

DATA SHEET

MKP 336 6

**Interference suppression film
capacitors**

Product specification
Supersedes data of April 1999
File under BCcomponents, BC05

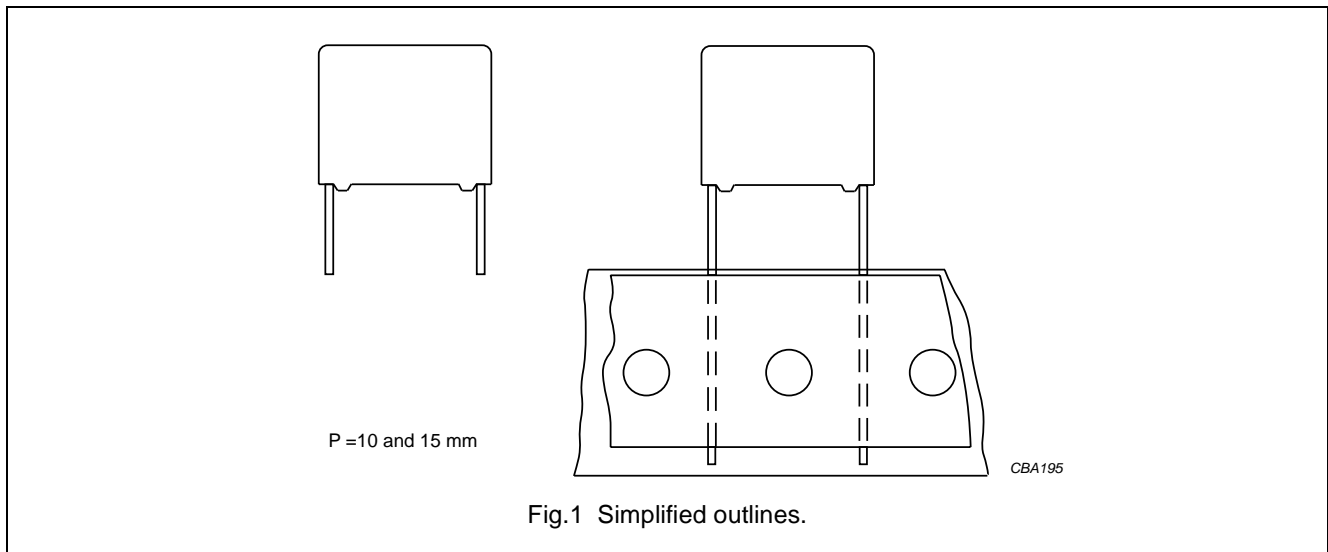
2000 Aug 31

Interference suppression film capacitors

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MKP RADIAL POTTED TYPE

PITCH 10/15 mm



FEATURES

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

APPLICATIONS

- For Y2-electromagnetic interference suppression
- Specially designed to meet the 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/B
Rated temperature	100 °C
Maximum application temperature	100 °C
Reference specifications	IEC 60384-14 2 nd edition and EN 132400
Safety approvals	UL1414; UL1283; CSA-C22.2 No 1; SEV; VDE; ÖVE; note 2 CCEE; note 1
Materials	qualified in accordance with UL94 V-0
Safety class	Y2








Notes

1. Pending.
2. Approved.

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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	1 nF to 47 nF	LR 94054
	SEV (EN132400)	1 nF to 47 nF	99.7 70456.01
	VDE (EN132400)	1 nF to 47 nF	83620
	ÖVE (EN132400)	1 nF to 47 nF	E 260-007
	CCEE	1 nF to 47 nF	pending

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COMPOSITION OF CATALOGUE NUMBER

TYPE AND PITCHES	
336 6	10.0 mm
Y2	15.0 mm

MULTIPLIER (nF)	
0.1	2
1	3

CAPACITANCE (numerically)

Example:
103 = 10 x 1 = 10 nF

2222 336 6X XX X

TYPE	PACKAGING ⁽¹⁾	LEAD CONFIGURATION	C-TOL	PREFERRED TYPES	
336 6 Y2	loose in box	lead length 3.5 mm	±20%	2222 336 60...	
		lead length 25.0 mm		2222 336 66...	
				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

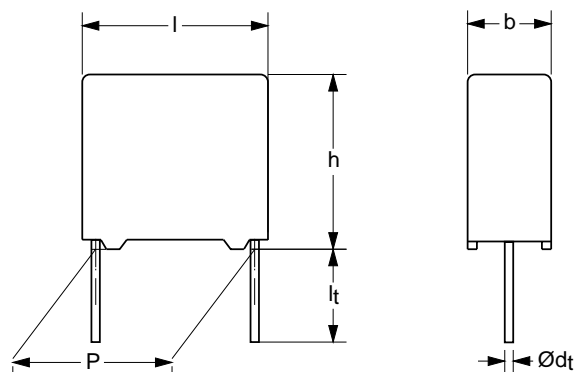
- 1) For SPQ refer to this handbook, chapter "Packaging information".
- 2) H = in-tape height; for detailed specifications refer to this handbook, chapter "Packaging information".

