

DATA SHEET

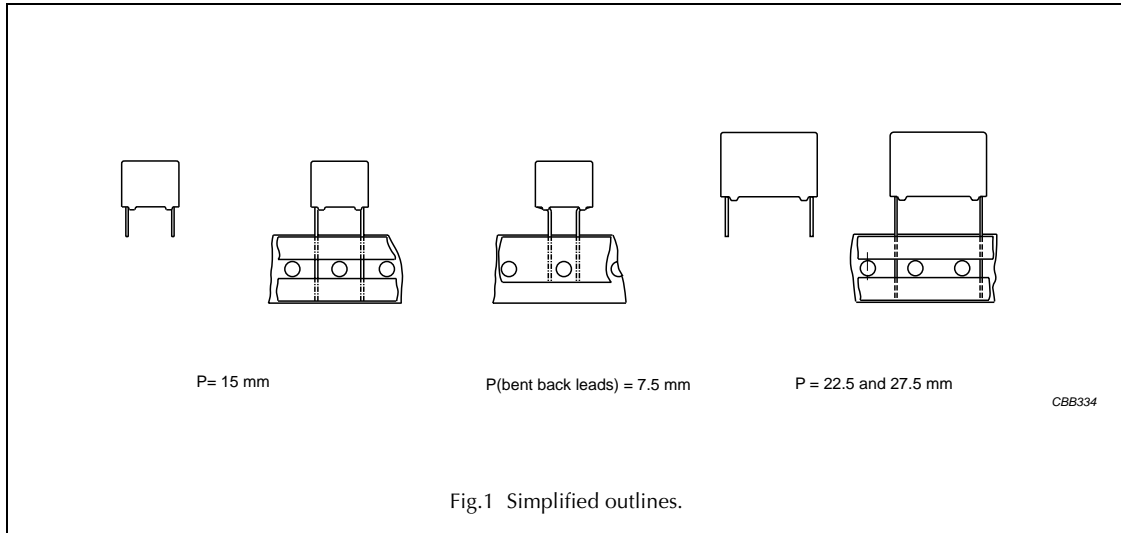
MKP 338 1 X1
Interference suppression film
capacitors

Product specification
Supersedes data of 2002 Oct 08
File under BCcomponents, BC05

2002 Nov 06

Interference suppression film capacitors MKP 338 1 X1

MKP RADIAL POTTED TYPE

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


FEATURES

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

APPLICATIONS

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




DETAIL SPECIFICATION

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

QUICK REFERENCE DATA

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

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

SAFETY APPROVALS (X1)		VOLTAGE	VALUE	FILE NUMBERS
	EN132400	440 V (AC)	10 nF to 1 μ F	ENEC/B04/2001
	UL1414	250 V (AC)	10 nF to 1 μ F	E112471
	UL1283 and CSA 22.2.8	440 V (AC)	100 nF to 1 μ F	E109565

Safety test report

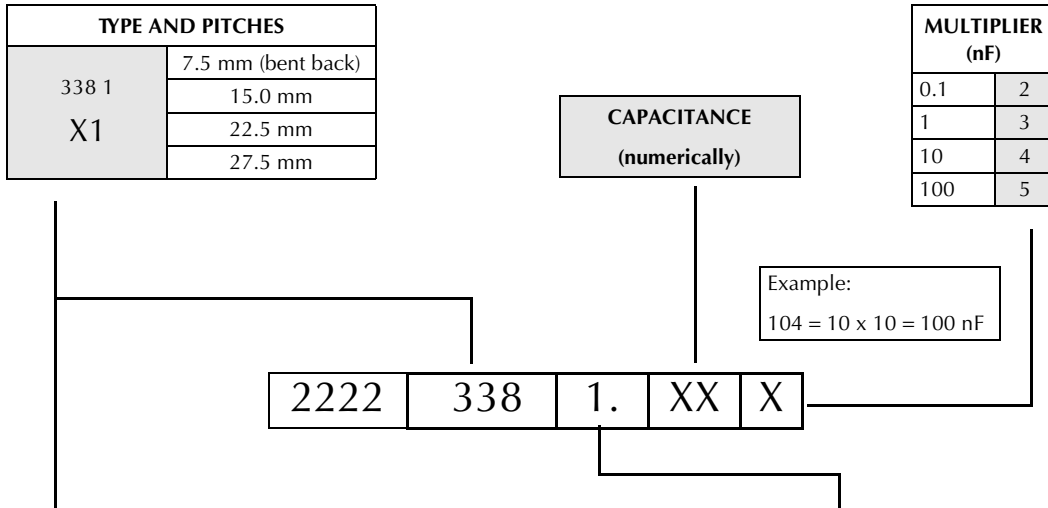
SAFETY TEST REPORT	VOLTAGE	VALUE	FILE NUMBERS
CB TEST CERTIFICATE	440 V (AC)	10 nF to 1 μ F: 55/105/56/B	FI 1653

