 minute	>5000 s		
R between interconnecting leads and case; 100 V; 1 minute	>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[1]	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	$l_t = 5.0 \pm 1.0$ mm	±10%	2222 344 21...	preferred
		±5%	2222 344 22...	on request
Taped on reel	H = 18.5 mm; note 2	±10%	2222 344 28...	on request
		±5%	2222 344 29...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*; taped on reel pitch = 27.5 mm is not available.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

Metallized polycarbonate film capacitors MKC 344

U_{Rdc} = 100 V; U_{Rac} = 63 V

C (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER[1] LOOSE IN BOX; l_t = 5.0 ±1.0 mm C-tol = ±10%
Pitch = 10.0 ±0.4 mm; d_t = 0.60 ±0.06 mm			
0.082	4.0 × 10.0 × 12.5	0.7	2222 344 21**823**
0.1			2222 344 21**104**
0.12			2222 344 21**124**
0.15			2222 344 21**154**
0.18			2222 344 21**184**
0.22	5.0 × 11.0 × 12.5	0.9	2222 344 21**224**
Pitch = 15.0 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.27	5.0 × 11.0 × 17.5	1.1	2222 344 21**274**
0.33			2222 344 21**334**
0.39			2222 344 21**394**
0.47			2222 344 21**474**
0.56	6.0 × 12.0 × 17.5	1.4	2222 344 21**564**
0.68			2222 344 21**684**
0.82	7.0 × 13.5 × 17.5	1.8	2222 344 21**824**
1			2222 344 21**105**
Pitch = 22.5 ±0.4 mm; d_t = 0.80 ±0.08 mm			
1.2	6.0 × 15.5 × 26.0	2.8	2222 344 21**125**
1.5			2222 344 21**155**
1.8	7.0 × 16.5 × 26.0	4.3	2222 344 21**185**
2.2	8.5 × 18.0 × 26.0	4.3	2222 344 21**225**
2.7		5.1	2222 344 21**275**
3.3	10.0 × 19.5 × 26.0	5.1	2222 344 21**335**
Pitch = 27.5 ±0.4 mm; d_t = 0.80 ±0.08 mm			
3.9	11.0 × 21.0 × 31.0	7.4	2222 344 21**395**
4.7			2222 344 21**475**
5.6	13.0 × 23.0 × 31.0	10.2	2222 344 21**565**
6.8			2222 344 21**685**

Note

1. The shading indicates preferred types.

Metallized polycarbonate film capacitors MKC 344

MKC 344 GENERAL DATA PITCH 10/15/22.5/27.5 mm

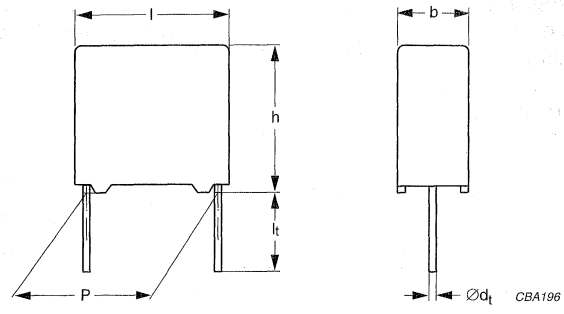


Fig.4 Outline.

Specific reference data for the 250 V DC capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle:			
$C \leq 0.1\ \mu F$	$\leq 30 \times 10^{-4}$	$\leq 60 \times 10^{-4}$	$\leq 130 \times 10^{-4}$
$0.1\ \mu F < C \leq 1.0\ \mu F$	$\leq 30 \times 10^{-4}$	$\leq 60 \times 10^{-4}$	–
$C > 1.0\ \mu F$	$\leq 30 \times 10^{-4}$	$\leq 75 \times 10^{-4}$	–
Rated voltage pulse slope $(dU/dt)_R$ at 250 V (DC):			
P = 10.0 mm	90 V/µs		
P = 15.0 mm	36 V/µs		
P = 22.5 mm	16 V/µs		
P = 27.5 mm	14 V/µs		
R between leads, for $C \leq 0.33\ \mu F$ at 100 V; 1 minute	>30000 MΩ		
RC between leads, for $C > 0.33\ \mu F$ at 100 V; 1 minute	>10000 s		
R between interconnecting leads and case; 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(1)	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	l_t = 5.0 ±1.0 mm	±10%	2222 344 45...	preferred
		±5%	2222 344 43...	on request
Taped on reel	H = 18.5 mm; note 2	±10%	2222 344 48...	on request
		±5%	2222 344 49...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*; taped on reel pitch = 27.5 mm is not available.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

Metallized polycarbonate film capacitors MKC 344

U_{Rdc} = 250 V; U_{Rac} = 160 V

C (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER[1] LOOSE IN BOX; l_t = 5.0 ±1.0 mm C-tol = ±10%
Pitch = 10.0 ±0.4 mm; d_t = 0.60 ±0.06 mm			
0.039	4.0 × 10.0 × 12.5	0.7	2222 344 45**393**
0.047			2222 344 45**473**
0.056			2222 344 45**563**
0.068			2222 344 45**683**
Pitch = 15.0 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.082	5.0 × 11.0 × 17.5	1.1	2222 344 45**823**
0.1			2222 344 45**104**
0.12			2222 344 45**124**
0.15			2222 344 45**154**
0.18	6.0 × 12.0 × 17.5	1.4	2222 344 45**184**
0.22			2222 344 45**224**
0.27	7.0 × 13.5 × 17.5	1.8	2222 344 45**274**
0.33			2222 344 45**334**
Pitch = 22.5 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.39	6.0 × 15.5 × 26.0	2.8	2222 344 45**394**
0.47			2222 344 45**474**
0.56	7.0 × 16.5 × 26.0	3.5	2222 344 45**564**
0.68			2222 344 45**684**
0.82	8.5 × 18.0 × 26.0	5.1	2222 344 45**824**
1			2222 344 45**105**
Pitch = 27.5 ±0.4 mm; d_t = 0.80 ±0.08 mm			
1.2	9.0 × 19.0 × 31.0	7.4	2222 344 45**125**
1.5	11.0 × 21.0 × 31.0	7.4	2222 344 45**155**
1.8		10.2	2222 344 45**185**
2.2	13.0 × 23.0 × 31.0	10.2	2222 344 45**225**

Note

1. The shading indicates preferred types.

Metallized polycarbonate film capacitors MKC 344

MKC 344 GENERAL DATA **PITCH 10/15/22.5/27.5 mm**

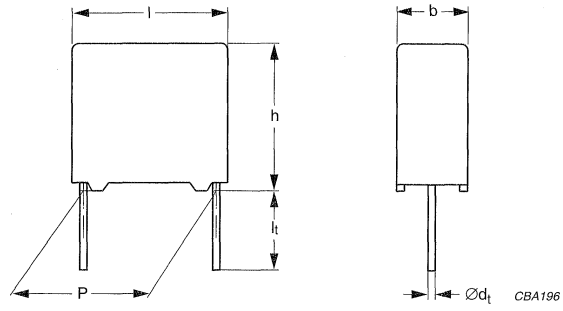


Fig.5 Outline.

Specific reference data for the 400 V DC capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle:			
$C \leq 0.1\ \mu F$	$\leq 30 \times 10^{-4}$	$\leq 60 \times 10^{-4}$	$\leq 130 \times 10^{-4}$
$0.1\ \mu F < C \leq 1.0\ \mu F$	$\leq 30 \times 10^{-4}$	$\leq 60 \times 10^{-4}$	–
Rated voltage pulse slope $(dU/dt)_R$ at 400 V (DC):			
P = 10.0 mm	140 V/µs		
P = 15.0 mm	60 V/µs		
P = 22.5 mm	26 V/µs		
P = 27.5 mm	22 V/µs		
R between leads, for $C \leq 0.33\ \mu F$ at 100 V; 1 minute	>30000 MΩ		
RC between leads, for $C > 0.33\ \mu F$ at 100 V; 1 minute	>10000 s		
R between interconnecting leads and case; 100 V; 1 minute	>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 ±1.0 mm	±10%	2222 344 51...	preferred
		±5%	2222 344 52...	on request
Taped on reel	H = 18.5 mm; note 2	±10%	2222 344 58...	on request
		±5%	2222 344 59...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*; taped on reel pitch = 27.5 mm is not available.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

Metallized polycarbonate film capacitors MKC 344

U_{Rdc} = 400 V; U_{Rac} = 220 V

C (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER[1] LOOSE IN BOX; l_t = 5.0 ±1.0 mm C-tol = ±10%
Pitch = 10.0 ±0.4 mm; d_t = 0.60 ±0.06 mm			
0.01	4.0 × 10.0 × 12.5	0.7	2222 344 51**103**
0.012			2222 344 51**123**
0.015			2222 344 51**153**
0.018			2222 344 51**183**
0.022			2222 344 51**223**
0.027			2222 344 51**273**
0.033			2222 344 51**333**
Pitch = 15.0 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.039	5.0 × 11.0 × 17.5	1.1	2222 344 51**393**
0.047			2222 344 51**473**
0.056			2222 344 51**563**
0.068			2222 344 51**683**
0.082	6.0 × 12.0 × 17.5	1.4	2222 344 51**823**
0.1			2222 344 51**104**
0.12	7.0 × 13.5 × 17.5	1.8	2222 344 51**124**
0.15			2222 344 51**154**
Pitch = 22.5 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.18	6.0 × 15.5 × 26.0	2.8	2222 344 51**184**
0.22			2222 344 51**224**
0.27	7.0 × 16.5 × 26.0	3.5	2222 344 51**274**
0.33	8.5 × 18.0 × 26.0	3.5	2222 344 51**334**
0.39		5.1	2222 344 51**394**
0.47	10.0 × 19.5 × 26.0	5.1	2222 344 51**474**
Pitch = 27.5 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.56	11.0 × 21.0 × 31.0	7.4	2222 344 51**564**
0.68			2222 344 51**684**
0.82	13.0 × 23.0 × 31.0	10.2	2222 344 51**824**
1			2222 344 51**105**

Note

1. The shading indicates preferred types.

Metallized polycarbonate film capacitors MKC 344

MKC 344 GENERAL DATA **PITCH 10/15/22.5/27.5 mm**

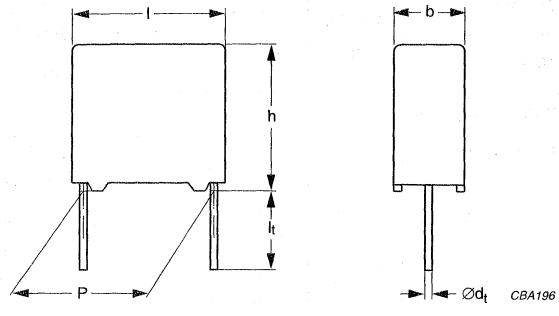


Fig.6 Outline.

Specific reference data for the 630 V DC capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle:			
$C \leq 0.1\ \mu F$	$\leq 30 \times 10^{-4}$	$\leq 60 \times 10^{-4}$	$\leq 130 \times 10^{-4}$
$0.1\ \mu F < C \leq 1.0\ \mu F$	$\leq 30 \times 10^{-4}$	$\leq 60 \times 10^{-4}$	–
Rated voltage pulse slope $(dU/dt)_R$ at 630 V (DC):			
P = 10.0 mm	200 V/µs		
P = 15.0 mm	90 V/µs		
P = 22.5 mm	36 V/µs		
P = 27.5 mm	30 V/µs		
R between leads, for $C \leq 0.33\ \mu F$ at 500 V; 1 minute	>30000 MΩ		
RC between leads, for $C > 0.33\ \mu F$ at 500 V; 1 minute	>10000 s		
R between interconnecting leads and case; 500 V; 1 minute	>30000 MΩ		
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	1018 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 ±1.0 mm	±10%	2222 344 61...	preferred
		±5%	2222 344 62...	on request
Taped on reel	H = 18.5 mm; note 2	±10%	2222 344 68...	on request
		±5%	2222 344 69...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*; taped on reel pitch = 27.5 mm is not available.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

Metallized polycarbonate film capacitors MKC 344

U_{Rdc} = 630 V; U_{Rac} = 220 V

C (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER[1] LOOSE IN BOX; l_t = 5.0 ±1.0 mm C-tol = ±10%
Pitch = 10.0 ±0.4 mm; d_t = 0.60 ±0.06 mm			
0.01	4.0 × 10.0 × 12.5	0.7	2222 344 61**103**
0.012	5.0 × 11.0 × 12.5	0.9	2222 344 61**123**
0.015			2222 344 61**153**
0.018			2222 344 61**183**
0.022	6.0 × 12.0 × 12.5	1.0	2222 344 61**223**
Pitch = 15.0 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.027	5.0 × 11.0 × 17.5	1.4	2222 344 61**273**
0.033	6.0 × 12.0 × 17.5	1.4	2222 344 61**333**
0.039		1.8	2222 344 61**393**
0.047	7.0 × 13.5 × 17.5	1.8	2222 344 61**473**
0.056		2.6	2222 344 61**563**
0.068	8.5 × 15.0 × 17.5	2.6	2222 344 61**683**
Pitch = 22.5 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.082	7.0 × 16.5 × 26.0	2.8	2222 344 61**823**
0.1			2222 344 61**104**
0.12		3.5	2222 344 61**124**
0.15	8.5 × 18.0 × 26.0	3.5	2222 344 61**154**
0.18	10.0 × 19.5 × 26.0	5.1	2222 344 61**184**
0.22			2222 344 61**224**
Pitch = 27.5 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.27	11.0 × 21.0 × 31.0	7.4	2222 344 61**274**
0.33			2222 344 61**334**
0.39	13.0 × 23.0 × 31.0	10.2	2222 344 61**394**
0.47			2222 344 61**474**

Note

1. The shading indicates preferred types.

Interference suppression film capacitors MKT-P 330 4

MKT-P RADIAL POTTED TYPE **PITCH 15/22.5/27.5 mm**

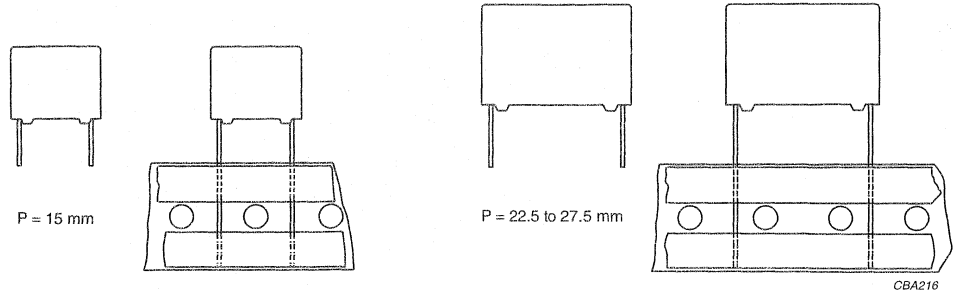


Fig.1 Simplified outlines.

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 polyester film and blank paper, potted in a flame-retardant case.

APPLICATIONS

- For X2 electromagnetic interference suppression.

DETAIL SPECIFICATION

For more detailed data and test requirements see *"Type detail specification HQN-384-14/105"*.