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MKP 336 6 GENERAL DATA

PITCH 10/15 mm



CBA196

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 355 V (DC)	200 V/ μ s	
R between leads, for $C \leq 0.33 \mu\text{F}$ at 100 V; 1 minute	$> 15000 \text{ M}\Omega$	
R between leads and case; 100 V; 1 minute	$> 30000 \text{ M}\Omega$	
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	2700 V; 1 minute	
Withstanding (AC) voltage between leads and case	2000 V; 1 minute	

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

C (μF)	DIMENSIONS $b \times h \times l$ (mm)	MASS (g)	CATALOGUE NUMBER	
			LOOSE IN BOX	
			$l_t = 3.5 +1/-0.5 \text{ mm}^{(1)}$	$l_t = 25.0 \pm 2.0 \text{ mm}$
			C-tol = $\pm 20\%$	
			catalogue number ⁽²⁾	last 5 digits ⁽²⁾
Pitch = $10.0 \pm 0.4 \text{ mm}$; $d_t = 0.60 \pm 0.06 \text{ mm}$				
0.001	4.0 × 10.0 × 12.5	0.6	2222 336 60 102	.. 66 102
0.0015			2222 336 60 152	.. 66 152
0.0022			2222 336 60 222	.. 66 222
0.0033	5.0 × 11.0 × 12.5	0.9	2222 336 60 332	.. 66 332
0.0047	6.0 × 12.0 × 12.5	1.0	2222 336 60 472	.. 66 472
0.0068			2222 336 60 682	.. 66 682
Pitch = $15.0 \pm 0.4 \text{ mm}$; $d_t = 0.80 \pm 0.08 \text{ mm}$				
0.0068	5.0 × 11.0 × 17.5	1.2	2222 336 69 005	.. 69 009
0.01			2222 336 60 103	.. 66 103
0.015	6.0 × 12.0 × 17.5	1.4	2222 336 60 153	.. 66 153
0.022	7.0 × 13.5 × 17.5	1.9	2222 336 60 223	.. 66 223
0.033	8.5 × 15.0 × 17.5	2.6	2222 336 60 333	.. 66 333
0.047	10.0 × 16.5 × 17.5	3.1	2222 336 60 473	.. 66 473

Notes

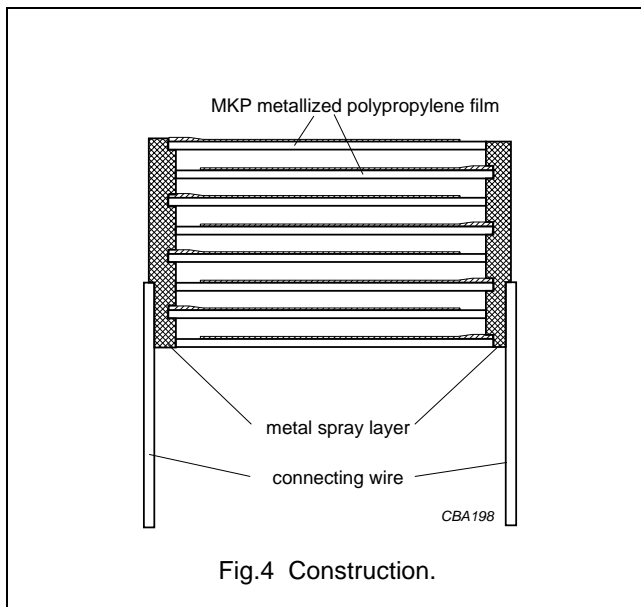
- $l_t = 3.5 \pm 0.3 \text{ mm}$ for pitch = 15 mm.
- The shading indicates preferred types.

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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.

**Mounting**

NORMAL USE

The capacitors are designed for mounting on printed-circuit boards. The capacitors packed in bandoliers are designed for mounting on printed-circuit boards by automatic insertion machines. For detailed tape specifications refer to this handbook, chapter "Packaging information".

SPECIFIC METHOD OF MOUNTING TO WITHSTAND VIBRATION AND SHOCK

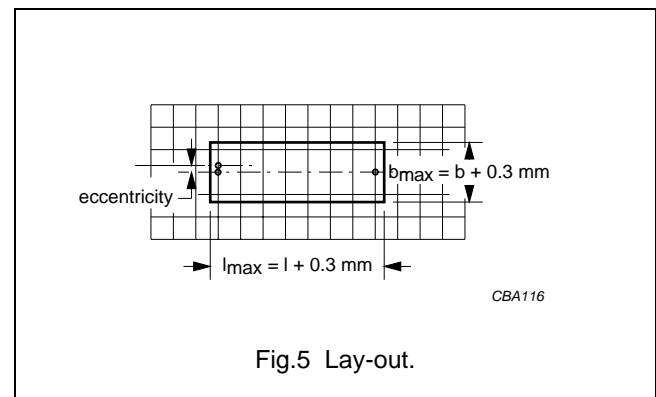
To withstand vibration and shock tests, it must be ensured that the stand-off pips are in good contact with the printed-circuit board:

- The capacitors shall be mechanically fixed by the leads.