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

Interference suppression film capacitors

MKP 338 1 X1

COMPOSITION OF CATALOGUE NUMBER



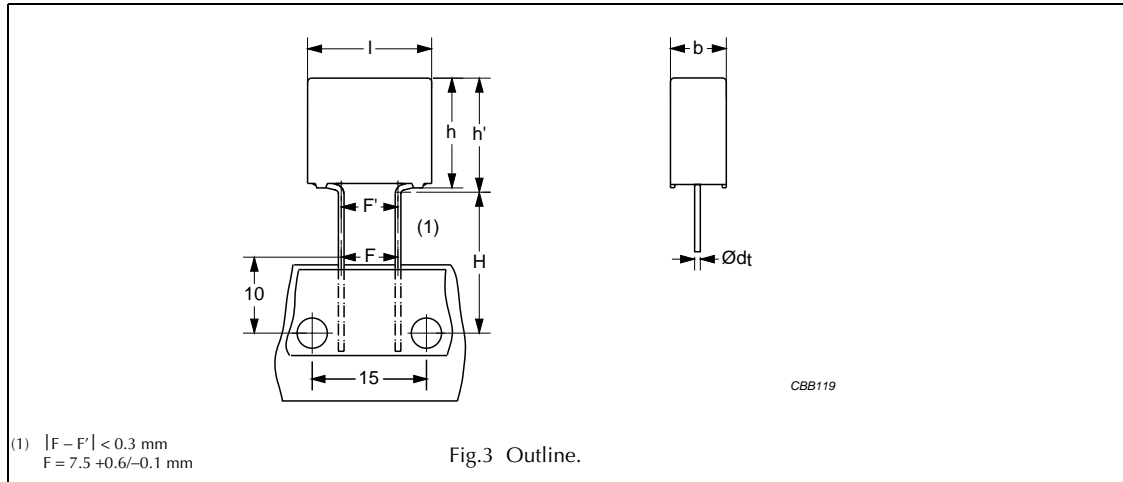
TYPE	PACKAGING	STANDARD DIMENSIONS	C-TOL	PREFERRED TYPES
338 1 X1	loose in box	lead length 3.5 mm	±20%	10
		lead length 5.0 mm		12
		lead length 25.0 mm		14
	taped on reel	bent back to 7.5 mm		16
		ALTERNATIVE TAPED VERSIONS		ON REQUEST
338 1 X1	taped on reel		±20%	17
		ALTERNATIVE C-TOL		ON REQUEST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

Interference suppression film capacitors

MKP 338 1 X1

MKP 338 1 GENERAL DATA

PITCH 7.5 mm (bent back leads)



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

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle: C ≤ 470 nF	≤10 × 10 ⁻⁴	≤20 × 10 ⁻⁴	≤100 × 10 ⁻⁴
C > 470 nF	≤20 × 10 ⁻⁴	≤70 × 10 ⁻⁴	–
Rated voltage pulse slope (dU/dt) _R at 615 V	250 V/μs		
R between leads, for C ≤ 0.33 μF at 100 V; 1 minute	>15 000 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	>30 000 MΩ		
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	3 400 V; 1 minute		
Withstanding (AC) voltage between leads and case	2 380 V; 1 minute		

Available 440 V AC (X1) versions

PACKAGING	DIMENSIONS	C-tol ⁽¹⁾	ORDERING	CATALOGUE NUMBER
Taped on reel; bent back	H = 16.0 mm; for P ₀ = 15.0 mm; reel diameter = 500 mm	±20%	preferred	see tables for details
		±10%	on request	

Note

1. ±5% tolerance values and other values are available on special request.

Interference suppression film capacitors**MKP 338 1 X1****Bent back pitch: 7.5 mm; C-tol = ±20%****U_{Rac} = 440 V**(for reference: U_{Rdc} = 1000 V)

C (μF)	DIMENSIONS b × h' × l (mm)	MASS (g)	CATALOGUE NUMBER 2222 338 AND PACKAGING	
			REEL ⁽¹⁾	
			H = 16.0 mm; P ₀ = 15.0 mm	SPQ
Bent back pitch = 7.5 ±0.4 mm; d_t = 0.60 ±0.06 mm				
0.01	5.0 × 13.0 × 17.5	1.2	16103	950
0.015			16153	
0.022			16223	
0.033	6.0 × 14.0 × 17.5	1.4	16333	800
Bent back pitch = 7.5 ±0.4 mm; d_t = 0.80 ±0.08 mm				
0.047	7.0 × 15.5 × 17.5	1.9	16473	700
0.068	8.5 × 17.0 × 17.5	2.6	16683	550
0.1	10.0 × 18.5 × 17.5	3.1	16104	500

Note

1. Reel diameter = 356 mm is available on request.

Bent back pitch: 7.5 mm; C-tol = ±10%**U_{Rac} = 440 V**(for reference: U_{Rdc} = 1000 V)