QUICK REFERENCE DATA

DESCRIPTION	VALUE
Capacitance range (E6 series)	0.01 to 1 µF
Capacitance tolerance	±20%; ±10%
Rated (AC) voltage, 50 to 60 Hz	250 V
Rated (DC) voltage	630 V
Climatic category	40/085/21
Rated temperature	85 °C
Maximum application temperature	85 °C
Reference specification	IEC 60384-14; First Edition 1981
Safety approvals	UL1283; VDE 565-1; IMQ
Materials qualified	in accordance with UL94V-O
Safety class	X2

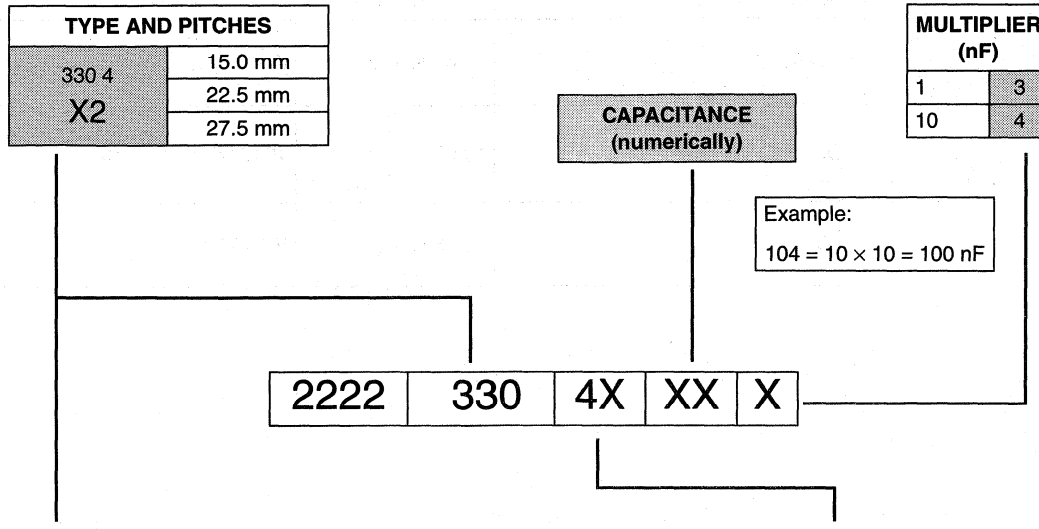
Interference suppression film capacitors MKT-P 330 4

SAFETY APPROVALS

SAFETY APPROVALS (X2)		VALUE	FILE NUMBERS
	UL1283	10 nF to 1 µF	E 109565
	VDE	10 nF to 1 µF	1016.30-4670-1010
	IMQ	10 nF to 1 µF	V 1557

Interference suppression film capacitors MKT-P 330 4

COMPOSITION OF CATALOGUE NUMBER



TYPE	PACKAGING[1]	LEAD CONFIGURATION	C-TOL	PREFERRED TYPES
330 4 X2	loose in box	lead length 5.0 mm	±20%	2222 330 40...
Other versions available on request				
330 4 X2	loose in box	lead length 5.0 mm	±10%	2222 330 41...
		lead length 3.5 mm	±20%	2222 330 47...
			±10%	2222 330 48...
		lead length 25.0 mm	±20%	2222 330 44...
			±10%	2222 330 45...
	taped on reel	H = 18.5 mm; note 2	±20%	2222 330 42...
			±10%	2222 330 43...

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*; taped on reel pitch = 27.5 mm is not available.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

Interference suppression film capacitors MKT-P 330 4

MKT-P 330 4 GENERAL DATA **PITCH 15/22.5/27.5 mm**

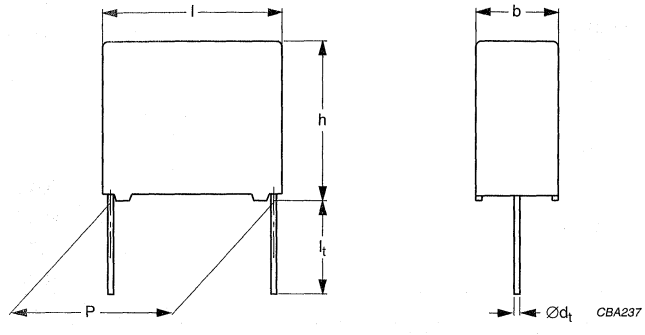


Fig.3 Outlines.

Specific reference data for the 250 V AC capacitors

DESCRIPTION	VALUE	
	at 1 kHz	at 10 kHz
Tangent of loss angle	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 350 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	1075 V; 1 minute	
Withstanding (AC) voltage between leads and case	2000 V; 1 minute	

Interference suppression film capacitors MKT-P 330 4

U_{Rac} = 250 V (AC) X2; U_{Rdc} = 630 V

C (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER[1] LOOSE IN BOX l_t = 5.0 ±1.0 mm C-tol = ±20%
Pitch = 15.0 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.01	5.0 × 11.0 × 17.5	1.2	2222 330 40**103**
0.015			2222 330 40**153**
0.022			2222 330 40**223**
0.033			2222 330 40**333**
0.047	6.0 × 12.0 × 17.5	1.4	2222 330 40**473**
0.068	7.0 × 13.5 × 17.5	2.0	2222 330 40**683**
0.1	8.5 × 15.0 × 17.5	2.6	2222 330 40**104**
Pitch = 22.5 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.15	7.0 × 16.5 × 26.0	3.0	2222 330 40**154**
0.22	8.5 × 18.0 × 26.0	3.7	2222 330 40**224**
0.33	10.0 × 19.5 × 26.0	15.4	2222 330 40**334**
Pitch = 27.5 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.47	13.0 × 23.0 × 31.0	10.8	2222 330 40**474**
0.68	15.0 × 25.0 × 31.0	12.9	2222 330 40**684**
1	18.0 × 28.0 × 31.0	18.2	2222 330 40**105**

Note

1. The shading indicates preferred types.

Interference suppression film capacitors MKT/MKT 331 6

MKT/MKT RADIAL POTTED TYPE PITCH 15/22.5/27.5 mm

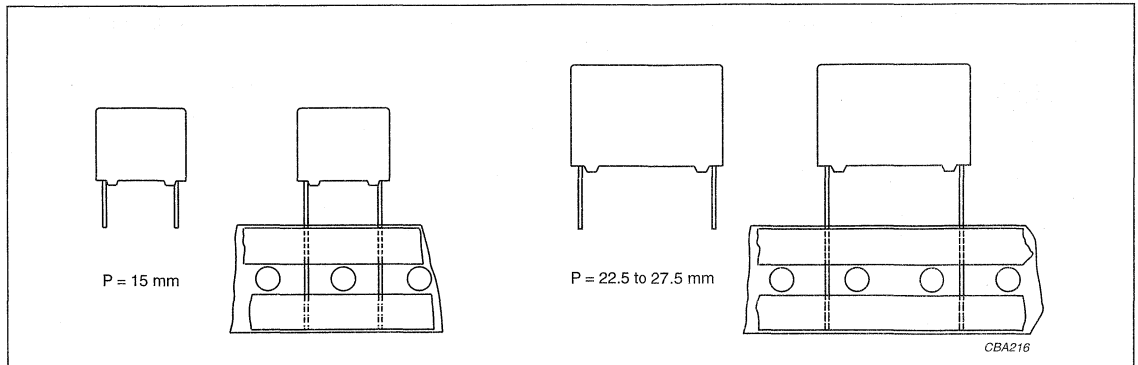


Fig.1 Simplified outlines.

FEATURES

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

APPLICATIONS

- For X2-electromagnetic interference suppression
- Specially designed to meet the NEW REQUIREMENTS of *"IEC 60384-14 2nd edition and EN 132400"*, requiring a 2.5 kV peak pulse voltage test
- Designed for 300 V AC applications.

DETAIL SPECIFICATION

For more detailed data and test requirements see *"Type detail specification HQN-384-14/101"*.

QUICK REFERENCE DATA

DESCRIPTION	VALUE
Capacitance range (E6 series)	10 nF to 330 nF
Capacitance tolerance	±20%; ±10%
Rated (AC) voltage, 50 to 60 Hz	300 V
Rated (DC) voltage	630 V
Climatic category	55/100/56/C
Rated temperature	100 °C
Maximum application temperature	100 °C
Reference specifications	IEC 60384-14 2nd edition and EN 132400
Safety approvals	UL1283; CSA C22.2 No.8-M1986; SEV; VDE; FI; N; D; S; IMQ; ÖVE
Materials	qualified in accordance with UL94V-O
Safety class	X2

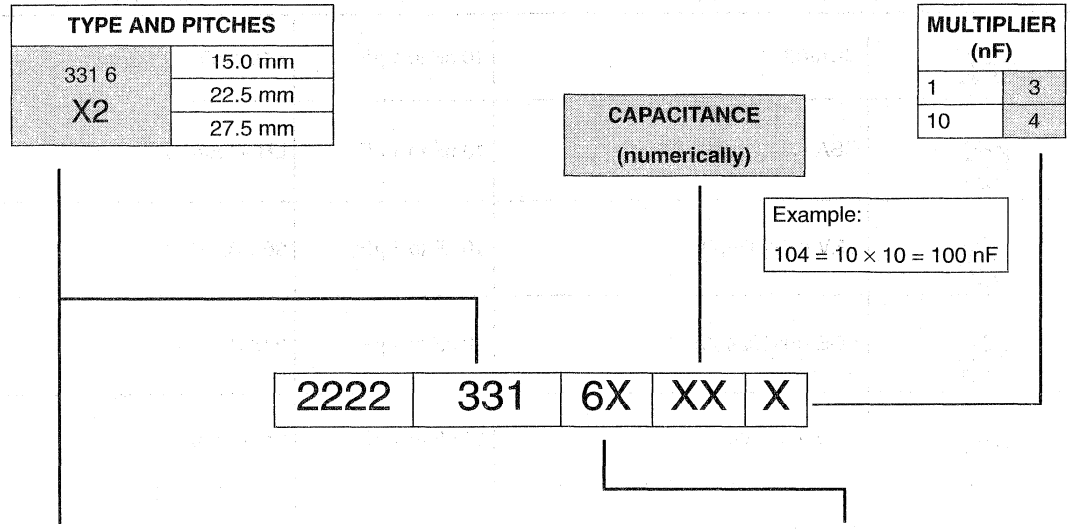
Interference suppression film capacitors MKT/MKT 331 6

SAFETY APPROVALS

SAFETY APPROVALS (X2)		VALUE	FILE NUMBERS
	UL1283	10 nF to 1 µF	E109565
	CSA-C22.2 No.8-M1986	10 nF to 1 µF	LR 94054 - 7
	SEV (EN132400)	10 nF to 1 µF	96,770672
	VDE (EN132400)	10 nF to 1 µF	94631
	FI (EN132400)	10 nF to 1 µF	CCA/FI 879
	NEMKO (EN132400)	10 nF to 1 µF	M 69945
	DEMKO (EN132400)	10 nF to 1 µF	111658 EC/121
	SEMKO (EN132400)	10 nF to 1 µF	9311171
	IMQ (EN132400)	10 nF to 1 µF	V 3416
	ÖVE (EN132400)	10 nF to 1 µF	E260 - 004 - 00

Interference suppression film capacitors MKT/MKT 331 6

COMPOSITION OF CATALOGUE NUMBER



TYPE	PACKAGING[1]	LEAD CONFIGURATION	C-TOL	PREFERRED TYPES
331 6 X2	loose in box	lead length 3.5 mm	±20%	2222 331 60...
				ON REQUEST
331 6 X2	loose in box	lead length 3.5 mm	±10%	2222 331 61...
		lead length 5.0 mm	±20%	2222 331 66...
		lead length 25.0 mm	±20%	2222 331 64...
			±10%	2222 331 65...
	taped on reel	H = 18.5 mm; note 2	±20%	2222 331 62...
			±10%	2222 331 63...

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*; taped on reel pitch = 27.5 mm is not available.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

Interference suppression film capacitors MKT/MKT 331 6

MKT/MKT 331 6 GENERAL DATA **PITCH 15/22.5/27.5 mm**

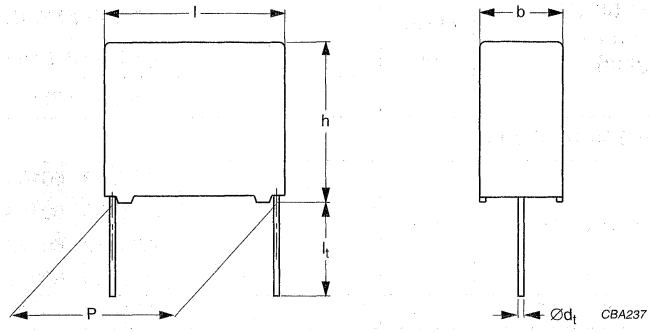


Fig.3 Outline.

Specific reference data for the 300 V AC capacitors

DESCRIPTION	VALUE		
	at 1 kHz	**at 10 kHz**	**at 100 kHz**
Tangent of loss angle:			
$C \leq 470$ nF	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	$\leq 300 \times 10^{-4}$
$C > 470$ nF	$\leq 75 \times 10^{-4}$	$\leq 130 \times 10^{-4}$	–
Rated voltage pulse slope $(dU/dt)_R$ at 420 V (DC):			
P = 15 mm	200 V/µs		
P = 22.5 mm	120 V/µs		
P = 27.5 mm	100 V/µs		
R between leads at 100 V; 1 minute	>30000 MΩ		
R between leads and case; 100 V; 1 minute	>30000 MΩ		
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	1290 V; 1 minute		
Withstanding (AC) voltage between leads and case	2100 V; 1 minute		

Interference suppression film capacitors MKT/MKT 331 6

U_{Rac} = 300 V (AC) X2; U_{Rdc} = 630 V

C (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER[1] LOOSE IN BOX l_t = 3.5 ±0.3 mm C-tol = ±20%
Pitch = 15.0 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.01	5.0 × 11.0 × 17.5	1.3	2222 331 60**103**
0.015			2222 331 60**153**
0.022			2222 331 60**223**
0.033			2222 331 60**333**
0.047	6.0 × 12.0 × 17.5	1.6	2222 331 60**473**
0.068	7.0 × 13.5 × 17.5	2.0	2222 331 60**683**
0.1	8.5 × 15.0 × 17.5	3.0	2222 331 60**104**
Pitch = 22.5 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.15	7.0 × 16.5 × 26.0	3.8	2222 331 60**154**
0.22	8.5 × 18.0 × 26.0	5.4	2222 331 60**224**
Pitch = 27.5 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.33	11.0 × 21.0 × 31.0	9.0	2222 331 60**334**

Note

1. The shading indicates preferred types.

Interference suppression film capacitors MP-KT 333 4

MP-KT RADIAL POTTED TYPE **PITCH 15/22.5/27.5 mm**

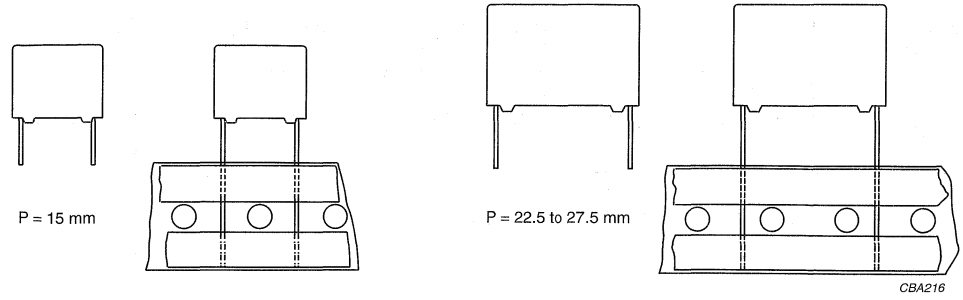


Fig.1 Simplified outlines.

FEATURES

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

APPLICATIONS

- For X2 electromagnetic interference suppression
- The capacitors can be used safely in these applications, where the equipment is connected continuously to the mains.

DETAIL SPECIFICATION

For more detailed data and test requirements see *"Type detail specification HQN-384-14/106"*.