SPACE REQUIREMENTS ON PRINTED-CIRCUIT BOARD

The maximum length and width of film capacitors is shown in Fig.5:

- Eccentricity as in Fig.5. The maximum eccentricity is smaller than or equal to the lead diameter of the product concerned.
- Product height with seating plane as given by "IEC 60717" as reference: $h_{\max} \leq h + 0.3 \text{ mm}$.

**Storage temperature**

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

RATINGS AND CHARACTERISTICS REFERENCE CONDITIONS

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

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

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CHARACTERISTICS

Capacitance

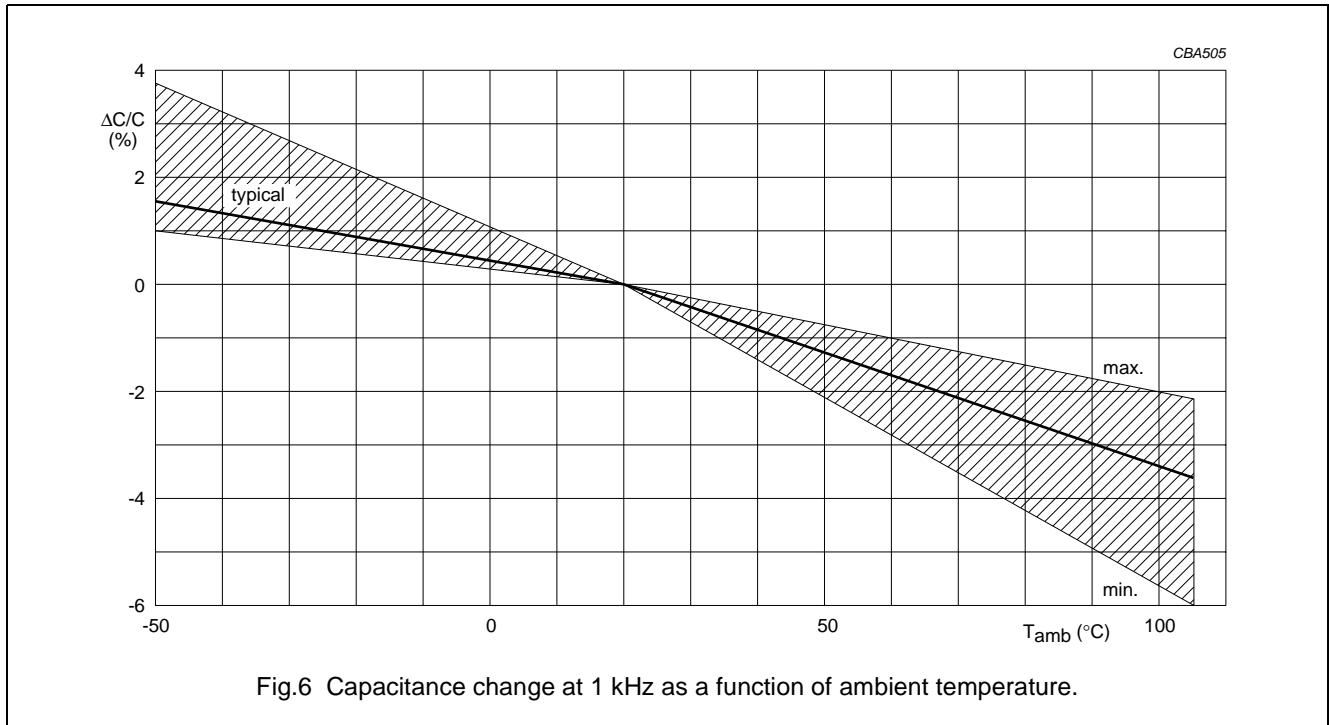


Fig.6 Capacitance change at 1 kHz as a function of ambient temperature.