C (μF)	DIMENSIONS b × h' × l (mm)	MASS (g)	CATALOGUE NUMBER 2222 338 AND PACKAGING	
			REEL ⁽¹⁾	
			H = 16.0 mm; P ₀ = 15.0 mm	SPQ
Bent back pitch = 7.5 ±0.4 mm; d_t = 0.60 ±0.06 mm				
0.01	5.0 × 13.0 × 17.5	1.2	18714	950
0.015			18716	
0.022			18718	
0.033	6.0 × 14.0 × 17.5	1.4	18718	800
Bent back pitch = 7.5 ±0.4 mm; d_t = 0.80 ±0.08 mm				
0.033	7.0 × 15.5 × 17.5	1.9	18721	700
0.047	8.5 × 17.0 × 17.5	2.6	18723	550
0.068	10.0 × 18.5 × 17.5	3.1	18725	500

Note

1. Reel diameter = 356 mm is available on request.

Interference suppression film capacitors

MKP 338 1 X1

MKP 338 1 GENERAL DATA

PITCH 15 mm

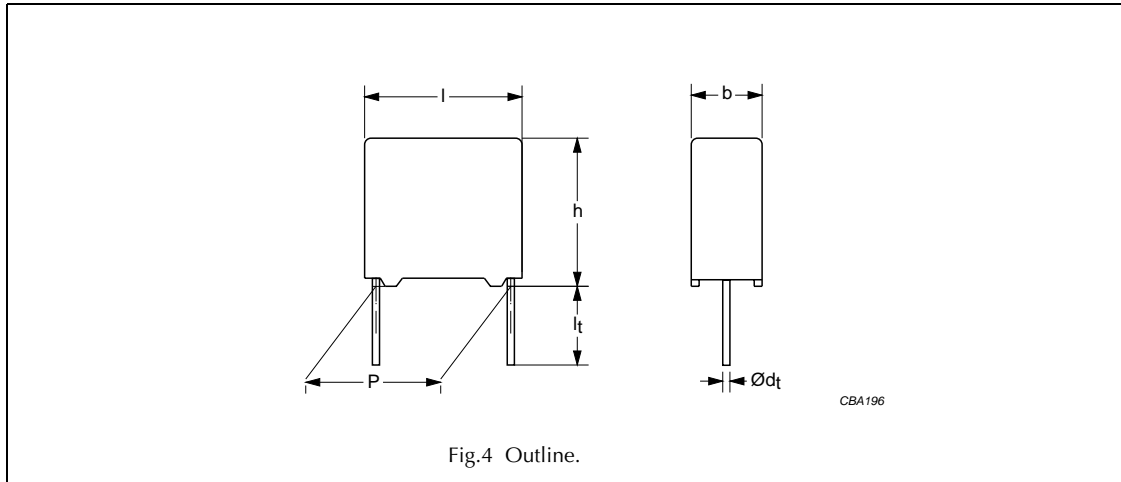


Fig.4 Outline.

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

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle:			
C ≤ 470 nF	≤10 × 10 ⁻⁴	≤20 × 10 ⁻⁴	≤100 × 10 ⁻⁴
C > 470 nF	≤20 × 10 ⁻⁴	≤70 × 10 ⁻⁴	–
Rated voltage pulse slope (dU/dt)R at 615 V	250 V/μs		
R between leads, for C ≤ 0.33 μF at 100 V; 1 minute	>15 000 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	>30 000 MΩ		
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	3 400 V; 1 minute		
Withstanding (AC) voltage between leads and case	2 380 V; 1 minute		

Available 440 V AC (X1) versions

PACKAGING	DIMENSIONS	C-tol ⁽¹⁾	ORDERING	CATALOGUE NUMBER
Loose in box	l _t = 3.5 ±0.3 mm	±20%	preferred	see tables for details
		±10%	on request	
	l _t = 5.0 ±1.0 mm	±20%	preferred	
		±10%	on request	
	l _t = 25.0 ±2.0 mm	±20%	preferred	
		±10%	on request	
Taped on reel	H = 18.5 mm; for P ₀ = 12.7 mm; reel diameter = 500 mm	±20%	on request	
		±10%	on request	

Note

1. ±5% tolerance values and other values are available on special request.