QUICK REFERENCE DATA

DESCRIPTION	VALUE
Capacitance range (E6 series)	10 nF to 1 μF
Capacitance tolerance	±10%
Rated (AC) voltage, 50 to 60 Hz	275 V
Rated (DC) voltage	630 V
Climatic category	40/085/21/C
Rated temperature	85 °C
Maximum application temperature	85 °C
Reference specifications	IEC 60384-14, 2nd edition and EN 132400
Safety approvals: 250 V 275 V	 UL1414; CSA-C22.2 No. 1 SEV; VDE; FI; N; D; S; IMQ; ÖVE
Materials	qualified in accordance with UL94V-O
Safety class	X2

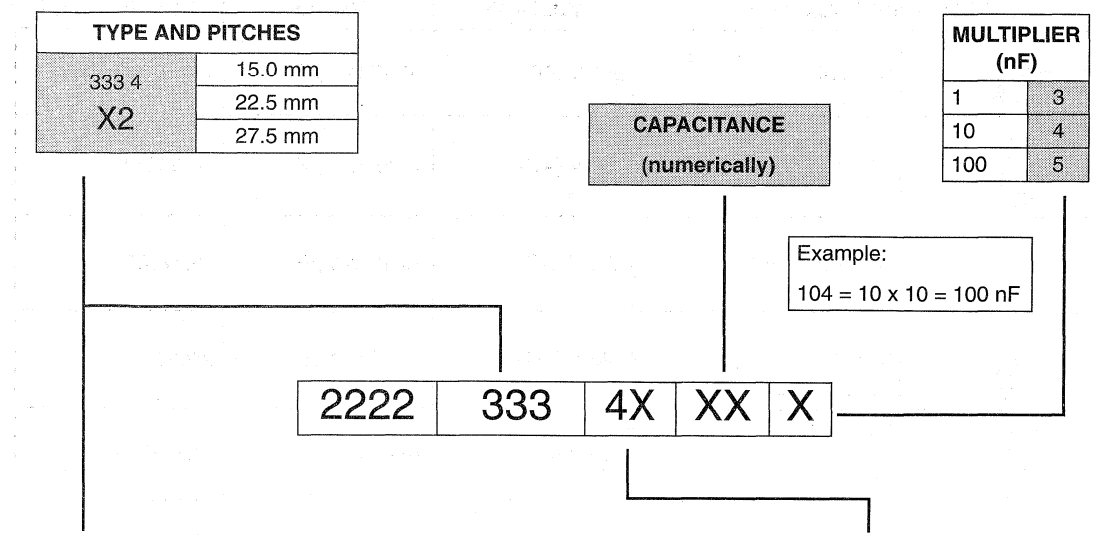
Interference suppression film capacitors MP-KT 333 4

SAFETY APPROVALS

SAFETY APPROVALS (X2)		VOLTAGE	VALUE	FILE NUMBERS
	UL1414	250 V (AC)	10 nF to 1 µF	E 112471
	CSA-C22.2 No.1-M90	250 V (AC)	10 nF to 1 µF	LR 94054
	SEV (EN132400)	275 V (AC)	10 nF to 1 µF	96,770671
	VDE (EN132400)	275 V (AC)	10 nF to 1 µF	94630
	FI (EN132400)	275 V (AC)	10 nF to 1 µF	CCA/FI 881
	NEMKO (EN132400)	275 V (AC)	10 nF to 1 µF	1995 30152 and 1995 30152001
	DEMKO (EN132400)	275 V (AC)	10 nF to 1 µF	304224
	SEMKO (EN132400)	275 V (AC)	10 nF to 1 µF	9527057
	IMQ (EN132400)	275 V (AC)	10 nF to 1 µF	V3105
	ÖVE (EN132400)	275 V (AC)	10 nF to 1 µF	E260 - 002 - 00

Interference suppression film capacitors MP-KT 333 4

COMPOSITION OF CATALOGUE NUMBER



TYPE	PACKAGING(1)	LEAD CONFIGURATION	C-TOL	PREFERRED TYPES
333 4 X2	loose in box	lead length 5.0 mm	±10%	2222 333 41...
				ON REQUEST
333 4 X2	loose in box	lead length 3.5 mm	±10%	2222 333 48...
		lead length 25.0 mm		2222 333 45...
	taped on reel	H = 18.5 mm; note 2		2222 333 43...

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*; taped on reel pitch = 27.5 mm is not available.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

Interference suppression film capacitors MP-KT 333 4

MP-KT 333 4 GENERAL DATA

PITCH 15/22.5/27.5 mm

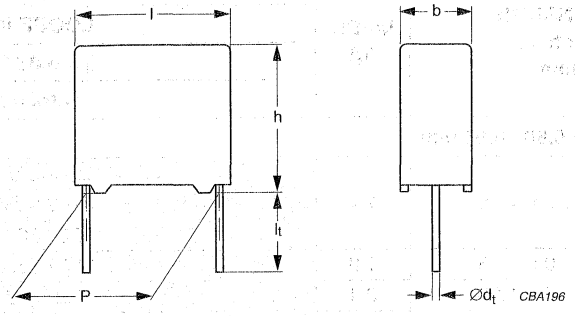


Fig.3 Outline.

Specific reference data for the 275 V AC capacitors

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle:			
0.47 µF < C ≤ 1.0 µF	≤100 × 10^{-4}	≤200 × 10^{-4}	–
C ≤ 0.47 µF	–	–	≤350 × 10^{-4}
Rated voltage pulse slope (dU/dt)$_R$ at 385 V (DC):			
P = 15.0 mm	1500 V/µs		
P = 22.5 mm	1000 V/µs		
P = 27.5 mm: 220 nF < C ≤ 330 nF	500 V/µs		
P = 27.5 mm: 330 nF < C ≤ 1.0 µF	250 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		
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		

Interference suppression film capacitors MP-KT 333 4

U_{Rac} = 275 V (AC) X2; U_{Rdc} = 630 V

C (μF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER[1] LOOSE IN BOX l_t = 5.0 ±1.0 mm C-tol = ±10%
Pitch = 15.0 ±0.4 mm; dt = 0.80 ±0.08 mm			
0.01	5.0 × 11.0 × 17.5	1.4	2222 333 41**103**
0.015			2222 333 41**153**
0.022			2222 333 41**223**
0.033	6.0 × 12.0 × 17.5	1.8	2222 333 41**333**
0.047	7.0 × 13.5 × 17.5	2.4	2222 333 41**473**
0.068	8.5 × 15.0 × 17.5	3.1	2222 333 41**683**
Pitch = 22.5 ±0.4 mm; dt = 0.80 ±0.08 mm			
0.1	7.0 × 16.5 × 26.0	3.7	2222 333 41**104**
0.15	8.5 × 18.0 × 26.0	5.0	2222 333 41**154**
Pitch = 27.5 ±0.40 mm; dt = 0.80 ±0.08 mm			
0.22	11.0 × 21.0 × 31.0	8.0	2222 333 41**224**
0.33	13.0 × 23.0 × 31.0	11.0	2222 333 41**334**
0.47	15.0 × 25.0 × 31.0	13.7	2222 333 41**474**
0.68	18.0 × 28.0 × 31.0	19.1	2222 333 41**684**
1	21.0 × 31.0 × 31.0	26.0	2222 333 41**105**

Note

1. The shading indicates preferred types.

Available on request

PACKAGING	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER
100 nF, pitch P = 15.0 ±0.4 mm, b × h × l = 10.0 mm × 16.5 mm × 17.5 mm[1]			
Loose in box	l_t = 5.0 ±1.0 mm	±20%	2222 333 94**001**
	l_t = 25.0 +2.0 mm	±20%	2222 333 94**004**
	l_t = 3.5 ±0.3 mm	±20%	2222 333 94**015**
Taped on reel	H = 18.5 mm; note 2	±20%	2222 333 94**006**
220 nF, pitch P = 22.5 ±0.4 mm, b × h × l = 10.0 mm × 19.5 mm × 26.0 mm[1]			
Loose in box	l_t = 5.0 ±1.0 mm	±20%	2222 333 94**002**
	l_t = 25.0 +2.0 mm	±20%	2222 333 94**005**
	l_t = 3.5 ±0.3 mm	±20%	2222 333 94**016**
Taped on reel	H = 18.5 mm; note 2	±20%	2222 333 94**007**

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

Interference suppression film capacitors MKP 335 1

MKP RADIAL POTTED TYPE **PITCH 15/22.5/27.5 mm**

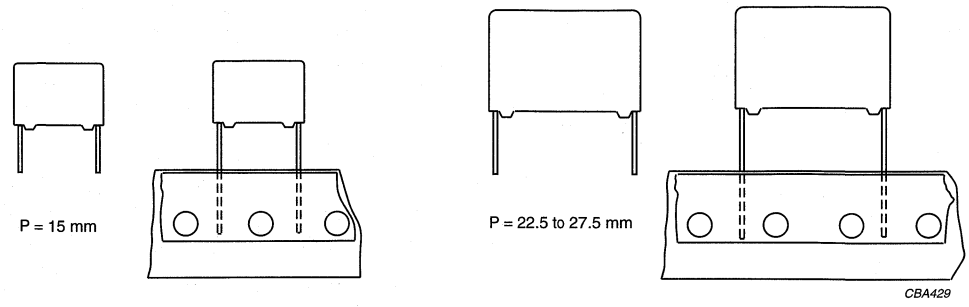


Fig.1 Simplified outlines.

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 NEW REQUIREMENTS of the new *"IEC 60384-14 2nd edition and EN 132400"*, requiring a 2.5 kV peak pulse voltage test.

DETAIL SPECIFICATION

For more detailed data and test requirements see *"Type detail specification HQN-384-14/107"*.

QUICK REFERENCE DATA

DESCRIPTION	VALUE
Capacitance range (E6 series)	10 nF to 1 µF
Capacitance tolerance	±10%, ±20%
Rated (AC) voltage, 50 to 60 Hz	250 V
Rated (DC) voltage	630 V
Climatic category	40/085/21/C
Rated temperature	85 °C
Maximum application temperature	85 °C
Reference specifications	IEC 60384-14 2nd edition and EN 132400
Safety approvals	FI, N, D, S, SEV, UL1283, VDE, IMQ, ÖVE, CSA-C22.2 No.8-M1986
Materials	qualified in accordance with UL94V-O
Safety class	X2

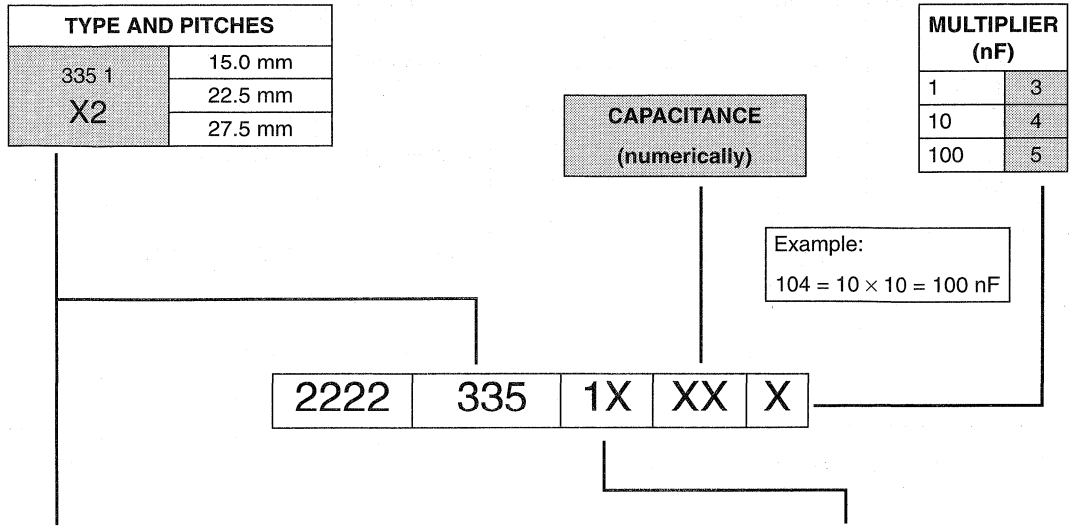
Interference suppression film capacitors MKP 335 1

SAFETY APPROVALS

SAFETY APPROVALS (X2)		VALUE	FILE NUMBERS
	UL1283	10 nF to 1 µF	E 109565
	CSA-C22.2 No.8-M90	10 nF to 1 µF	LR 94054
	SEV (EN132400)	10 nF to 1 µF	98.5 50150.01
	VDE (EN132400)	10 nF to 1 µF	94632
	FI (EN132400)	10 nF to 1 µF	175484
	NEMKO (EN132400)	10 nF to 1 µF	P98100145
	DEMKO (EN132400)	10 nF to 1 µF	302810
	SEMKO (EN132400)	10 nF to 1 µF	9439122
	IMQ (EN132400)	10 nF to 1 µF	V3205
	ÖVE (EN132400)	10 nF to 1 µF	E260-003-00

Interference suppression film capacitors MKP 335 1

COMPOSITION OF CATALOGUE NUMBER



TYPE	PACKAGING(1)	LEAD CONFIGURATION	C-TOL	PREFERRED TYPES
335 1 X2	loose in box	lead length 3.5 mm	±20%	2222 335 10...
		lead length 25.0 mm		2222 335 14...
Other versions available on request				
335 1 X2	loose in box	lead length 3.5 mm	±10%	2222 335 11...
		lead length 5.0 mm	±20%	2222 335 16...
			±10%	2222 335 17...
		lead length 25.0 mm	±10%	2222 335 15...
	taped on reel	H = 18.5 mm; note 3	±20%	2222 335 12...
			±10%	2222 335 13...

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*; taped on reel pitch = 27.5 mm is not available.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

Interference suppression film capacitors MKP 335 1

MKP 335 1 GENERAL DATA **PITCH 15/22.5/27.5 mm**

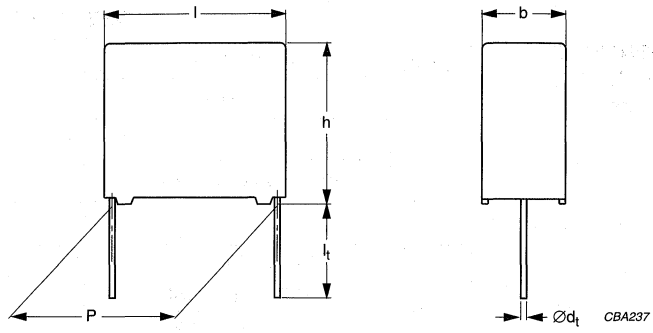


Fig.3 Outline.

Specific reference data for the 250 V AC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
$C \leq 100$ nF	$\leq 10 \times 10^{-4}$	$\leq 30 \times 10^{-4}$
100 nF < C ≤ 470 nF	$\leq 20 \times 10^{-4}$	$\leq 70 \times 10^{-4}$
C > 470 nF	$\leq 70 \times 10^{-4}$	–
Rated voltage pulse slope $(dU/dt)_R$ at 355 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	1800 V; 1 minute	
Withstanding (AC) voltage between leads and case	2000 V; 1 minute	

Interference suppression film capacitors MKP 335 1

U_{Rac} = 250 V (AC) X2; U_{Rdc} = 630 V

C (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER	
			LOOSE IN BOX	
			short leads	long leads
			l_t = 3.5 ±0.5 mm	l_t = 25.0 ±2.0 mm
			C-tol = ±20%	
			catalogue number[1]	last 5 digits[1]
Pitch = 15.0 ±0.4 mm; d_t = 0.80 ±0.08 mm				
0.01	5.0 × 11.0 × 17.5	1.2	2222 335 10**103**	.. 14**103**
0.015			2222 335 10**153**	.. 14**153**
0.022			2222 335 10**223**	.. 14**223**
0.033			2222 335 10**333**	.. 14**333**
0.047	6.0 × 12.0 × 17.5	1.4	2222 335 10**473**	.. 14**473**
0.068	7.0 × 13.5 × 17.5	1.9	2222 335 10**683**	.. 14**683**
0.1	8.5 × 15.0 × 17.5	2.6	2222 335 10**104**	.. 14**104**
Pitch = 22.5 ±0.4 mm; d_t = 0.80 ±0.08 mm				
0.15	7.0 × 16.5 × 26.0	3.2	2222 335 10**154**	.. 14**154**
0.22	8.5 × 18.0 × 26.0	4.4	2222 335 10**224**	.. 14**224**
0.33	10.0 × 19.5 × 26.0	5.5	2222 335 10**334**	.. 14**334**
Pitch = 27.5 ±0.4 mm; d_t = 0.80 ±0.08 mm				
0.47	11.0 × 21.0 × 31.0	7.8	2222 335 10**474**	.. 14**474**
0.68	15.0 × 25.0 × 31.0	12.8	2222 335 10**684**	.. 14**684**
1	18.0 × 28.0 × 31.0	17.2	2222 335 10**105**	.. 14**105**

Note

1. The shading indicates preferred types.

AC and pulse metallized polypropylene film capacitors

MKP 379/380

MKP RADIAL POTTED TYPE

PITCH 5/10/15/22.5/27.5 mm

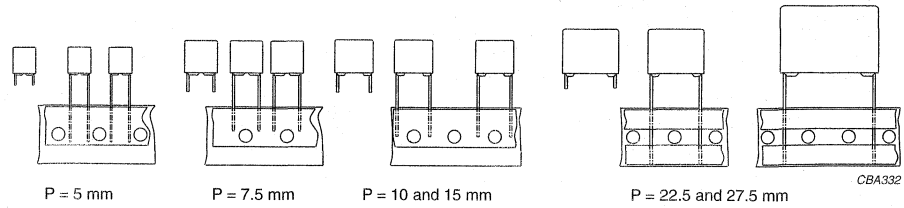


Fig.1 Simplified outlines.