Tangent of loss angle

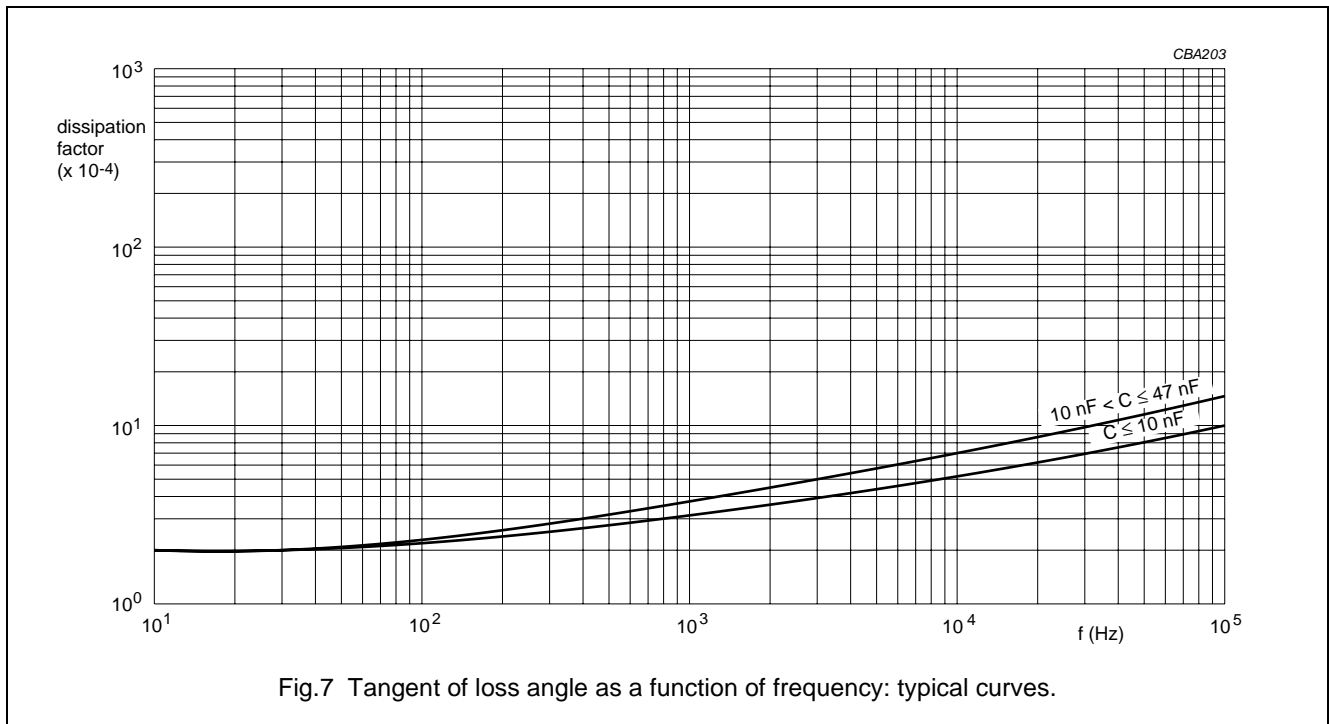
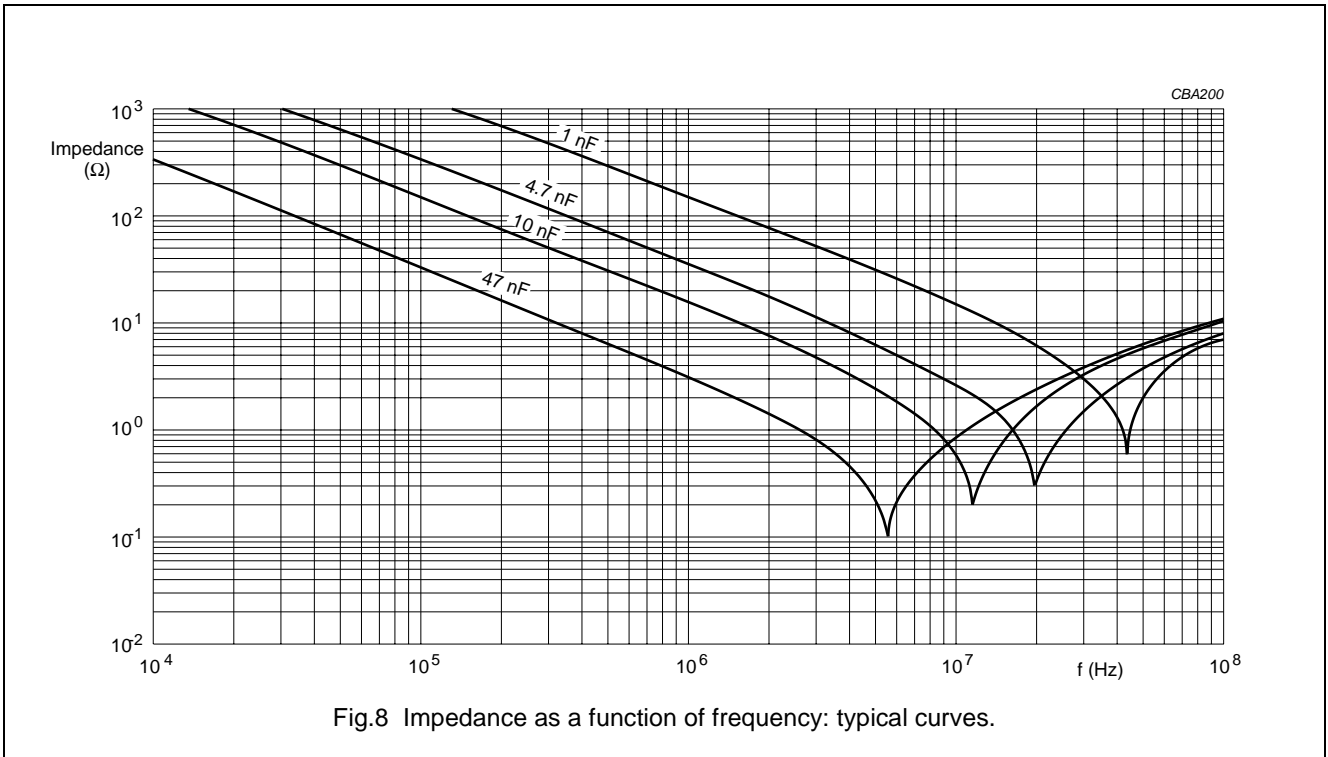


Fig.7 Tangent of loss angle as a function of frequency: typical curves.