Interference suppression film capacitors

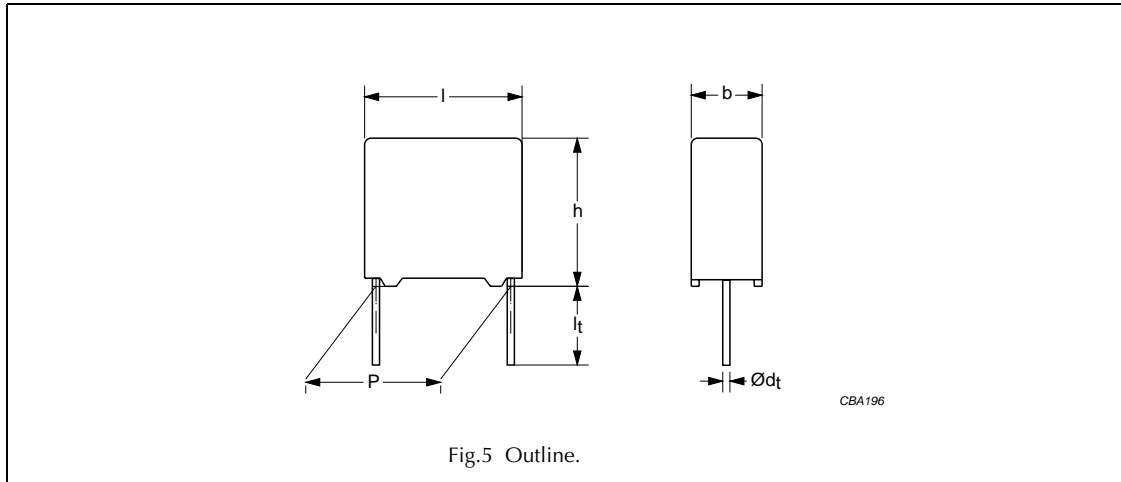
MKP 338 1 X1

Pitch: 15 mm; C-tol = $\pm 20\%$ $U_{Rac} = 440 V$ (for reference: $U_{Rdc} = 1000 V$)

C (μF)	DIMENSIONS $b \times h \times l$ (mm)	MASS (g)	CATALOGUE NUMBER 2222 338 AND PACKAGING						
			LOOSE IN BOX					REEL	
			short leads			long leads		H = 18.5 mm P ₀ = 12.7mm	
			$l_t =$ 3.5 \pm 0.3 mm	$l_t =$ 5.0 \pm 0.3 mm	SPQ	$l_t =$ 25.0 \pm 2.0 mm	SPQ		SPQ
Pitch = 15.0 \pm 0.4 mm; $d_t = 0.60 \pm 0.06$ mm									
0.01	5.0 \times 11.0 \times 17.5	1.2	10103	12103	1000	14103	1000	17103	1100
0.015			10153	12153		14153		17153	
0.022			10223	12223		14223		17223	
0.033	6.0 \times 12.0 \times 17.5	1.4	10333	12333	1000	14333	1000	17333	900
Pitch = 15.0 \pm 0.4 mm; $d_t = 0.80 \pm 0.08$ mm									
0.047	7.0 \times 13.5 \times 17.5	1.9	10473	12473	750	14473	500	17473	800
0.068	8.5 \times 15.0 \times 17.5	2.6	10683	12683	750	14683	500	17683	650
0.1	10.0 \times 16.5 \times 17.5	3.1	10104	12104	500	14104	450	17104	600

Pitch: 15 mm; C-tol = $\pm 10\%$ $U_{Rac} = 440 V$ (for reference: $U_{Rdc} = 1000 V$)

C (μF)	DIMENSIONS $b \times h \times l$ (mm)	MASS (g)	CATALOGUE NUMBER 2222 338 AND PACKAGING						
			LOOSE IN BOX					REEL	
			short leads			long leads		H = 18.5 mm P ₀ = 12.7mm	
			$l_t =$ 3.5 \pm 0.3 mm	$l_t =$ 5.0 \pm 0.3 mm	SPQ	$l_t =$ 25.0 \pm 2.0 mm	SPQ		SPQ
Pitch = 15.0 \pm 0.4 mm; $d_t = 0.60 \pm 0.06$ mm									
0.01	5.0 \times 11.0 \times 17.5	1.2	18114	18314	1000	18514	1000	18914	1100
0.015			18116	18316		18516		18916	
0.022			18118	18318		18518		18918	
0.033	6.0 \times 12.0 \times 17.5	1.4	18118	18318	1000	18518	1000	18918	900
Pitch = 15.0 \pm 0.4 mm; $d_t = 0.80 \pm 0.08$ mm									
0.033	7.0 \times 13.5 \times 17.5	1.9	18121	18321	750	18521	500	18921	800
0.047	8.5 \times 15.0 \times 17.5	2.6	18123	18323	750	18523	500	18923	650
0.068	10.0 \times 16.5 \times 17.5	3.1	18125	18325	500	18525	450	18925	600

Interference suppression film capacitors**MKP 338 1 X1****MKP 338 1 GENERAL DATA****PITCH 22.5 mm****Specific reference data for the 440 V AC (X1) capacitors**

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle:			
C ≤ 470 nF	≤10 × 10 ⁻⁴	≤20 × 10 ⁻⁴	≤100 × 10 ⁻⁴
C > 470 nF	≤20 × 10 ⁻⁴	≤70 × 10 ⁻⁴	–
Rated voltage pulse slope (dU/dt) _R at 615 V:	150 V/μs		
R between leads, for C ≤ 0.33 μF at 100 V; 1 minute	>15 000 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	>30 000 MΩ		
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	3 400 V; 1 minute		
Withstanding (AC) voltage between leads and case	2 380 V; 1 minute		