FEATURES

- 5 to 27.5 mm lead pitch
- Supplied loose in box, in ammopack and taped on reel.

DETAIL SPECIFICATION

For more detailed data and test requirements see *"Type detail specification HQN-384-17/103"*.

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.
- Their small dimensions make them suitable for circuits with high packaging density.

QUICK REFERENCE DATA

DESCRIPTION	VALUE
Capacitance range (E24 series)	0.0015 to 6.2 μF
Capacitance tolerance	±5%; ±10%
For pitch ≤15 mm:	
rated (DC) voltage	100 V; 160 V; 250 V; 400 V; 630 V
rated (AC) voltage	63 V; 100 V; 160 V; 200 V; 220 V; see note 1
rated peak-to-peak voltage	180 V; 280 V; 450 V; 560 V; 620 V; see note 1
For pitch >15 mm:	
rated (DC) voltage	160 V; 250 V; 400 V; 630 V
rated (AC) voltage	100 V; 160 V; 200 V; 250 V
rated peak-to-peak voltage	280 V; 450 V; 560 V; 700 V
Climatic category	55/085/56
Rated temperature (DC)	85 °C
Rated temperature (AC)	70 °C
Maximum application temperature	85 °C
Reference specification	IEC 60384-17
Performance grade	grade 1 (long life)
Stability grade:	
100 V, 160 V versions	grade 2
250 V to 630 V versions pitch 5 to 15 mm	grade 2
250 V to 630 V versions pitch 22.5 and 27.5 mm	grade 1

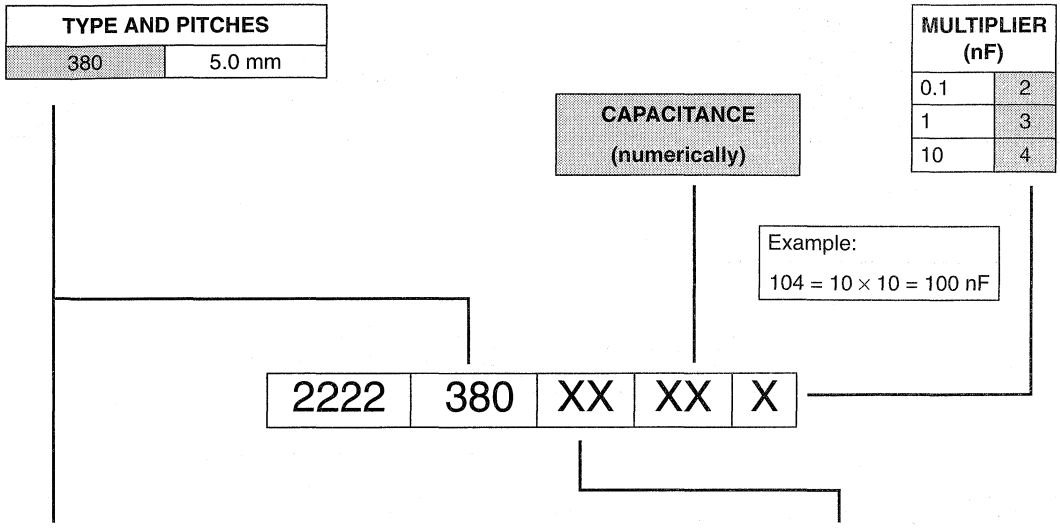
Note

1. For pitch = 5.0 mm: rated (AC) voltage = 200 V and rated peak-to-peak voltage = 560 V_{p-p}.

AC and pulse metallized polypropylene film capacitors

MKP 380

COMPOSITION OF CATALOGUE NUMBER



TYPE	PACKAGING	LEAD CONFIGURATION	C-TOL	100 V	160 V	250 V	400 V	630 V
380	ammopack	H = 18.5 mm	±10%	25	35	45	55	65
			±5%	26	36	46	56	66
	loose in box	lead length 4.0 +1.0/–0.5 mm	±10%	21	31	41	51	61
			±5%	22	32	42	52	62

AC and pulse metallized polypropylene film capacitors

MKP 379

TYPE AND PITCHES	
379	10.0 mm
	15.0 mm
	22.5 mm
	27.5 mm

MULTIPLIER (nF)	
1	3
10	4
100	5

CAPACITANCE (numerically)

Example:
104 = 10 × 10 = 100 nF

2222	379	XX	XX	X

TYPE	PACKAGING	LEAD CONFIGURATION	C-TOL	160 V	250 V	400 V	630 V
379	loose in box	short leads	±5%	34	44	54	64
	taped on reel	H = 18.5 mm	±5%	35	45	55	65

AC and pulse metallized polypropylene film capacitors

MKP 380

MKP 380 GENERAL DATA

PITCH 5 mm

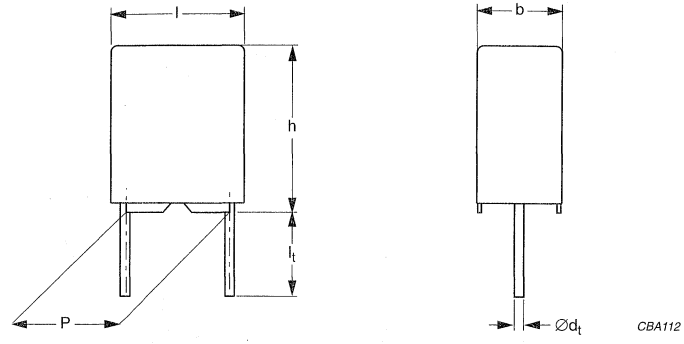


Fig.4 Outline.

Specific reference data for the 100 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
0.018 μF ≤ C ≤ 0.027 μF	$\leq 5 \times 10^{-4}$	$\leq 15 \times 10^{-4}$
0.0027 μF < C ≤ 0.075 μF	$\leq 5 \times 10^{-4}$	$\leq 20 \times 10^{-4}$
0.075 μF < C ≤ 0.1 μF	$\leq 5 \times 10^{-4}$	$\leq 25 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 100 V (DC)	80 V/μs	
R between leads for C ≤ 1.0 μF 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	160 V; 1 minute	
Withstanding (DC)voltage between leads and case	2840 V; 1 minute	

Available 100 V DC versions

PACKAGING[1]	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Ammopack	H = 18.5 mm; note 2	±10%	2222 380 25...	preferred
		±5%	2222 380 26...	on request
Loose in box	l_t = 4.0 +1.0/–0.5 mm	±10%	2222 380 21...	on request
		±5%	2222 380 22...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse metallized polypropylene film capacitors

MKP 380

U_{Rdc} = 100 V; U_{Rac} = 63 V/U_{p-p} = 180 V

C (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER(1) AMMOPACK H = 18.5 mm C-tol = ±10%
Pitch = 5.0 ±0.3 mm; d_t = 0.50 ±0.05 mm			
0.018	3.5 × 8.0 × 7.2	0.35	2222 380 25**183**
0.02			2222 380 25**203**
0.022			2222 380 25**223**
0.024			2222 380 25**243**
0.027			2222 380 25**273**
0.03			2222 380 25**303**
0.033			2222 380 25**333**
0.036	4.5 × 9.0 × 7.2	0.45	2222 380 25**363**
0.039			2222 380 25**393**
0.043			2222 380 25**433**
0.047			2222 380 25**473**
0.051	6.0 × 11.0 × 7.2	0.60	2222 380 25**513**
0.056			2222 380 25**563**
0.062			2222 380 25**623**
0.068			2222 380 25**683**
0.075			2222 380 25**753**
0.082			2222 380 25**823**
0.091			2222 380 25**913**
0.1			2222 380 25**104**

Note

1. The shading indicates preferred types.

AC and pulse metallized polypropylene film capacitors

MKP 380

MKP 380 GENERAL DATA

PITCH 5 mm

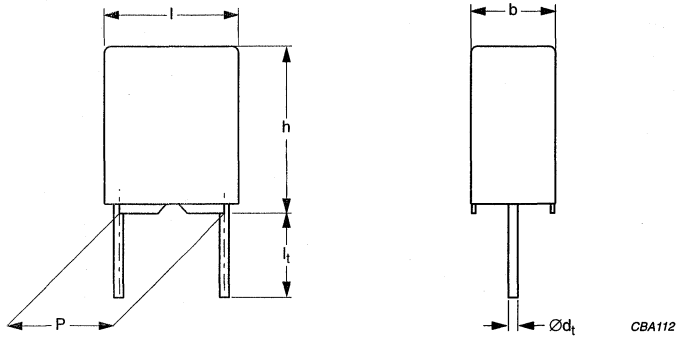


Fig.5 Outline.

Specific reference data for the 160 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
0.013 μF ≤ C ≤ 0.027 μF	$\leq 5 \times 10^{-4}$	$\leq 15 \times 10^{-4}$
0.027 μF < C ≤ 0.068 μF	$\leq 5 \times 10^{-4}$	$\leq 20 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 160 V (DC)	80 V/μs	
R between leads for C ≤ 1.0 μF 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	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
Ammopack	H = 18.5 mm; note 2	±10%	2222 380 35...	preferred
		±5%	2222 380 36...	on request
Loose in box	l_t = 4.0 +1.0/–0.5 mm	±10%	2222 380 31...	on request
		±5%	2222 380 32...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse metallized polypropylene film capacitors

MKP 380

U_{Rdc} = 160 V; U_{Rac} = 100 V/U_{p-p} = 280 V

C (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER[1] AMMOPACK H = 18.5 mm C-tol = ±10%
Pitch = 5.0 ±0.3 mm; d_t = 0.50 ±0.05 mm			
0.013	3.5 × 8.0 × 7.2	0.35	2222 380 35**133**
0.015			2222 380 35**153**
0.016			2222 380 35**163**
0.018			2222 380 35**183**
0.02			2222 380 35**203**
0.022			2222 380 35**223**
0.024	4.5 × 9.0 × 7.2	0.45	2222 380 35**243**
0.027			2222 380 35**273**
0.03			2222 380 35**303**
0.033			2222 380 35**333**
0.036	6.0 × 11.0 × 7.2	0.60	2222 380 35**363**
0.039			2222 380 35393
0.043			2222 380 35**433**
0.047			2222 380 35**473**
0.051			2222 380 35**513**
0.056			2222 380 35**563**
0.062			2222 380 35**623**
0.068			2222 380 35**683**

Note

1. The shading indicates preferred types.

AC and pulse metallized polypropylene film capacitors

MKP 380

MKP 380 GENERAL DATA

PITCH 5 mm

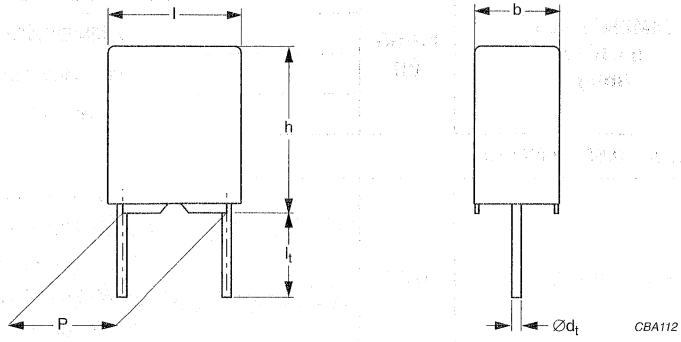


Fig.6 Outline.

Specific reference data for the 250 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
0.0091 μF ≤ C ≤ 0.027 μF	$\leq 5 \times 10^{-4}$	$\leq 15 \times 10^{-4}$
0.027 μF < C ≤ 0.043 μF	$\leq 5 \times 10^{-4}$	$\leq 20 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 250 V (DC)	90 V/μs	
R between leads for C ≤ 1.0 μF 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	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
Ammopack	H = 18.5 mm; note 2	±10%	2222 380 45...	preferred
		±5%	2222 380 46...	on request
Loose in box	l_t = 4.0 +1.0/−0.5 mm	±10%	2222 380 41...	on request
		±5%	2222 380 42...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse metallized polypropylene film capacitors

MKP 380

U_{Rdc} = 250 V; U_{Rac} = 160 V/U_{p-p} = 450 V

C (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER[1] AMMOPACK H = 18.5 mm C-tol = ±10%
Pitch = 5.0 ±0.3 mm; d_t = 0.50 ±0.05 mm			
0.0091	3.5 × 8.0 × 7.2	0.35	2222 380 45**912**
0.01			2222 380 45**103**
0.011			2222 380 45**113**
0.012			2222 380 45**123**
0.013			2222 380 45**133**
0.015			2222 380 45**153**
0.016	4.5 × 9.0 × 7.2	0.45	2222 380 45**163**
0.018			2222 380 45**183**
0.02			2222 380 45**203**
0.022			2222 380 45**223**
0.024			2222 380 45**243**
0.027	6.0 × 11.0 × 7.2	0.60	2222 380 45**273**
0.03			2222 380 45**303**
0.033			2222 380 45**333**
0.036			2222 380 45**363**
0.039			2222 380 45**393**
0.043			2222 380 45**433**

Note

1. The shading indicates preferred types.

AC and pulse metallized polypropylene film capacitors

MKP 380

MKP 380 GENERAL DATA

PITCH 5 mm

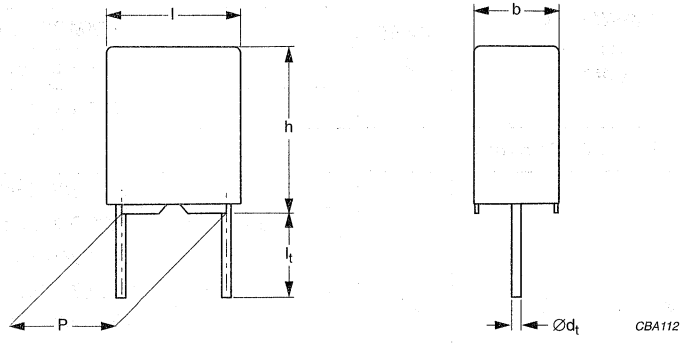


Fig.7 Outline.

Specific reference data for the 400 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
0.0043 µF ≤ C ≤ 0.0091 µF	$\leq 5 \times 10^{-4}$	$\leq 10 \times 10^{-4}$
0.0091 µF < C ≤ 0.02 µF	$\leq 5 \times 10^{-4}$	$\leq 15 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 400 V (DC)	100 V/µs	
R between leads for C ≤ 1.0 µF 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	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
Ammopack	H = 18.5 mm; note 2	±10%	2222 380 55...	preferred
		±5%	2222 380 56...	on request
Loose in box	l_t = 4.0 +1.0/–0.5 mm	±10%	2222 380 51...	on request
		±5%	2222 380 52...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse metallized polypropylene film capacitors

MKP 380

U_{Rdc} = 400 V; U_{Rac} = 200 V/U_{p-p} = 560 V

C (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER[1] AMMOPACK H = 18.5 mm C-tol = ±10%
Pitch = 5.0 ±0.3 mm; d_t = 0.50 ±0.05 mm			
0.0043	3.5 × 8.0 × 7.2	0.35	2222 380 55**432**
0.0047			2222 380 55**472**
0.0051			2222 380 55**512**
0.0056			2222 380 55**562**
0.0062			2222 380 55**622**
0.0068			2222 380 55**682**
0.0075			2222 380 55**752**
0.0082			2222 380 55**822**
0.0091	4.5 × 9.0 × 7.2	0.45	2222 380 55**912**
0.01			2222 380 55**103**
0.011			2222 380 55**113**
0.012			2222 380 55**123**
0.013	6.0 × 11.0 × 7.2	0.60	2222 380 55**133**
0.015			2222 380 55**153**
0.016			2222 380 55**163**
0.018			2222 380 55**183**
0.02			2222 380 55**203**

Note

1. The shading indicates preferred types.

AC and pulse metallized polypropylene film capacitors

MKP 380

MKP 380 GENERAL DATA

PITCH 5 mm

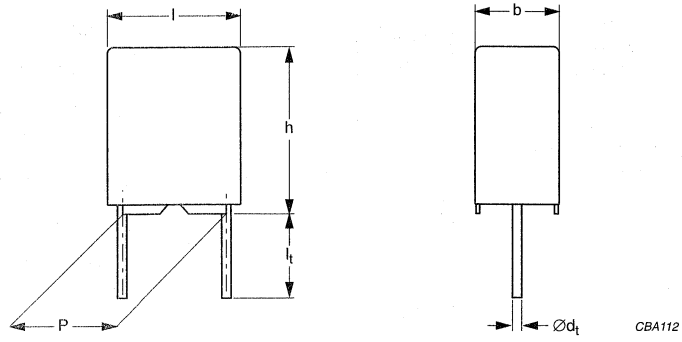


Fig.8 Outline.