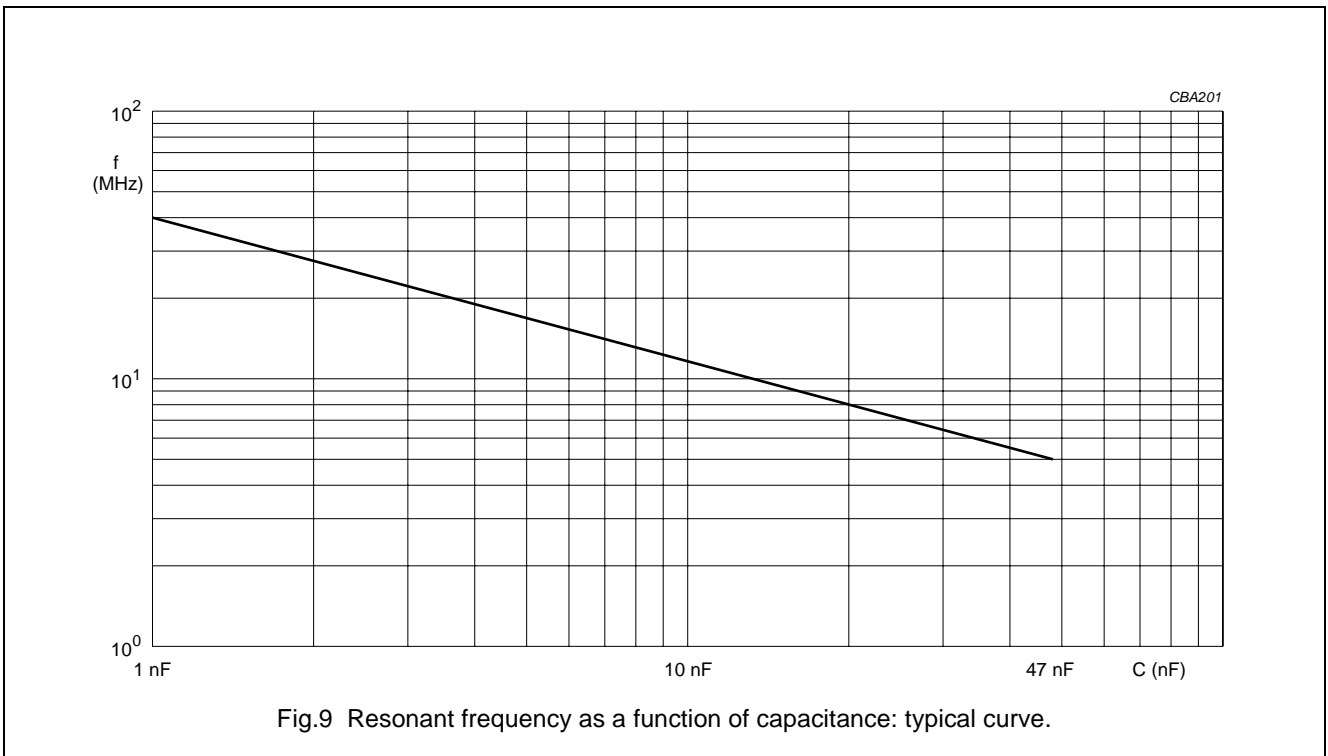
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Impedance