Available 440 V AC (X1) versions

PACKAGING	DIMENSIONS	C-tol ⁽¹⁾	ORDERING	CATALOGUE NUMBER
Loose in box	l _t = 3.5 ±0.3 mm	±20%	preferred	see tables for details
		±10%	on request	
	l _t = 5.0 ±1.0 mm	±20%	preferred	
		±10%	on request	
	l _t = 25.0 ±2.0 mm	±20%	preferred	
		±10%	on request	
Taped on reel	H = 18.5 mm; for P ₀ = 12.7 mm; reel diameter = 500 mm	±20%	on request	
		±10%	on request	

Note

1. ±5% tolerance values and other values are available on special request.

Interference suppression film capacitors**MKP 338 1 X1****Pitch: 22.5 mm; C-tol = ±20%****U_{Rac} = 440 V**(for reference: U_{Rdc} = 1000 V)

C (μF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER 2222 338 AND PACKAGING						
			LOOSE IN BOX					REEL	
			short leads			long leads		H = 18.5 mm P ₀ = 12.7mm	
			l _t = 3.5 ±0.3 mm	l _t = 5.0 ±0.3 mm	SPQ	l _t = 25.0 ±2.0 mm	SPQ		SPQ
Pitch = 22.5 ±0.4 mm; d_t = 0.80 ±0.08 mm									
0.15	8.5 × 18.0 × 26.0	4.4	10154	12154	200	14154	250	14154	450
0.22	10.0 × 19.5 × 26.0	5.5	10224	12224	200	14224	200	14224	350

Pitch: 22.5 mm; C-tol = ±10%**U_{Rac} = 440 V**(for reference: U_{Rdc} = 1000 V)

C (μF)	DIMENSIONS b × h × l (mm)	MASS (g)	CATALOGUE NUMBER 2222 338 AND PACKAGING						
			LOOSE IN BOX					REEL	
			short leads			long leads		H = 18.5 mm P ₀ = 12.7mm	
			l _t = 3.5 ±0.3 mm	l _t = 5.0 ±0.3 mm	SPQ	l _t = 25.0 ±2.0 mm	SPQ		SPQ
Pitch = 22.5 ±0.4 mm; d_t = 0.80 ±0.08 mm									
0.1	7.0 × 16.5 × 26.0	3.2	18127	18327	200	18527	250	18927	550
0.15	8.5 × 18.0 × 26.0	4.4	18129	18329	200	18529	250	18929	450

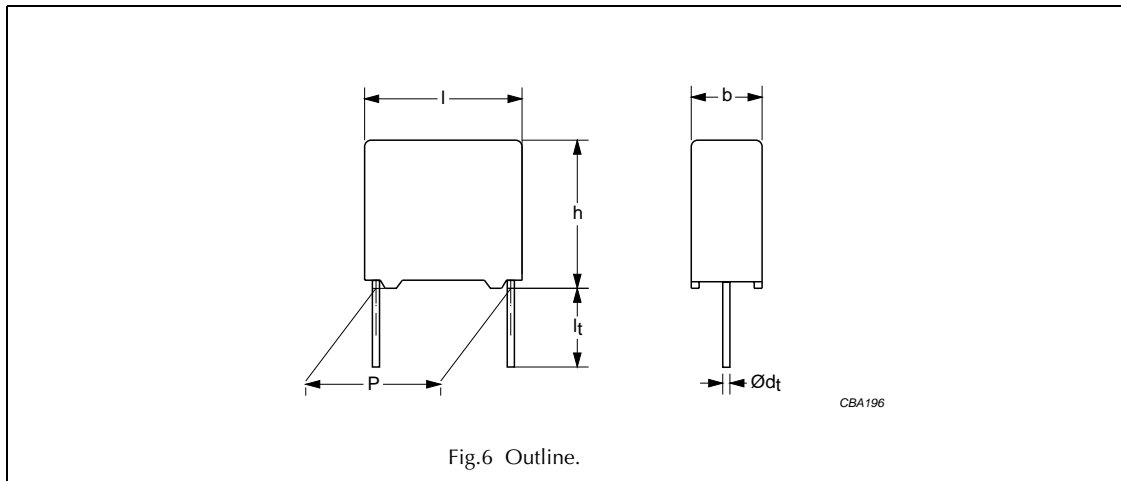
Interference suppression film capacitors**MKP 338 1 X1****MKP 338 1 GENERAL DATA****PITCH 27.5 mm**

Fig.6 Outline.