Specific reference data for the 630 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: 0.0015 µF ≤ C ≤ 0.0091 µF	$\leq 5 \times 10^{-4}$	$\leq 10 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 630 V (DC)	120 V/µs	
R between leads for C ≤ 1.0 µF 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	880 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
Ammopack	H = 18.5 mm; note 2	±10%	2222 380 65...	preferred
		±5%	2222 380 66...	on request
Loose in box	l_t = 4.0 +1.0/–0.5 mm	±10%	2222 380 61...	on request
		±5%	2222 380 62...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse metallized polypropylene film capacitors

MKP 380

U_{Rdc} = 630 V; U_{Rac} = 200 V/U_{p-p} = 560 V

C (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER[1] AMMOPACK H = 18.5 mm C-tol = ±10%
Pitch = 5.0 ±0.3 mm; d_t = 0.50 ±0.05 mm			
0.0015	3.5 × 8.0 × 7.2	0.35	2222 380 65152
0.0016			2222 380 65162
0.0018			2222 380 65182
0.002			2222 380 65202
0.0022			2222 380 65222
0.0024			2222 380 65242
0.0027			2222 380 65272
0.003			2222 380 65302
0.0033			2222 380 65332
0.0036			2222 380 65362
0.0039			2222 380 65392
0.0043	4.5 × 9.0 × 7.2	0.45	2222 380 65432
0.0047			2222 380 65472
0.0051			2222 380 65512
0.0056			2222 380 65562
0.0062	6.0 × 11.0 × 7.2	0.60	2222 380 65622
0.0068			2222 380 65682
0.0075			2222 380 65752
0.0082			2222 380 65822
0.0091			2222 380 65912

Note

1. The shading indicates preferred types.

AC and pulse metallized polypropylene film capacitors

MKP 379

MKP 379 GENERAL DATA

PITCH 10 mm

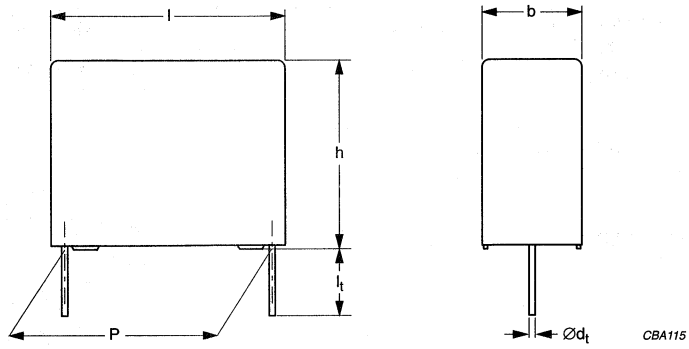


Fig.9 Outline.

Specific reference data for the 160 V DC capacitors (pitch = 10 mm)

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
$C \leq 0.075\ \mu F$	$\leq 5 \times 10^{-4}$	$\leq 20 \times 10^{-4}$
$0.075\ \mu F < C \leq 0.11\ \mu F$	$\leq 5 \times 10^{-4}$	$\leq 25 \times 10^{-4}$
$0.11\ \mu F < C \leq 0.16\ \mu F$	$\leq 10 \times 10^{-4}$	$\leq 30 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 160 V (DC)	60 V/µs	
R between leads for $C \leq 1.0\ \mu F$ 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	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 = 4.0 +1/–0.5 mm	±5%	2222 379 34...	preferred
Taped on reel	H = 18.5 mm; note 2	±5%	2222 379 35...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse metallized polypropylene film capacitors

MKP 379

U_{Rdc} = 160 V; U_{Rac} = 100 V/U_{p-p} = 280 V

C (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER(1)
			LOOSE IN BOX
			l_t = 4.0 +1.0/–0.5 mm
			C-tol = ±5%
Pitch = 10.0 ±0.4 mm; d_t = 0.60 ±0.06 mm			
0.075	4.0 × 10.0 × 12.5	0.6	2222 379 34**753**
0.082			2222 379 34**823**
0.091			2222 379 34**913**
0.1			2222 379 34**104**
0.11	5.0 × 11.0 × 12.5	0.85	2222 379 34**114**
0.12			2222 379 34**124**
0.13			2222 379 34**134**
0.15			2222 379 34**154**
0.16	6.0 × 12.0 × 12.5	1.0	2222 379 34**164**

Note

1. The shading indicates preferred types.

Available on request

PITCH	d_t	CAPACITANCE RANGE (µF)(1)
U_{Rdc} = 160 V; U_{Rac} = 100 V/U_{p-p} = 280 V		
7.5 ±0.4 mm	0.60 ±0.06 mm	0.022 to 0.12

Note

1. E24 series.

AC and pulse metallized polypropylene film capacitors

MKP 379

MKP 379 GENERAL DATA

PITCH 15/22.5/27.5 mm

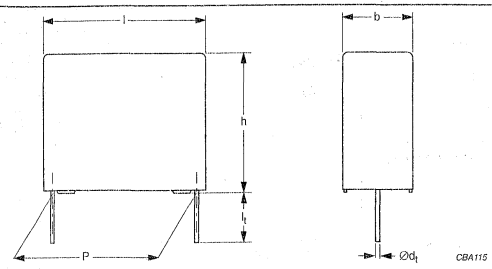


Fig.10 Outline.

Specific reference data for the 160 V DC capacitors (pitch > 10 mm)

DESCRIPTION	VALUE		DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz		at 10 kHz	at 100 kHz
Tangent of loss angle:			Tangent of loss angle:		
$C \leq 0.18\ \mu F$	$\leq 10 \times 10^{-4}$	$\leq 30 \times 10^{-4}$	$1.8\ \mu F < C \leq 2.0\ \mu F$	$\leq 10 \times 10^{-4}$	$\leq 95 \times 10^{-4}$
$0.18\ \mu F < C \leq 0.3\ \mu F$	$\leq 10 \times 10^{-4}$	$\leq 35 \times 10^{-4}$	$2.0\ \mu F < C \leq 2.2\ \mu F$	$\leq 10 \times 10^{-4}$	$\leq 100 \times 10^{-4}$
$0.3\ \mu F < C \leq 0.39\ \mu F$	$\leq 10 \times 10^{-4}$	$\leq 40 \times 10^{-4}$	$2.2\ \mu F < C \leq 2.4\ \mu F$	$\leq 15 \times 10^{-4}$	$\leq 105 \times 10^{-4}$
$0.39\ \mu F < C \leq 0.56\ \mu F$	$\leq 10 \times 10^{-4}$	$\leq 45 \times 10^{-4}$	$2.4\ \mu F < C \leq 2.7\ \mu F$	$\leq 15 \times 10^{-4}$	$\leq 110 \times 10^{-4}$
$0.56\ \mu F < C \leq 0.68\ \mu F$	$\leq 10 \times 10^{-4}$	$\leq 50 \times 10^{-4}$	$2.7\ \mu F < C \leq 3.0\ \mu F$	$\leq 15 \times 10^{-4}$	$\leq 115 \times 10^{-4}$
$0.68\ \mu F < C \leq 0.82\ \mu F$	$\leq 10 \times 10^{-4}$	$\leq 55 \times 10^{-4}$	$3.0\ \mu F < C \leq 3.3\ \mu F$	$\leq 15 \times 10^{-4}$	$\leq 125 \times 10^{-4}$
$0.82\ \mu F < C \leq 0.91\ \mu F$	$\leq 10 \times 10^{-4}$	$\leq 60 \times 10^{-4}$	$3.3\ \mu F < C \leq 3.6\ \mu F$	$\leq 15 \times 10^{-4}$	$\leq 130 \times 10^{-4}$
$0.91\ \mu F < C \leq 1.0\ \mu F$	$\leq 10 \times 10^{-4}$	$\leq 65 \times 10^{-4}$	$3.6\ \mu F < C \leq 3.9\ \mu F$	$\leq 15 \times 10^{-4}$	$\leq 135 \times 10^{-4}$
$1.0\ \mu F < C \leq 1.2\ \mu F$	$\leq 10 \times 10^{-4}$	$\leq 70 \times 10^{-4}$	$3.9\ \mu F < C \leq 4.3\ \mu F$	$\leq 15 \times 10^{-4}$	$\leq 145 \times 10^{-4}$
$1.2\ \mu F < C \leq 1.3\ \mu F$	$\leq 10 \times 10^{-4}$	$\leq 75 \times 10^{-4}$	$4.3\ \mu F < C \leq 4.7\ \mu F$	$\leq 20 \times 10^{-4}$	$\leq 155 \times 10^{-4}$
$1.3\ \mu F < C \leq 1.5\ \mu F$	$\leq 10 \times 10^{-4}$	$\leq 80 \times 10^{-4}$	$4.7\ \mu F < C \leq 5.1\ \mu F$	$\leq 20 \times 10^{-4}$	$\leq 160 \times 10^{-4}$
$1.5\ \mu F < C \leq 1.6\ \mu F$	$\leq 10 \times 10^{-4}$	$\leq 85 \times 10^{-4}$	$5.1\ \mu F < C \leq 5.6\ \mu F$	$\leq 20 \times 10^{-4}$	$\leq 175 \times 10^{-4}$
$1.6\ \mu F < C \leq 1.8\ \mu F$	$\leq 10 \times 10^{-4}$	$\leq 90 \times 10^{-4}$	$5.6\ \mu F < C \leq 6.2\ \mu F$	$\leq 20 \times 10^{-4}$	$\leq 185 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 160 V (DC):			Rated voltage pulse slope $(dU/dt)_R$ at 160 V (DC):		
l = 17.5 mm	50 V/µs		l = 31.0 mm	15 V/µs (b < 15 mm)	
l = 26.0 mm	25 V/µs		l = 31.0 mm	7.5 V/µs (b ≥ 15 mm)	
R between leads, for $C \leq 1\ \mu F$ at 100 V; 1 minute			>100000 MΩ		
RC between leads, for $C > 1\ \mu F$ at 100 V; 1 minute			>100000 s		
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			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 = 3.5 ±0.3 mm	±5%	2222 379 34...	preferred
Taped on reel	H = 18.5 mm; note 2	±5%	2222 379 35...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*; taped on reel pitch = 27.5 mm is not available.
2. H = in-tape height for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse metallized polypropylene film capacitors

MKP 379

U_{Rdc} = 160 V; U_{Rac} = 100 V/U_{p-p} = 280 V

C (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER[1] LOOSE IN BOX l_t = 3.5 ±0.3 mm C-tol = ±5%
Pitch = 15.0 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.18	5.0 × 11.0 × 17.5	1.2	2222 379 34**184**
0.2			2222 379 34**204**
0.22			2222 379 34**224**
0.24			2222 379 34**244**
0.27			2222 379 34**274**
0.3	6.0 × 12.0 × 17.5	1.4	2222 379 34**304**
0.33			2222 379 34**334**
0.36			2222 379 34**364**
0.39			2222 379 34**394**
0.43	7.0 × 13.5 × 17.5	1.9	2222 379 34**434**
0.47			2222 379 34**474**
0.51			2222 379 34**514**
0.56	8.5 × 15.0 × 17.5	2.6	2222 379 34**564**
0.62			2222 379 34**624**
0.68			2222 379 34**684**
0.75			2222 379 34**754**
Pitch = 22.5 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.82	7.0 × 16.5 × 26.0	3.2	2222 379 34**824**
0.91			2222 379 34**914**
1	8.5 × 18.0 × 26.0	4.4	2222 379 34**105**
1.1			2222 379 34**115**
1.2			2222 379 34**125**
1.3			2222 379 34**135**
1.5	10.0 × 19.5 × 26.0	5.5	2222 379 34**155**
1.6			2222 379 34**165**
1.8			2222 379 34**185**
Pitch = 27.5 ±0.4 mm; d_t = 0.80 ±0.08 mm			
2	11.0 × 21.0 × 31.0	7.8	2222 379 34**205**
2.2			2222 379 34**225**
2.4			2222 379 34**245**
2.7	13.0 × 23.0 × 31.0	10.4	2222 379 34**275**
3			2222 379 34**305**
3.3			2222 379 34**335**
3.6	15.0 × 25.0 × 31.0	12.8	2222 379 34**365**
3.9			2222 379 34**395**
4.3			2222 379 34**435**
4.7	18.0 × 28.0 × 31.0	17.2	2222 379 34**475**
5.1			2222 379 34**515**
5.6			2222 379 34**565**
6.2			2222 379 34**625**

Note

1. The shading indicates preferred types.

AC and pulse metallized polypropylene film capacitors — MKP 379

MKP 379 GENERAL DATA **PITCH 10 mm**

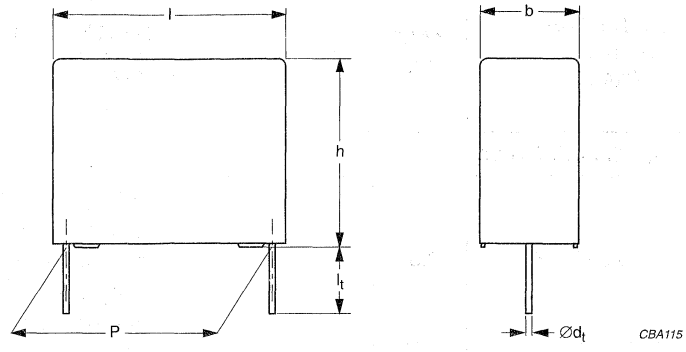


Fig.11 Outline.

Specific reference data for the 250 V DC capacitors (pitch = 10 mm)

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
0.047 µF < C ≤ 0.075 µF	$\leq 5 \times 10^{-4}$	$\leq 20 \times 10^{-4}$
0.075 µF < C ≤ 0.091 µF	$\leq 5 \times 10^{-4}$	$\leq 25 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 250 V (DC)	70 V/µs	
R between leads for C ≤ 1.0 µF 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	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 = 4.0 +1/–0.5 mm	±5%	2222 379 44...	preferred
Taped on reel	H = 18.5 mm; note 2	±5%	2222 379 45...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse metallized polypropylene film capacitors

MKP 379

U_{Rdc} = 250 V; U_{Rac} = 160 V/U_{p-p} = 450 V

C (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER[1] LOOSE IN BOX l_t = 4.0 +1.0/−0.5 mm C-tol = ±5%
Pitch = 10.0 ±0.4 mm; d_t = 0.60 ±0.06 mm			
0.047	4.0 × 10.0 × 12.5	0.6	2222 379 44**473**
0.051			2222 379 44**513**
0.056			2222 379 44**563**
0.062			2222 379 44**623**
0.068			2222 379 44**683**
0.075	5.0 × 11.0 × 12.5	0.85	2222 379 44**753**
0.082			2222 379 44**823**
0.091			2222 379 44**913**

Note

1. The shading indicates preferred types.

Available on request

PITCH	d_t	CAPACITANCE RANGE (µF)[1]
U_{Rdc} = 250 V; U_{Rac} = 160 V/U_{p-p} = 450 V		
7.5 ±0.4 mm	0.60 ±0.06 mm	0.012 to 0.082

Note

1. E24 series.

AC and pulse metallized polypropylene film capacitors

MKP 379

MKP 379 GENERAL DATA

PITCH 15/22.5/27.5 mm

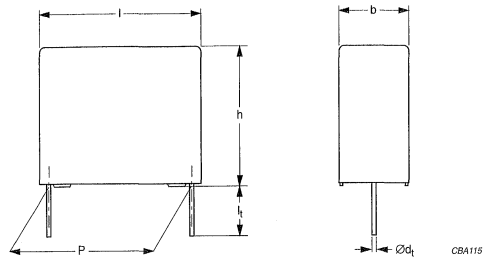


Fig.12 Outline.