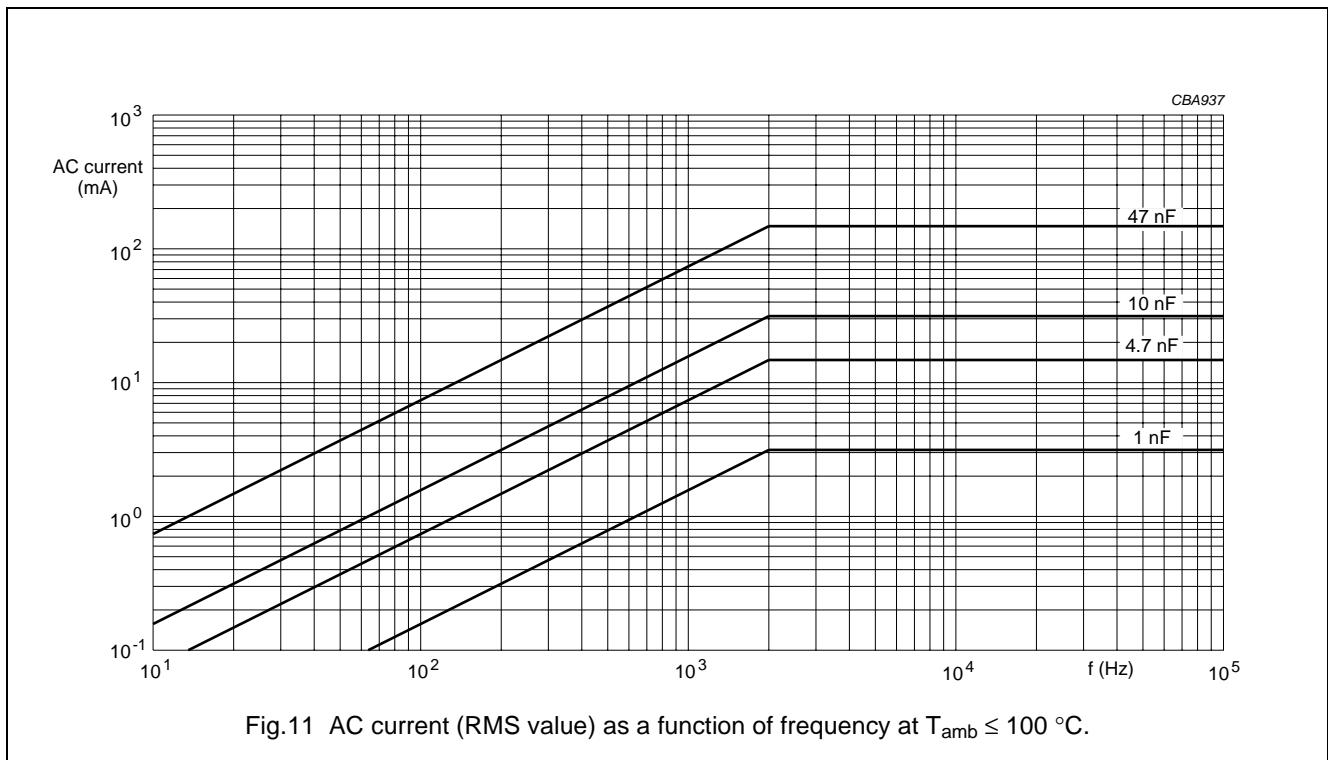
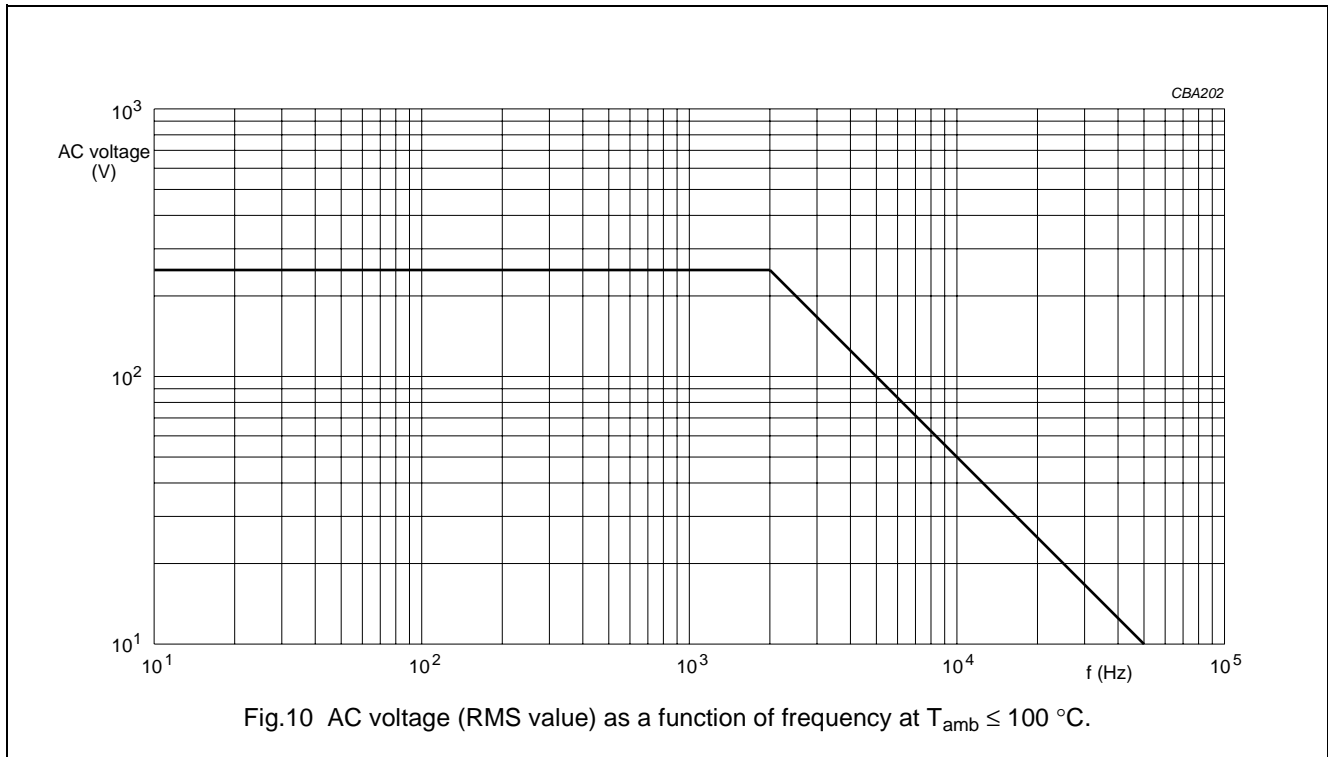
Resonant frequency