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

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle: C ≤ 470 nF	≤10 × 10 ⁻⁴	≤20 × 10 ⁻⁴	≤100 × 10 ⁻⁴
C > 470 nF	≤20 × 10 ⁻⁴	≤70 × 10 ⁻⁴	–
Rated voltage pulse slope (dU/dt)R at 615 V	100 V/μs		
R between leads, for C ≤ 0.33 μF at 100 V; 1 minute	>15 000 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	>30 000 MΩ		
Withstanding (DC) voltage (cut off current 10 mA); rise time 100 V/s	3 400 V; 1 minute		
Withstanding (AC) voltage between leads and case	2 380 V; 1 minute		

Available 440 V AC (X1) versions

PACKAGING	DIMENSIONS	C-tol ⁽¹⁾	ORDERING	CATALOGUE NUMBER
Loose in box	l _t = 3.5 ±0.3 mm	±20%	preferred	see tables for details
		±10%	on request	
	l _t = 5.0 ±1.0 mm	±20%	preferred	
		±10%	on request	
	l _t = 25.0 ±2.0 mm	±20%	preferred	
		±10%	on request	

Note

1. ±5% tolerance values and other values are available on special request.

Interference suppression film capacitors**MKP 338 1 X1****Pitch: 27.5 mm; C-tol = $\pm 20\%$** **$U_{Rac} = 440 V$** (for reference: $U_{Rdc} = 1000 V$)

C (μF)	DIMENSIONS $b \times h \times l$ (mm)	MASS (g)	CATALOGUE NUMBER 2222 338 AND PACKAGING				
			LOOSE IN BOX				
			short leads			long leads	
			$l_t =$ 3.5 ± 0.3 mm	$l_t =$ 5.0 ± 0.3 mm	SPQ	$l_t =$ 25.0 ± 2.0 mm	SPQ
Pitch = 27.5 ± 0.4 mm; $d_t = 0.80 \pm 0.08$ mm							
0.33	13.0 \times 23.0 \times 31.0	10.4	10334	12334	100	14334	125
0.47	15.0 \times 25.0 \times 31.0	12.8	10474	12474	100	14474	125
0.68	18.0 \times 28.0 \times 31.0	17.2	10684	12684	100	14684	100
1	21.0 \times 31.0 \times 31.0	20.4	10105	12105	50	14105	75

Pitch: 27.5 mm; C-tol = $\pm 10\%$ **$U_{Rac} = 440 V$** (for reference: $U_{Rdc} = 1000 V$)

C (μF)	DIMENSIONS $b \times h \times l$ (mm)	MASS (g)	CATALOGUE NUMBER 2222 338 AND PACKAGING				
			LOOSE IN BOX				
			short leads			long leads	
			$l_t =$ 3.5 ± 0.3 mm	$l_t =$ 5.0 ± 0.3 mm	SPQ	$l_t =$ 25.0 ± 2.0 mm	SPQ
Pitch = 27.5 ± 0.4 mm; $d_t = 0.80 \pm 0.08$ mm							
0.22	11.0 \times 21.0 \times 31.0	7.8	18132	18332	100	18532	125
0.33	13.0 \times 23.0 \times 31.0	12.8	18134	18334	100	18534	125
0.47	15.0 \times 25.0 \times 31.0	12.8	18136	18336	100	18536	125
0.68	18.0 \times 28.0 \times 31.0	17.2	18138	18338	100	18538	100

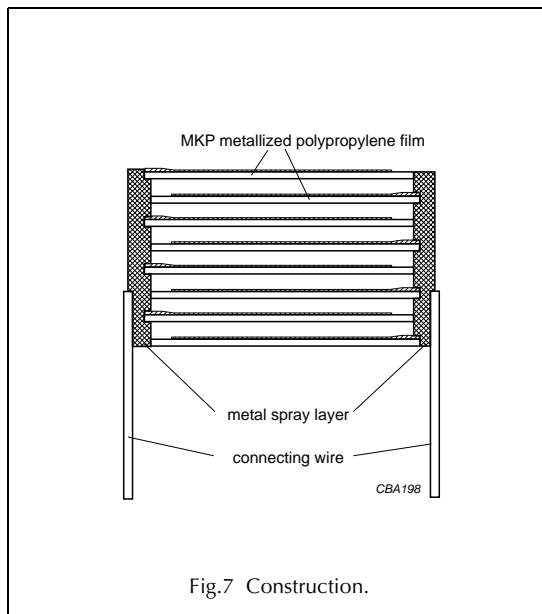
Interference suppression film capacitors

MKP 338 1 X1

CONSTRUCTION

Description

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



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

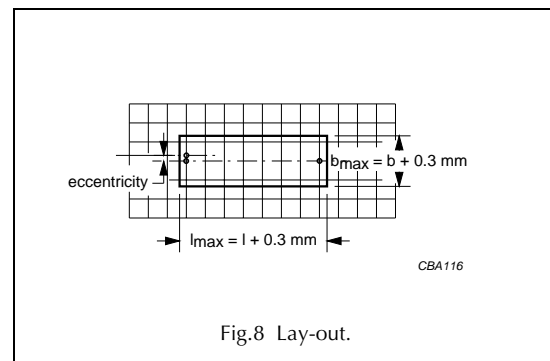
In order to withstand vibration and shock tests, it must be ensured that the stand-off pips are in good contact with the printed-circuit board:

- 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.8:

- Eccentricity as in Fig.8. 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.