Specific reference data for the 250 V DC capacitors (pitch > 10 mm)

DESCRIPTION	VALUE		DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz		at 10 kHz	at 100 kHz
Tangent of loss angle:			Tangent of loss angle:		
0.1 µF < C ≤ 0.11 µF	$\leq 10 \times 10^{-4}$	$\leq 25 \times 10^{-4}$	1.3 µF < C ≤ 1.5 µF	$\leq 10 \times 10^{-4}$	$\leq 80 \times 10^{-4}$
0.11 µF < C ≤ 0.18 µF	$\leq 10 \times 10^{-4}$	$\leq 30 \times 10^{-4}$	1.5 µF < C ≤ 1.6 µF	$\leq 10 \times 10^{-4}$	$\leq 85 \times 10^{-4}$
0.18 µF < C ≤ 0.3 µF	$\leq 10 \times 10^{-4}$	$\leq 35 \times 10^{-4}$	1.6 µF < C ≤ 1.8 µF	$\leq 10 \times 10^{-4}$	$\leq 90 \times 10^{-4}$
0.3 µF < C ≤ 0.39 µF	$\leq 10 \times 10^{-4}$	$\leq 40 \times 10^{-4}$	1.8 µF < C ≤ 2.0 µF	$\leq 10 \times 10^{-4}$	$\leq 95 \times 10^{-4}$
0.39 µF < C ≤ 0.56 µF	$\leq 10 \times 10^{-4}$	$\leq 40 \times 10^{-4}$	2.0 µF < C ≤ 2.2 µF	$\leq 10 \times 10^{-4}$	$\leq 100 \times 10^{-4}$
0.56 µF < C ≤ 0.68 µF	$\leq 10 \times 10^{-4}$	$\leq 50 \times 10^{-4}$	2.2 µF < C ≤ 2.4 µF	$\leq 15 \times 10^{-4}$	$\leq 105 \times 10^{-4}$
0.68 µF < C ≤ 0.82 µF	$\leq 10 \times 10^{-4}$	$\leq 55 \times 10^{-4}$	2.4 µF < C ≤ 2.7 µF	$\leq 15 \times 10^{-4}$	$\leq 110 \times 10^{-4}$
0.82 µF < C ≤ 0.91 µF	$\leq 10 \times 10^{-4}$	$\leq 60 \times 10^{-4}$	2.7 µF < C ≤ 3.0 µF	$\leq 15 \times 10^{-4}$	$\leq 115 \times 10^{-4}$
0.91 µF < C ≤ 1.0 µF	$\leq 10 \times 10^{-4}$	$\leq 65 \times 10^{-4}$	3.0 µF < C ≤ 3.3 µF	$\leq 15 \times 10^{-4}$	$\leq 125 \times 10^{-4}$
1.0 µF < C ≤ 1.2 µF	$\leq 10 \times 10^{-4}$	$\leq 70 \times 10^{-4}$	3.3 µF < C ≤ 3.6 µF	$\leq 15 \times 10^{-4}$	$\leq 130 \times 10^{-4}$
1.2 µF < C ≤ 1.3 µF	$\leq 10 \times 10^{-4}$	$\leq 75 \times 10^{-4}$	3.6 µF < C ≤ 3.9 µF	$\leq 15 \times 10^{-4}$	$\leq 135 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 250 V (DC):			Rated voltage pulse slope $(dU/dt)_R$ at 250 V (DC):		
l = 17.5 mm	60 V/µs		l = 31.0 mm	20 V/µs (b < 15 mm)	
l = 26.0 mm	30 V/µs		l = 31.0 mm	10 V/µs (b ≥ 15 mm)	
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 interconnected leads and case; 100 V; 1 minute			>100000 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			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 ±0.3 mm	±5%	2222 379 44...	preferred
Taped on reel	H = 18.5 mm; note 2	±5%	2222 379 45...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*; taped on reel pitch = 27.5 mm is not available.
2. H = in-tape height for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse metallized polypropylene film capacitors

MKP 379

U_{Rdc} = 250 V; U_{Rac} = 160 V/U_{p-p} = 450 V

C (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER[1] LOOSE IN BOX l_t = 3.5 ±0.3 mm C-tol = ±5%
Pitch = 15.0 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.1	5.0 × 11.0 × 17.5	1.2	2222 379 44104
0.11			2222 379 44114
0.12			2222 379 44124
0.13			2222 379 44134
0.15			2222 379 44154
0.16			2222 379 44164
0.18	6.0 × 12.0 × 17.5	1.4	2222 379 44184
0.2			2222 379 44204
0.22			2222 379 44224
0.24			2222 379 44244
0.27	7.0 × 13.5 × 17.5	1.9	2222 379 44274
0.3			2222 379 44304
0.33			2222 379 44334
0.36	8.5 × 15.0 × 17.5	2.6	2222 379 44364
0.39			2222 379 44394
0.43			2222 379 44434
0.47			2222 379 44474
Pitch = 22.5 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.51	7.0 × 16.5 × 26.0	3.2	2222 379 44514
0.56			2222 379 44564
0.62			2222 379 44624
0.68	8.5 × 18.0 × 26.0	4.4	2222 379 44684
0.75			2222 379 44754
0.82			2222 379 44824
0.91			2222 379 44914
1	10.0 × 19.5 × 26.0	5.5	2222 379 44105
1.1			2222 379 44115
1.2			2222 379 44125
Pitch = 27.5 ±0.4 mm; d_t = 0.80 ±0.08 mm			
1.3	11.0 × 21.0 × 31.0	7.8	2222 379 44135
1.5			2222 379 44155
1.6			2222 379 44165
1.8	13.0 × 23.0 × 31.0	10.4	2222 379 44185
2			2222 379 44205
2.2			2222 379 44225
2.4	15.0 × 25.0 × 31.0	12.8	2222 379 44245
2.7			2222 379 44275
3	18.0 × 28.0 × 31.0	17.2	2222 379 44305
3.3			2222 379 44335
3.6			2222 379 44365
3.9			2222 379 44395

Note

1. The shading indicates preferred types.

AC and pulse metallized polypropylene film capacitors

MKP 379

MKP 379 GENERAL DATA

PITCH 10 mm

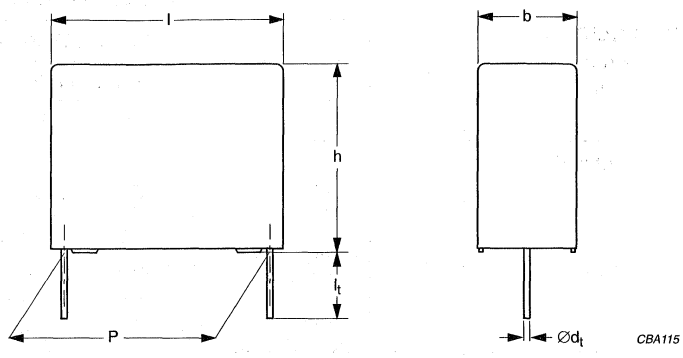


Fig.13 Outline.

Specific reference data for the 400 V DC capacitors (pitch = 10 mm)

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
0.0075 µF ≤ C ≤ 0.0091 µF	$\leq 5 \times 10^{-4}$	$\leq 10 \times 10^{-4}$
0.0091 µF < C ≤ 0.027 µF	$\leq 5 \times 10^{-4}$	$\leq 15 \times 10^{-4}$
0.027 µF < C ≤ 0.043 µF	$\leq 5 \times 10^{-4}$	$\leq 20 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 400 V (DC)	80 V/µs	
R between leads for C ≤ 1.0 µF 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	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 = 4.0 +1/−0.5 mm	±5%	2222 379 54...	preferred
Taped on reel	H = 18.5 mm; note 2	±5%	2222 379 55...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse metallized polypropylene film capacitors

MKP 379

U_{Rdc} = 400 V; U_{Rac} = 200 V/U_{p-p} = 560 V

C (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER[1]
			LOOSE IN BOX
			l_t = 4.0 +1.0/–0.5 mm
			C-tol = ±5%
Pitch = 10.0 ±0.4 mm; d_t = 0.60 ±0.06 mm			
0.022	4.0 × 10.0 × 12.5	0.6	2222 379 54**223**
0.024			2222 379 54**243**
0.027			2222 379 54**273**
0.03			2222 379 54**303**
0.033			2222 379 54**333**
0.036	5.0 × 11.0 × 12.5	0.85	2222 379 54**363**
0.039			2222 379 54**393**
0.043			2222 379 54**433**

Note

1. The shading indicates preferred types.

Available on request

PITCH	d_t	CAPACITANCE RANGE (µF)[1]
U_{Rdc} = 400 V; U_{Rac} = 200 V/U_{p-p} = 560 V		
7.5 ±0.4 mm	0.60 ±0.06 mm	0.0075 to 0.039

Note

1. E24 series.

AC and pulse metallized polypropylene film capacitors

MKP 379

MKP 379 GENERAL DATA

PITCH 15/22.5/27.5 mm

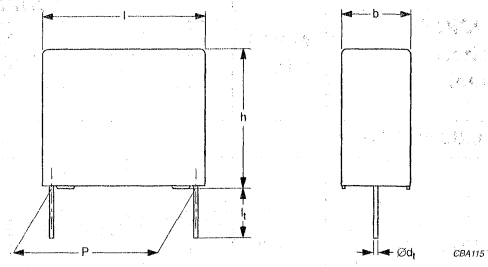


Fig.14 Outline.

Specific reference data for the 400 V DC capacitors (pitch > 10 mm)

DESCRIPTION	VALUE		DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz		at 10 kHz	at 100 kHz
Tangent of loss angle:			Tangent of loss angle:		
0.047 µF ≤ C ≤ 0.075 µF	$\leq 5 \times 10^{-4}$	$\leq 20 \times 10^{-4}$	0.82 µF < C ≤ 0.91 µF	$\leq 10 \times 10^{-4}$	$\leq 60 \times 10^{-4}$
0.075 µF < C ≤ 0.11 µF	$\leq 5 \times 10^{-4}$	$\leq 25 \times 10^{-4}$	0.91 µF < C ≤ 1.0 µF	$\leq 10 \times 10^{-4}$	$\leq 65 \times 10^{-4}$
0.11 µF < C ≤ 0.18 µF	$\leq 10 \times 10^{-4}$	$\leq 30 \times 10^{-4}$	1.0 µF < C ≤ 1.2 µF	$\leq 10 \times 10^{-4}$	$\leq 70 \times 10^{-4}$
0.18 µF < C ≤ 0.3 µF	$\leq 10 \times 10^{-4}$	$\leq 35 \times 10^{-4}$	1.2 µF < C ≤ 1.3 µF	$\leq 10 \times 10^{-4}$	$\leq 75 \times 10^{-4}$
0.3 µF < C ≤ 0.39 µF	$\leq 10 \times 10^{-4}$	$\leq 40 \times 10^{-4}$	1.3 µF < C ≤ 1.5 µF	$\leq 10 \times 10^{-4}$	$\leq 80 \times 10^{-4}$
0.39 µF < C ≤ 0.56 µF	$\leq 10 \times 10^{-4}$	$\leq 45 \times 10^{-4}$	1.5 µF < C ≤ 1.6 µF	$\leq 10 \times 10^{-4}$	$\leq 85 \times 10^{-4}$
0.56 µF < C ≤ 0.68 µF	$\leq 10 \times 10^{-4}$	$\leq 50 \times 10^{-4}$	1.6 µF < C ≤ 1.8 µF	$\leq 10 \times 10^{-4}$	$\leq 90 \times 10^{-4}$
0.68 µF < C ≤ 0.82 µF	$\leq 10 \times 10^{-4}$	$\leq 55 \times 10^{-4}$	1.8 µF < C ≤ 2.0 µF	$\leq 10 \times 10^{-4}$	$\leq 95 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 400 V (DC):			Rated voltage pulse slope $(dU/dt)_R$ at 400 V (DC):		
l = 17.5 mm	70 V/µs		l = 31.0 mm	25 V/µs (b < 15 mm)	
l = 26.0 mm	35 V/µs		l = 31.0 mm	13 V/µs (b ≥ 15 mm)	
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 interconnected leads and case; 100 V; 1 minute	>100000 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	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 379 54...	preferred
Taped on reel	H = 18.5 mm; note 2	±5%	2222 379 55...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*; taped on reel pitch = 27.5 mm is not available.
2. H = in-tape height for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse metallized polypropylene film capacitors

MKP 379

U_{Rdc} = 400 V; U_{Rac} = 200 V/U_{p-p} = 560 V

C (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER[1] LOOSE IN BOX l_t = 3.5 ±0.3 mm C-tol = ±5%
Pitch = 15.0 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.047	5.0 × 11.0 × 17.5	1.2	2222 379 54**473**
0.051			2222 379 54**513**
0.056			2222 379 54**563**
0.062			2222 379 54**623**
0.068			2222 379 54**683**
0.075			2222 379 54**753**
0.082			2222 379 54**823**
0.091	6.0 × 12.0 × 17.5	1.4	2222 379 54**913**
0.1			2222 379 54**104**
0.11			2222 379 54**114**
0.12			2222 379 54**124**
0.13	7.0 × 13.5 × 17.5	1.9	2222 379 54**134**
0.15			2222 379 54**154**
0.16			2222 379 54**164**
0.18	8.5 × 15.0 × 17.5	2.6	2222 379 54**184**
0.2			2222 379 54**204**
0.22			2222 379 54**224**
Pitch = 22.5 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.24	7.0 × 16.5 × 26.0	3.2	2222 379 54**244**
0.27			2222 379 54**274**
0.3			2222 379 54**304**
0.33	8.5 × 18.0 × 26.0	4.4	2222 379 54**334**
0.36			2222 379 54**364**
0.39			2222 379 54**394**
0.43			2222 379 54**434**
0.47			2222 379 54**474**
0.51	10.0 × 19.5 × 26.0	5.5	2222 379 54**514**
0.56			2222 379 54**564**
0.62			2222 379 54**624**
Pitch = 27.5 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.68	11.0 × 21.0 × 31.0	7.8	2222 379 54**684**
0.75			2222 379 54**754**
0.82			2222 379 54**824**
0.91	13.0 × 23.0 × 31.0	10.4	2222 379 54**914**
1			2222 379 54**105**
1.1			2222 379 54**115**
1.2	15.0 × 25.0 × 31.0	12.8	2222 379 54**125**
1.3			2222 379 54**135**
1.5			2222 379 54**155**
1.6	18.0 × 28.0 × 31.0	17.2	2222 379 54**165**
1.8			2222 379 54**185**
2			2222 379 54**205**

Note

1. The shading indicates preferred types.

AC and pulse metallized polypropylene film capacitors

MKP 379

MKP 379 GENERAL DATA

PITCH 10 mm

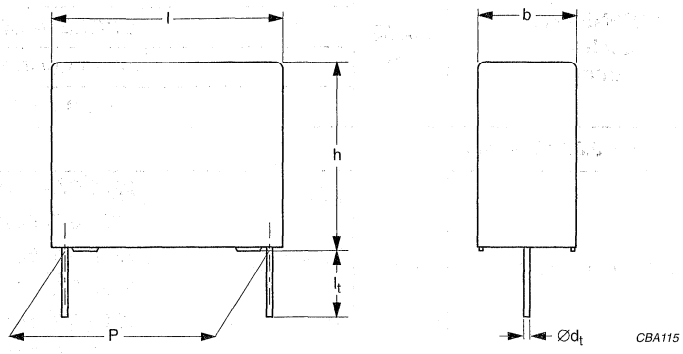


Fig.15 Outline.