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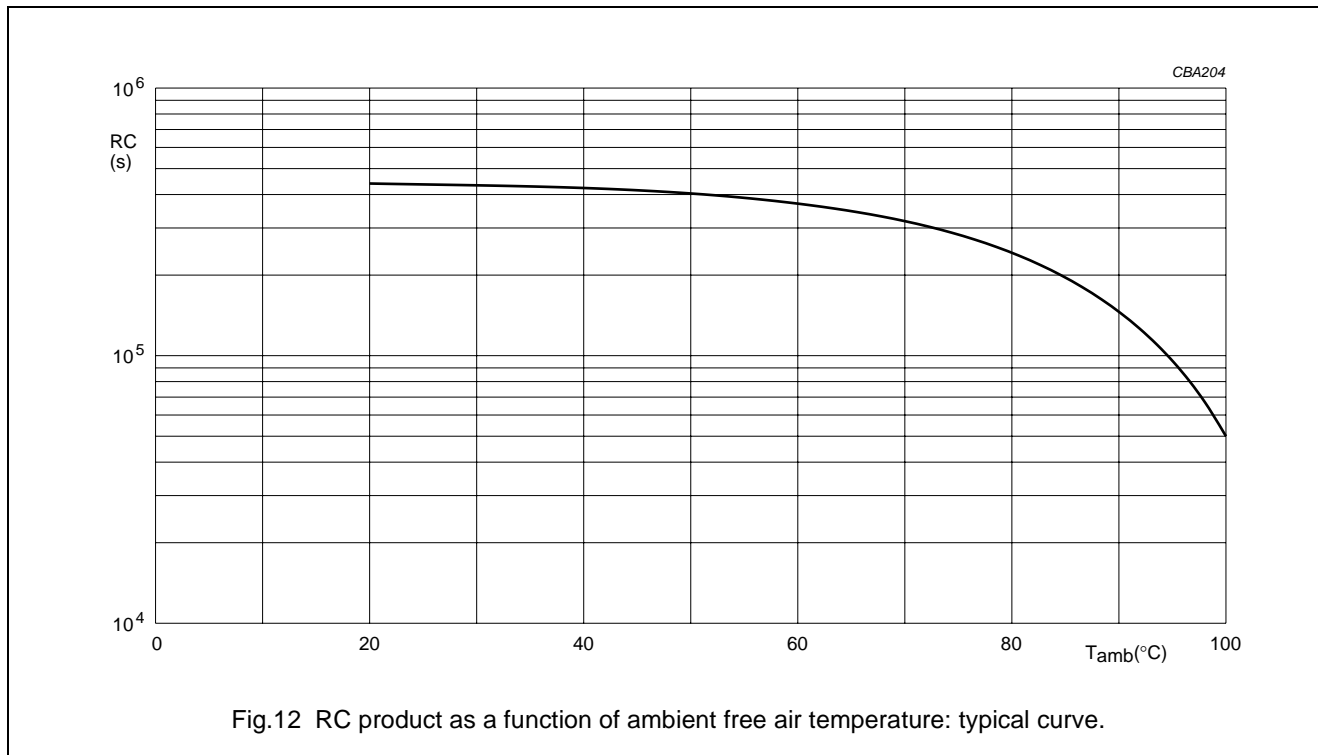
Maximum RMS voltage and AC current (sinewave) as a function of frequency for $T_{amb} \leq 100\text{ }^{\circ}\text{C}$