Storage temperature

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

RATINGS AND CHARACTERISTICS REFERENCE CONDITIONS

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

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

Interference suppression film capacitors

MKP 338 1 X1

CHARACTERISTICS

Capacitance

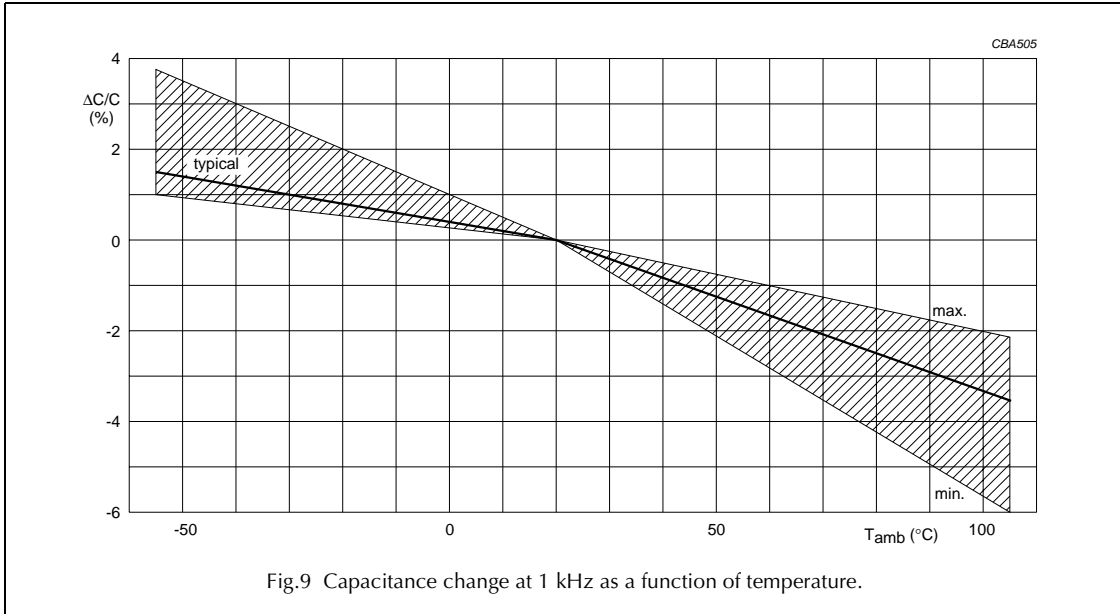


Fig.9 Capacitance change at 1 kHz as a function of temperature.