Specific reference data for the 630 V DC capacitors (pitch = 10 mm)

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle: 0.01 μF ≤ C ≤ 0.024 μF	$\leq 5 \times 10^{-4}$	$\leq 15 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 500 V (DC)	100 V/μs	
R between leads for C ≤ 1.0 μF at 100 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	960 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 = 4.0 +1/−0.5 mm	±5%	2222 379 64...	preferred
Taped on reel	H = 18.5 mm; note 2	±5%	2222 379 65...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*.
2. H = in-tape height for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse metallized polypropylene film capacitors

MKP 379

U_{Rdc} = 630 V; U_{Rac} = 220 V/U_{p-p} = 620 V

C (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER[1] LOOSE IN BOX l_t = 4.0 +1.0/–0.5 mm C-tol = ±5%
Pitch = 10.0 ±0.4 mm; d_t = 0.60 ±0.06 mm			
0.01	4.0 × 10.0 × 12.5	0.6	2222 379 64**103**
0.011			2222 379 64**113**
0.012			2222 379 64**123**
0.013			2222 379 64**133**
0.015			2222 379 64**153**
0.016			2222 379 64**163**
0.018	5.0 × 11.0 × 12.5	0.85	2222 379 64**183**
0.02			2222 379 64**203**
0.022			2222 379 64**223**
0.024			2222 379 64**243**

Note

1. The shading indicates preferred types.

Available on request

PITCH	d_t	CAPACITANCE RANGE (µF)[1]
U_{Rdc} = 630 V; U_{Rac} = 220 V/U_{p-p} = 620 V		
7.5 ±0.4 mm	0.60 ±0.06 mm	0.0033 to 0.022

Note

1. E24 series.

AC and pulse metallized polypropylene film capacitors

MKP 379

MKP 379 GENERAL DATA

PITCH 15/22.5/27.5 mm

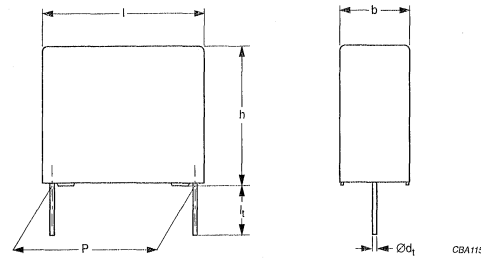


Fig.16 Outline.

Specific reference data for the 630 V DC capacitors (pitch > 10 mm)

DESCRIPTION	VALUE		DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz		at 10 kHz	at 100 kHz
Tangent of loss angle:			Tangent of loss angle:		
$C \leq 0.027\ \mu F$	$\leq 5 \times 10^{-4}$	$\leq 15 \times 10^{-4}$	$0.3\ \mu F < C \leq 0.39\ \mu F$	$\leq 10 \times 10^{-4}$	$\leq 40 \times 10^{-4}$
$0.027\ \mu F < C \leq 0.075\ \mu F$	$\leq 5 \times 10^{-4}$	$\leq 20 \times 10^{-4}$	$0.39\ \mu F < C \leq 0.56\ \mu F$	$\leq 10 \times 10^{-4}$	$\leq 45 \times 10^{-4}$
$0.075\ \mu F < C \leq 0.11\ \mu F$	$\leq 5 \times 10^{-4}$	$\leq 25 \times 10^{-4}$	$0.56\ \mu F < C \leq 0.68\ \mu F$	$\leq 10 \times 10^{-4}$	$\leq 50 \times 10^{-4}$
$0.11\ \mu F < C \leq 0.18\ \mu F$	$\leq 10 \times 10^{-4}$	$\leq 30 \times 10^{-4}$	$0.68\ \mu F < C \leq 0.82\ \mu F$	$\leq 10 \times 10^{-4}$	$\leq 55 \times 10^{-4}$
$0.18\ \mu F < C \leq 0.3\ \mu F$	$\leq 10 \times 10^{-4}$	$\leq 35 \times 10^{-4}$	$0.82\ \mu F < C \leq 1.0\ \mu F$	$\leq 10 \times 10^{-4}$	$\leq 60 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 630 V (DC):			Rated voltage pulse slope $(dU/dt)_R$ at 630 V (DC):		
l = 17.5 mm	90 V/µs		l = 31.0 mm	30 V/µs (b < 15 mm)	
l = 26.0 mm	45 V/µs		l = 31.0 mm	15 V/µs (b ≥ 15 mm)	
R between leads, for $C \leq 1\ \mu F$ at 500 V; 1 minute			>100000 MΩ		
RC between leads, for $C > 1\ \mu F$ at 500 V; 1 minute			>100000 s		
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			960 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	$l_t = 3.5 \pm 0.3$ mm	±5%	2222 379 64...	preferred
Taped on reel	H = 18.5 mm; note 2	±5%	2222 379 65...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*; taped on reel pitch = 27.5 mm is not available.
2. H = in-tape height for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse metallized polypropylene film capacitors

MKP 379

U_{Rdc} = 630 V; U_{Rac} = 250 V/U_{p-p} = 700 V; see note 1

C (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER(2) LOOSE IN BOX l_t = 3.5 ±0.3 mm C-tol = ±5%
Pitch = 15.0 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.027	5.0 × 11.0 × 17.5	1.2	2222 379 64**273**
0.03			2222 379 64**303**
0.033			2222 379 64**333**
0.036			2222 379 64**363**
0.039			2222 379 64**393**
0.043	6.0 × 12.0 × 17.5	1.4	2222 379 64**433**
0.047			2222 379 64**473**
0.051			2222 379 64**513**
0.056			2222 379 64**563**
0.062			2222 379 64**623**
0.068	7.0 × 13.5 × 17.5	1.9	2222 379 64**683**
0.075			2222 379 64**753**
0.082			2222 379 64**823**
0.091	8.5 × 15.0 × 17.5	2.6	2222 379 64**913**
0.1			2222 379 64**104**
0.11			2222 379 64**114**
Pitch = 22.5 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.12	7.0 × 16.5 × 26.0	3.2	2222 379 64**124**
0.13			2222 379 64**134**
0.15			2222 379 64**154**
0.16			2222 379 64**164**
0.18	8.5 × 18.0 × 26.0	4.4	2222 379 64**184**
0.2			2222 379 64**204**
0.22			2222 379 64**224**
0.24	10.0 × 19.5 × 26.0	5.5	2222 379 64**244**
0.27			2222 379 64**274**
0.3			2222 379 64**304**
Pitch = 27.5 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.33	11.0 × 21.0 × 31.0	7.8	2222 379 64**334**
0.36			2222 379 64**364**
0.39			2222 379 64**394**
0.43			2222 379 64**434**
0.47	13.0 × 23.0 × 31.0	10.4	2222 379 64**474**
0.51			2222 379 64**514**
0.56			2222 379 64**564**
0.62	15.0 × 25.0 × 31.0	12.8	2222 379 64**624**
0.68			2222 379 64**684**
0.75			2222 379 64**754**
0.82	18.0 × 28.0 × 31.0	17.2	2222 379 64**824**
0.91			2222 379 64**914**
1			2222 379 64**105**

Notes

1. U_{Rac} = 220 V/U_{p-p} = 620 V for C ≤ 0.11 µF.
2. The shading indicates preferred types.

AC and pulse metallized polypropylene film capacitors

KP/MMKP 376

KP/MMKP RADIAL POTTED TYPE **PITCH 15/22.5/27.5 mm**

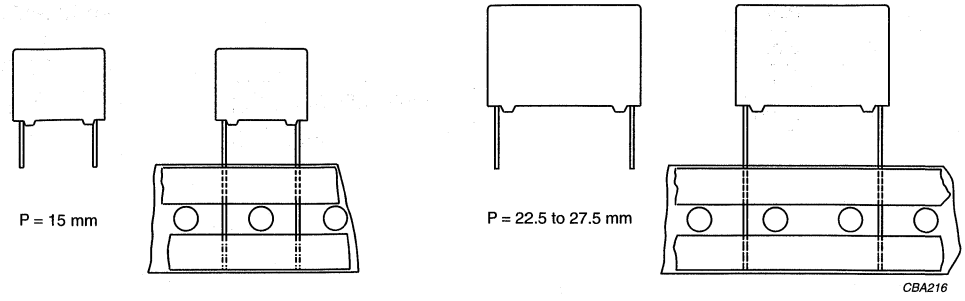


Fig.1 Simplified outlines.

FEATURES

- 15 to 27.5 mm lead pitch
- Supplied loose in box and taped on reel.

APPLICATIONS

- Where high currents and steep pulses occur
- For deflection circuits in television receivers.

DETAIL SPECIFICATION

For more detailed data and test requirements see *"Type detail specification HQN-384-17/101"*.

QUICK REFERENCE DATA

DESCRIPTION	VALUE
Capacitance range (E24 series)	0.001 to 0.27 μF
Capacitance tolerance	±5%; ±3.5%
Rated (DC) voltage	630 V; 1000 V; 1600 V; 2000 V
Rated (AC) voltage	300 V; 400 V; 500 V; 600 V
Rated peak-to-peak voltage	850 V; 1100 V; 1400 V; 1700 V
Climatic category	55/100/56
Maximum application temperature	100 °C
Rated temperature	85 °C
Reference specification	IEC 60384-17
Performance grade: for $C > 4.7$ nF for $C \leq 4.7$ nF	 grade 1 (long life) grade 2 (general purpose)
Stability grade	grade 2

AC and pulse metallized polypropylene film capacitors

KP/MMKP 376

COMPOSITION OF CATALOGUE NUMBER

TYPE AND PITCHES	
376	15.0 mm
	22.5 mm
	27.5 mm

CAPACITANCE (numerically)

MULTIPLIER (nF)	
0.1	2
1	3
10	4

Example:
104 = 10 × 10 = 100 nF

2222	376	XX	XX	X

TYPE	PACKAGING	LEAD CONFIGURATION	C-TOL	630 V	1000 V	1600 V	2200 V
376	loose in box	lead length 5.0 mm	±5%	62	72	82	92
			±3.5%	63	73	83	93
		lead length 3.5 mm	±5%	68	78	88	98
			±3.5%	69	79	89	99
	taped on reel	H = 18.5 mm; P_0 = 12.7 mm	±5%	65	75	85	95
			±3.5%	66	76	86	96

AC and pulse metallized polypropylene film capacitors

KP/MMKP 376

KP/MMKP 376 GENERAL DATA

PITCH 15/22.5/27.5 mm

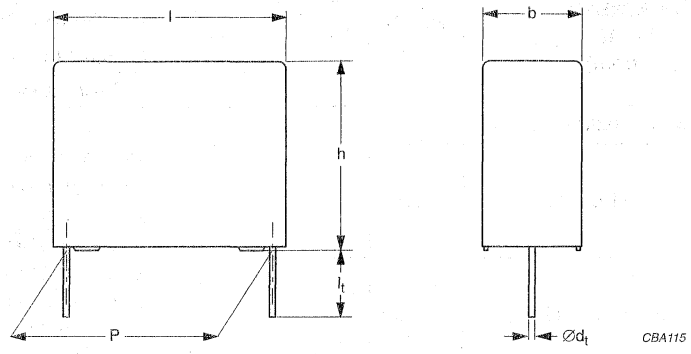


Fig.3 Outline.

Specific reference data for the 630 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
P = 15.0 mm	$\leq 3 \times 10^{-4}$	$\leq 10 \times 10^{-4}$
P = 22.5 mm	$\leq 3 \times 10^{-4}$	$\leq 15 \times 10^{-4}$
P = 27.5 mm	$\leq 4 \times 10^{-4}$	$\leq 20 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 630 V (DC):		
P = 15.0 mm	4000 V/µs	
P = 22.5 mm	1400 V/µs	
P = 27.5 mm	900 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

PACKAGING[1]	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	l_t = 5.0 ±1.0 mm	±5%	2222 376 62...	on request
		±3.5%	2222 376 63...	on request
	l_t = 3.5 ±0.3 mm	±5%	2222 376 68...	on request
		±3.5%	2222 376 69...	on request
Taped on reel	H = 18.5 mm; note 2	±5%	2222 376 65...	on request
		±3.5%	2222 376 66...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*; taped on reel pitch = 27.5 mm is not available.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse metallized polypropylene film capacitors

KP/MMKP 376

U_{Rdc} = 630 V; U_{Rac} = 300 V/U_{p-p} = 850 V

C (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER LOOSE IN BOX l_t = 5.0 ±1.0 mm C-tol = ±5%
Pitch = 15.0 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.0068	5.0 × 11.0 × 17.5	1.1	2222 376 62**682**
0.0075			2222 376 62**752**
0.0082			2222 376 62**822**
0.0091			2222 376 62**912**
0.01	6.0 × 12.0 × 17.5	1.5	2222 376 62**103**
0.011			2222 376 62**113**
0.012			2222 376 62**123**
0.013			2222 376 62**133**
0.015	7.0 × 13.5 × 17.5	2.0	2222 376 62**153**
0.016			2222 376 62**163**
0.018			2222 376 62**183**
0.02	8.5 × 15.0 × 17.5	2.6	2222 376 62**203**
0.022			2222 376 62**223**
Pitch = 22.5 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.024	6.0 × 15.5 × 26.0	2.8	2222 376 62**243**
0.027			2222 376 62**273**
0.03			2222 376 62**303**
0.033	7.0 × 16.5 × 26.0	3.5	2222 376 62**333**
0.036			2222 376 62**363**
0.039			2222 376 62**393**
0.043	8.5 × 18.0 × 26.0	4.5	2222 376 62**433**
0.047		4.5	2222 376 62**473**
0.051		4.5	2222 376 62**513**
0.056		5.1	2222 376 62**563**
Pitch = 27.5 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.062	9.0 × 19.0 × 31.0	6.2	2222 376 62**623**
0.068			2222 376 62**683**
0.075			2222 376 62**753**
0.082	11.0 × 21.0 × 31.0	8.3	2222 376 62**823**
0.091			2222 376 62**913**
0.1			2222 376 62**104**
0.11			2222 376 62**114**
0.12	13.0 × 23.0 × 31.0	10.8	2222 376 62**124**
0.13			2222 376 62**134**
0.15			2222 376 62**154**
0.16			2222 376 62**164**
0.18	15.0 × 25.0 × 31.0	13.0	2222 376 62**184**
0.2			2222 376 62**204**
0.22	18.0 × 28.0 × 31.0	19.0	2222 376 62**224**
0.24			2222 376 62**244**
0.27			2222 376 62**274**

AC and pulse metallized polypropylene film capacitors

KP/MMKP 376

KP/MMKP 376 GENERAL DATA

PITCH 15/22.5/27.5 mm

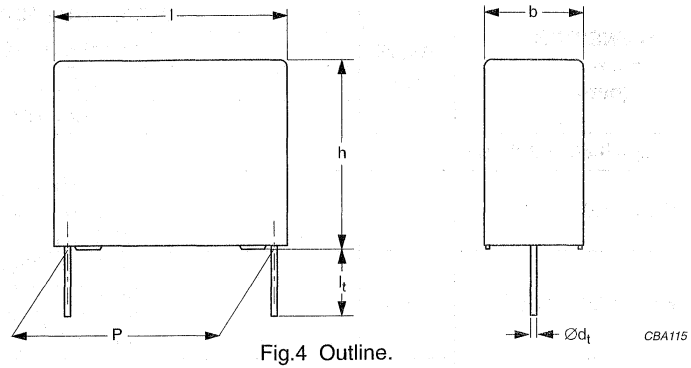


Fig.4 Outline.