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Insulation resistance



APPLICATION NOTES

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

Interference suppression film capacitors

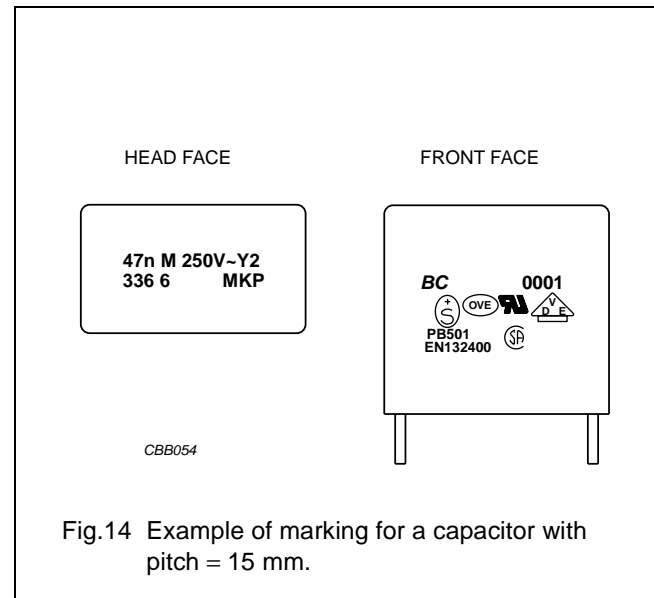
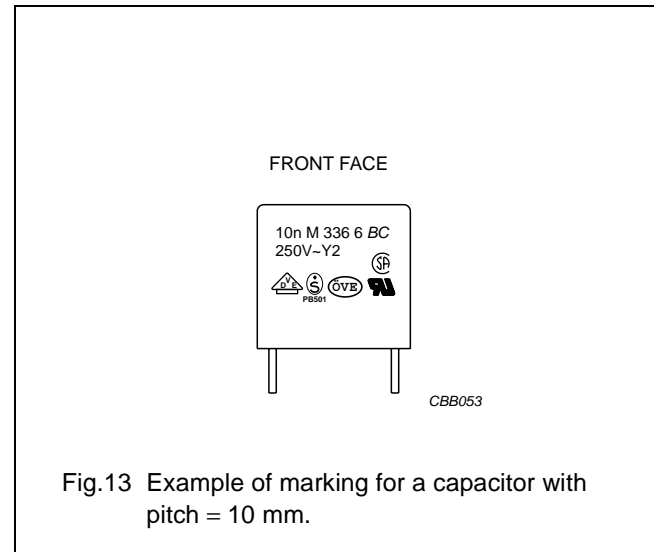
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MARKING

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 = $\pm 20\%$; K = $\pm 10\%$; J = $\pm 5\%$
3. Rated (AC) voltage (250 V~)
4. Sub-class (Y2)
5. Manufacturer's type designation (336 6)
6. Code for dielectric material (MKP) for pitch = 15 mm
7. Manufacturer
8. Year and week of manufacture (e.g. 0001) 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.







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Package marking

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

BCcomponents
 MADE IN BELGIUM
 INTERF. SUPPR. FILM CAPACITOR
 MKP RADIAL POTTED TYPE Y2
 0.001µF ±20% 250V~ 55/100/21/B

250V~
WO: 12345678

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

TYPE **MKP 336 6**

QTY **1000** DATE **0003**

CODENO **2222 336 60102**

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.

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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
Bending: "IEC 60068-2-21"	load 5 N; 4 × 90 °	$ \Delta C/C \leq 5\%$
Component solvent resistance	isopropyl alcohol; 23 °C; 5 minutes	$\Delta \tan \delta \leq 80 \times 10^{-4}$
Robustness of component		
Rapid change of temperature: "IEC 60068-2-14"	5 cycles 1 cycle = 30 minutes at -55 °C and 30 minutes at 100 °C	$ \Delta C/C \leq 5\%$
Vibration: "IEC 60068-2-6"	10 to 55 Hz; amplitude 0.75 mm; 6 hours	$\Delta \tan \delta \leq 80 \times 10^{-4}$
Shock: "IEC 60068-2-27"	half sinewave; 490 m/s ² ; 11 ms	
Climatic sequence		
Dry heat: "IEC 60068-2-2"	16 hours; 100 °C	
Damp heat, cyclic, test Db, first cycle: "IEC 60068-2-30"		$ \Delta C/C \leq 5\%$
Cold: "IEC 60068-2-1"	2 hours; -55 °C	$\Delta \tan \delta \leq 80 \times 10^{-4}$
Damp heat, cyclic, test Db, remaining cycles: "IEC 60068-2-30"		$R_{\text{ins}} \geq 50\%$ of specified value
Voltage proof: "IEC 60384-14"	$V_p = 2250 \text{ V (DC)}$; 1 minute	
Other applicable tests		
Damp heat, steady state: "IEC 60068-2-3"	21 days; 40 °C; 90 to 95% RH no load $V_p = 2250 \text{ V (DC)}$; 1 minute	$ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 70 \times 10^{-4}$ $R_{\text{ins}} \geq 50\%$ 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; $V_p = 2250 \text{ V (DC)}$; 1 minute	$ \Delta C/C \leq 10\%$ $\Delta \tan \delta \leq 80 \times 10^{-4}$ $R_{\text{ins}} \geq 50\%$ of specified value
Charge and discharge: "IEC 60384-14"	10000 cycles; 5 ms; 1.5 × dV/dt	$ \Delta C/C \leq 10\%$ $\Delta \tan \delta \leq 80 \times 10^{-4}$ $R_{\text{ins}} \geq 50\%$ of specified value
Passive flammability: "IEC 60384-14"	class B	no burning

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TEST	PROCEDURE (quick reference)	REQUIREMENTS
Active flammability: "IEC 60384-14"	20 × 5 kV discharge	no burning
Heat storage: "IEC 60384-14"	1 000 hours; 100 °C	$ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 80 \times 10^{-4}$
Resistance to soldering heat with preheating: "IEC 60384-14"	preheating: 100 °C; solder bath: 260 °C; 10 s	$ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 80 \times 10^{-4}$
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

Note

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