Specific reference data for the 1000 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
P = 15.0 mm	$\leq 3 \times 10^{-4}$	$\leq 10 \times 10^{-4}$
P = 22.5 mm	$\leq 3 \times 10^{-4}$	$\leq 10 \times 10^{-4}$
P = 27.5 mm	$\leq 3 \times 10^{-4}$	$\leq 15 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 1000 V (DC):		
P = 15.0 mm	7000 V/µs	
P = 22.5 mm	2500 V/µs	
P = 27.5 mm	1600 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	1600 V; 1 minute	
for C > 47 nF	$[1.6 - (0.0364 \times \sqrt{C - 47})] \times 1000$ 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 ±1.0 mm	±5%	2222 376 72...	on request
		±3.5%	2222 376 73...	on request
	l_t = 3.5 ±0.3 mm	±5%	2222 376 78...	on request
		±3.5%	2222 376 79...	on request
Taped on reel	H = 18.5 mm; note 2	±5%	2222 376 75...	on request
		±3.5%	2222 376 76...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*; taped on reel pitch = 27.5 mm is not available.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse metallized polypropylene film capacitors

KP/MMKP 376

U_{Rdc} = 1000 V; U_{Rac} = 400 V/U_{p-p} = 1100 V

C (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER LOOSE IN BOX l_t = 5.0 ±1.0 mm C-tol = ±5%
Pitch = 15.0 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.0047	5.0 × 11.0 × 17.5	1.1	2222 376 72**472**
0.0051			2222 376 72**512**
0.0056			2222 376 72**562**
0.0062	6.0 × 12.0 × 17.5	1.5	2222 376 72**622**
0.0068			2222 376 72**682**
0.0075			2222 376 72**752**
0.0082			2222 376 72**822**
0.0091	7.0 × 13.5 × 17.5	2.0	2222 376 72**912**
0.01			2222 376 72**103**
0.011			2222 376 72**113**
0.012			2222 376 72**123**
Pitch = 22.5 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.013	6.0 × 15.5 × 26.0	2.8	2222 376 72**133**
0.015	7.0 × 16.5 × 26.0	3.5	2222 376 72**153**
0.016			2222 376 72**163**
0.018			2222 376 72**183**
0.02	8.5 × 18.0 × 26.0	4.5	2222 376 72**203**
0.022			2222 376 72**223**
0.024			2222 376 72**243**
0.027			2222 376 72**273**
0.03			2222 376 72**303**
0.033			2222 376 72**333**
0.036			2222 376 72**363**
0.039	10.0 × 19.5 × 26.0	5.4	2222 376 72**393**
Pitch = 27.5 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.043	9.0 × 19.0 × 31.0	6.2	2222 376 72**433**
0.047			2222 376 72**473**
0.051			2222 376 72**513**
0.056	11.0 × 21.0 × 31.0	8.3	2222 376 72**563**
0.062			2222 376 72**623**
0.068			2222 376 72**683**
0.075			2222 376 72**753**
0.082	13.0 × 23.0 × 31.0	10.8	2222 376 72**823**
0.091			2222 376 72**913**
0.1			2222 376 72**104**
0.11	15.0 × 25.0 × 31.0	13.0	2222 376 72**114**
0.12			2222 376 72**124**
0.13			2222 376 72**134**
0.15			2222 376 72**154**
0.16	18.0 × 28.0 × 31.0	19.0	2222 376 72**164**
0.18			2222 376 72**184**

AC and pulse metallized polypropylene film capacitors

KP/MMKP 376

KP/MMKP 376 GENERAL DATA

PITCH 15/22.5/27.5 mm

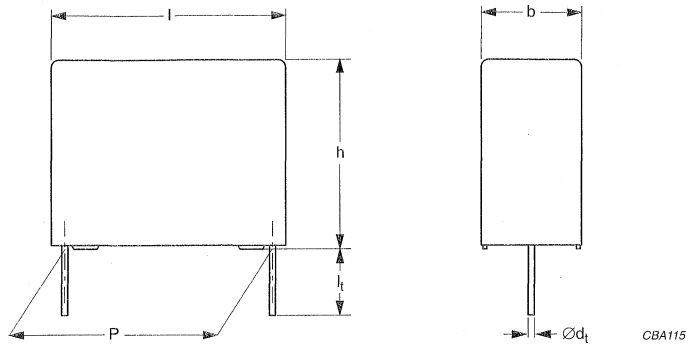


Fig.5 Outline.

Specific reference data for the 1600 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
P = 15.0 mm	$\leq 3 \times 10^{-4}$	$\leq 10 \times 10^{-4}$
P = 22.5 mm	$\leq 3 \times 10^{-4}$	$\leq 10 \times 10^{-4}$
P = 27.5 mm	$\leq 3 \times 10^{-4}$	$\leq 15 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 1600 V (DC):		
P = 15.0 mm	10000 V/µs	
P = 22.5 mm	3500 V/µs	
P = 27.5 mm	2300 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

PACKAGING(1)	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	l_t = 5.0 ±1.0 mm	±5%	2222 376 82...	on request
		±3.5%	2222 376 83...	on request
	l_t = 3.5 ±0.3 mm	±5%	2222 376 88...	on request
		±3.5%	2222 376 89...	on request
Taped on reel	H = 18.5 mm; note 2	±5%	2222 376 85...	on request
		±3.5%	2222 376 86...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*; taped on reel pitch = 27.5 mm is not available.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse metallized polypropylene film capacitors

KP/MMKP 376

U_{Rdc} = 1600 V; U_{Rac} = 500 V/U_{p-p} = 1400 V

C (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER LOOSE IN BOX l_t = 5.0 ±1.0 mm C-tol = ±5%
Pitch = 15.0 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.0018	5.0 × 11.0 × 17.5	1.1	2222 376 82**182**
0.002	6.0 × 12.0 × 17.5	1.5	2222 376 82**202**
0.0022			2222 376 82**222**
0.0024			2222 376 82**242**
0.0027	7.0 × 13.5 × 17.5	2.0	2222 376 82**272**
0.003			2222 376 82**302**
0.0033			2222 376 82**332**
0.0036	8.5 × 15.0 × 17.5	2.6	2222 376 82**362**
0.0039			2222 376 82**392**
0.0043			2222 376 82**432**
0.0047			2222 376 82**472**
Pitch = 22.5 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.0051	6.0 × 15.5 × 26.0	2.8	2222 376 82**512**
0.0056			2222 376 82**562**
0.0062			2222 376 82**622**
0.0068			2222 376 82**682**
0.0075	7.0 × 16.5 × 26.0	3.5	2222 376 82**752**
0.0082			2222 376 82**822**
0.0091			2222 376 82**912**
0.01	8.5 × 18.0 × 26.0	4.5	2222 376 82**103**
0.011			2222 376 82**113**
0.012			2222 376 82**123**
0.013			2222 376 82**133**
0.015	10.0 × 19.5 × 26.0	5.4	2222 376 82**153**
Pitch = 27.5 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.016	9.0 × 19.0 × 31.0	6.2	2222 376 82**163**
0.018	11.0 × 21.0 × 31.0	7.4	2222 376 82**183**
0.02			2222 376 82**203**
0.022			2222 376 82**223**
0.024			2222 376 82**243**
0.027	13.0 × 23.0 × 31.0	10.2	2222 376 82**273**
0.03			2222 376 82**303**
0.033			2222 376 82**333**
0.036			2222 376 82**363**
0.039	15.0 × 25.0 × 31.0	13.0	2222 376 82**393**
0.043			2222 376 82**433**
0.047			2222 376 82**473**
0.051	18.0 × 28.0 × 31.0	19.0	2222 376 82**513**
0.056			2222 376 82**563**

AC and pulse metallized polypropylene film capacitors

KP/MMKP 376

KP/MMKP 376 GENERAL DATA

PITCH 15/22.5/27.5 mm

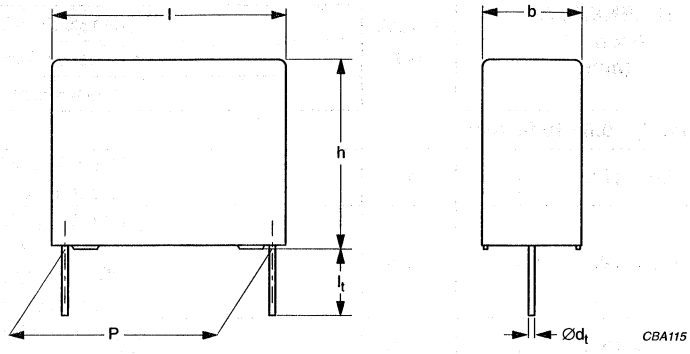


Fig.6 Outline.

Specific reference data for the 2000 V DC capacitors

DESCRIPTION	VALUE	
	at 10 kHz	at 100 kHz
Tangent of loss angle:		
P = 15.0 mm	$\leq 3 \times 10^{-4}$	$\leq 10 \times 10^{-4}$
P = 22.5 mm	$\leq 3 \times 10^{-4}$	$\leq 10 \times 10^{-4}$
P = 27.5 mm	$\leq 3 \times 10^{-4}$	$\leq 15 \times 10^{-4}$
Rated voltage pulse slope $(dU/dt)_R$ at 2000 V (DC):		
P = 15.0 mm	15000 V/µs	
P = 22.5 mm	5000 V/µs	
P = 27.5 mm	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 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(1)	DIMENSIONS	C-tol	FIRST 9 DIGITS OF CATALOGUE NUMBER	ORDERING
Loose in box	l_t = 5.0 ±1.0 mm	±5%	2222 376 92...	on request
		±3.5%	2222 376 93...	on request
	l_t = 3.5 ±0.3 mm	±5%	2222 376 98...	on request
		±3.5%	2222 376 99...	on request
Taped on reel	H = 18.5 mm; note 2	±5%	2222 376 95...	on request
		±3.5%	2222 376 96...	on request

Notes

1. For SPQ refer to this handbook, chapter *"Packaging information"*; taped on reel pitch = 27.5 mm is not available.
2. H = in-tape height; for detailed specifications refer to this handbook, chapter *"Packaging information"*.

AC and pulse metallized polypropylene film capacitors

KP/MMKP 376

U_{Rdc} = 2000 V; U_{Rac} = 600 V/U_{p-p} = 1700 V

C (µF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER LOOSE IN BOX l_t = 5.0 ±1.0 mm C-tol = ±5%
Pitch = 15.0 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.001	5.0 × 11.0 × 17.5	1.1	2222 376 92**102**
0.0011			2222 376 92**112**
0.0012	6.0 × 12.0 × 17.5	1.5	2222 376 92**122**
0.0013			2222 376 92**132**
0.0015			2222 376 92**152**
0.0016			2222 376 92**162**
0.0018	7.0 × 13.5 × 17.5	2.0	2222 376 92**182**
0.002			2222 376 92**202**
0.0022	8.5 × 15.0 × 17.5	2.6	2222 376 92**222**
0.0024			2222 376 92**242**
0.0027			2222 376 92**272**
0.003			2222 376 92**302**
Pitch = 22.5 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.0033	6.0 × 15.5 × 26.0	2.8	2222 376 92**332**
0.0036			2222 376 92**362**
0.0039			2222 376 92**392**
0.0043	7.0 × 16.5 × 26.0	3.5	2222 376 92**432**
0.0047			2222 376 92**472**
0.0051			2222 376 92**512**
0.0056	8.5 × 18.0 × 26.0	4.5	2222 376 92**562**
0.0062			2222 376 92**622**
0.0068			2222 376 92**682**
0.0075			2222 376 92**752**
0.0082			2222 376 92**822**
0.0091	10.0 × 19.5 × 26.0	5.4	2222 376 92**912**
0.01			2222 376 92**103**
Pitch = 27.5 ±0.4 mm; d_t = 0.80 ±0.08 mm			
0.011	11.0 × 21.0 × 31.0	7.4	2222 376 92**113**
0.012			2222 376 92**123**
0.013			2222 376 92**133**
0.015			2222 376 92**153**
0.016	13.0 × 23.0 × 31.0	10.2	2222 376 92**163**
0.018			2222 376 92**183**
0.02			2222 376 92**203**
0.022			2222 376 92**223**
0.024	15.0 × 25.0 × 31.0	13.0	2222 376 92**243**
0.027			2222 376 92**273**
0.03	18.0 × 28.0 × 31.0	19.0	2222 376 92**303**
0.033			2222 376 92**333**

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Data handbook system

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According to *"IEC publication 60063"*.

E192	E96	E48	E192	E96	E48	E192	E96	E48	E192	E96	E48
100	100	100	178	178	178	316	316	316	562	562	562
101			180			320			569		
102	102		182	182		324	324		576	576	
104			184			328			583		
105	105	105	187	187	187	332	332	332	590	590	590
106			189			336			597		
107	107		191	191		340	340		604	604	
109			193			344			612		
110	110	110	196	196	196	348	348	348	619	619	619
111			198			352			626		
113	113		200	200		357	357		634	634	
114			203			361			642		
115	115	115	205	205	205	365	365	365	649	649	649
117			208			370			657		
118	118		210	210		374	374		665	665	
120			213			379			673		
121	121	121	215	215	215	383	383	383	681	681	681
123			218			388			690		
124	124		221	221		392	392		698	698	
126			223			397			706		
127	127	127	226	226	226	402	402	402	715	715	715
129			229			407			723		
130	130		232	232		412	412		732	732	
132			234			417			741		
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		

E24	E12	E6	E3
10	10	10	10
11			
12	12		
13			
15	15	15	
16			
18	18		
20			
22	22	22	22
24			
27	27		
30			
33	33	33	
36			
39	39		
43			
47	47	47	47
51			
56	56		
62			
68	68	68	
75			
82	82		
91			

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BEIJING, Tel. +86 10 6507 3366/3071, Fax. +86 10 6507 1539
GUANGDONG, Tel. +86 752 3355 373, Fax. +86 752 3356 842
SHANGHAI, Tel. +86 21 6354 1088, Fax. +86 21 6354 6545

Denmark: Philips Components, COPENHAGEN,
Tel. +45 3329 3333, Fax. +45 3329 3905

Finland: Philips Components, ESPOO,
Tel. +358 9 6158 0000, Fax. +358 9 6158 0920

France: BC Components S.A.S., SURESNES,
Tel. +33 1 4099 6161, Fax. +33 1 4099 6493

Germany: BC Components Vertriebs-GmbH, HAMBURG,
Tel. +49 40 2489 0, Fax. +49 40 2489 1400

Hong Kong: BC Components Hong Kong Ltd., KOWLOON BAY,
Tel. +852 2753 3542, Fax. +852 2799 0525

India: Philips India Ltd., NEAR PUNE,
Tel. +91 20 813 157, Fax. +91 20 813 741

Indonesia: BC Components Singapore Pte Ltd., SINGAPORE,
Tel. +65 483 8300, Fax. +65 482 5521

Israel: Rapac Electronics Ltd., TEL AVIV,
Tel. +972 3 6450 444, Fax. +972 3 6491 007

Italy: Philips Components S.p.A., MILANO,
Tel. +39 02 6752 2231, Fax. +39 02 6752 2430

Japan: Philips Japan Ltd., TOKYO,
Tel. +81 3 3740 5143, Fax. +81 3 3740 5035

Korea (Republic of): Philips Electronics (Korea) Ltd., SEOUL,
Tel. +82 2 709 1478, Fax. +82 2 709 1480

Malaysia: BC Components, SLANGOR,
Tel. +03 432 3763, Fax. +03 432 3265

New Zealand: Philips New Zealand Ltd., AUCKLAND,
Tel. +64 9 815 4000, Fax. +64 9 849 7811

Norway: Philips Components, STOCKHOLM,
Tel. +46 8 5985 2000, Fax. +46 8 5985 2745

Poland: BC Components Vertriebs-GmbH, HAMBURG,
Tel. +49 40 2489 0, Fax. +49 40 2489 1400

Portugal: Philips Iberica S.A., BARCELONA,
Tel. +34 93 301 6312, Fax. +34 93 301 4208

Russia: BC Components Vertriebs-GmbH, HAMBURG,
Tel. +49 40 2489 0, Fax. +49 40 2489 1400

Singapore: BC Components Singapore Pte Ltd., SINGAPORE,
Tel. +65 483 8300, Fax. +65 482 5521

Spain: Philips Iberica S.A., BARCELONA,
Tel. +34 93 301 6312, Fax. +34 93 301 4208

Sweden: Philips Components, STOCKHOLM,
Tel. +46 8 5985 2000, Fax. +46 8 5985 2745

Switzerland: BC Components Vertriebs-GmbH, HAMBURG,
Tel. +49 40 2489 0, Fax. +49 40 2489 1400

Taiwan: BC Components Taiwan Ltd., CHUNGLI,
Tel. +886 3 4379 766, Fax. +886 3 4379 715/771

Thailand: BC Components, BANGKOK,
Tel. +662 361 2057, Fax. +662 361 2081

Turkey: Türk Philips Ticaret A.S., DUDULLU/ISTANBUL,
Tel. +90 216 522 1795, Fax. +90 216 522 1814

United Kingdom: BC Components UK Ltd., DORKING,
Tel. +44 1306 512 018, Fax. +44 1306 512 352

United States: BC Components Inc., SAN JOSE, CA,
Tel. +1 408 570 5600, Fax. +1 408 544 9522

For all other countries apply to:
BC Components, P.O. Box 8777,
5605 LT EINDHOVEN, The Netherlands,
Fax. +31 40 27 83 152

For the most recent contact details please visit our internet site:
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