Tangent of loss angle

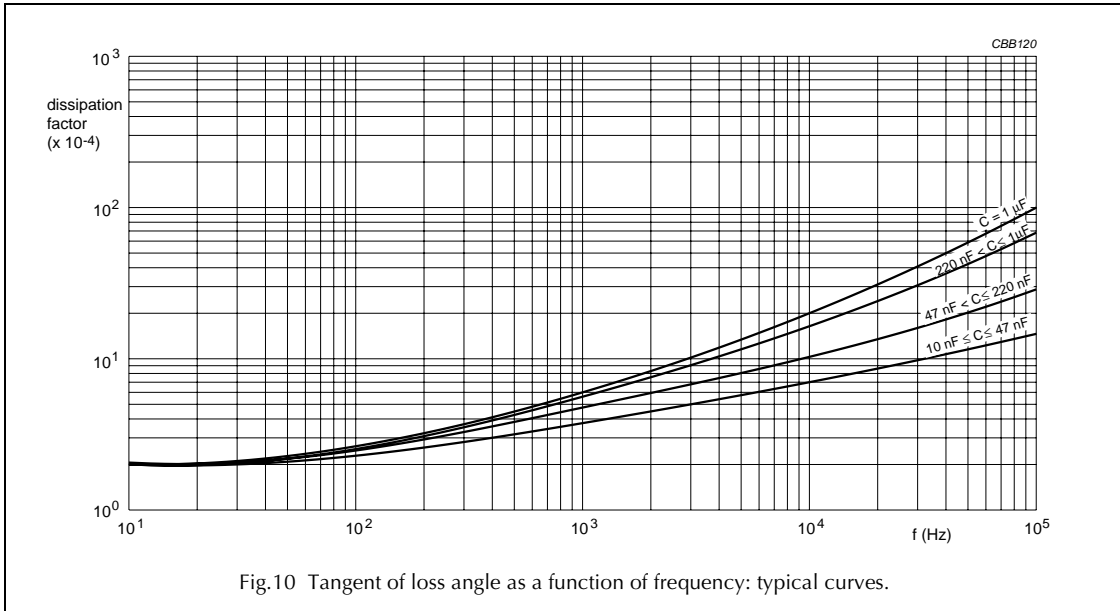
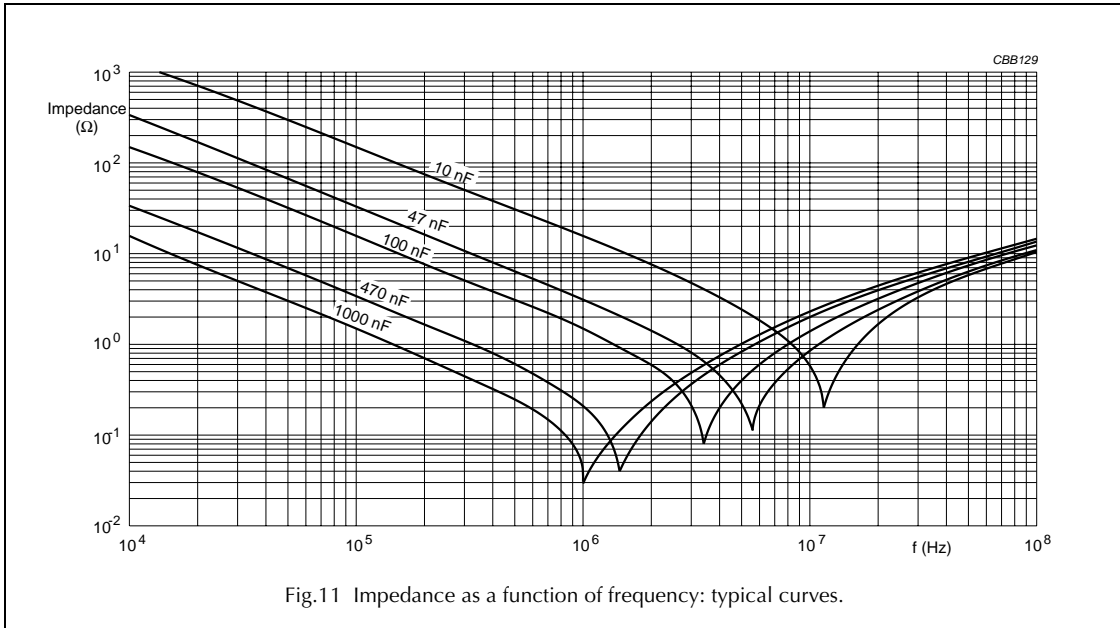


Fig.10 Tangent of loss angle as a function of frequency: typical curves.

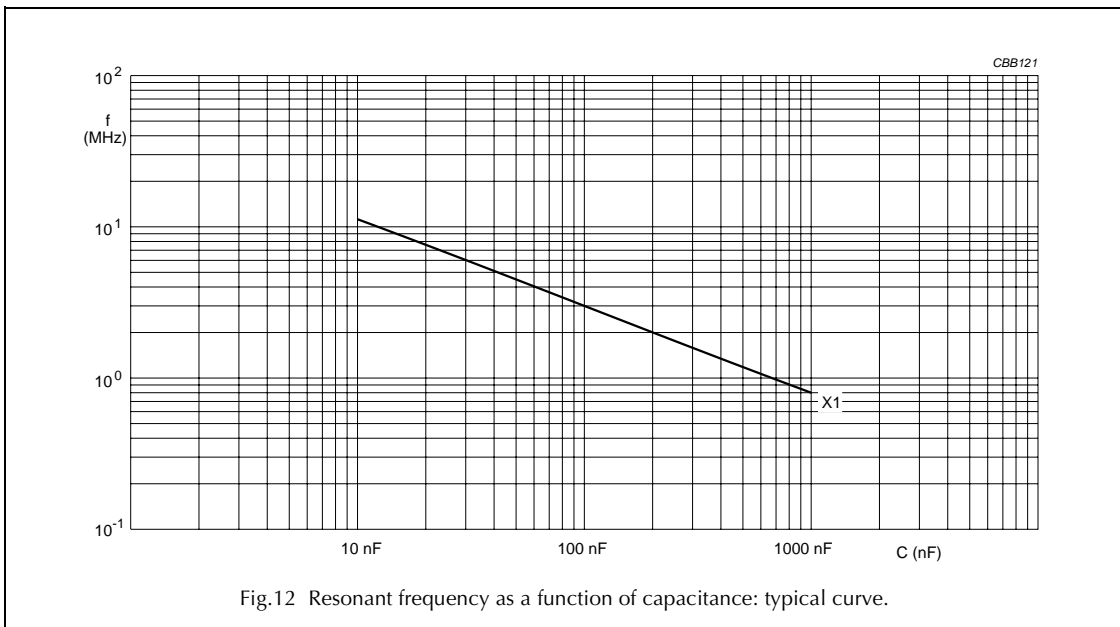
Interference suppression film capacitors

MKP 338 1 X1

Impedance



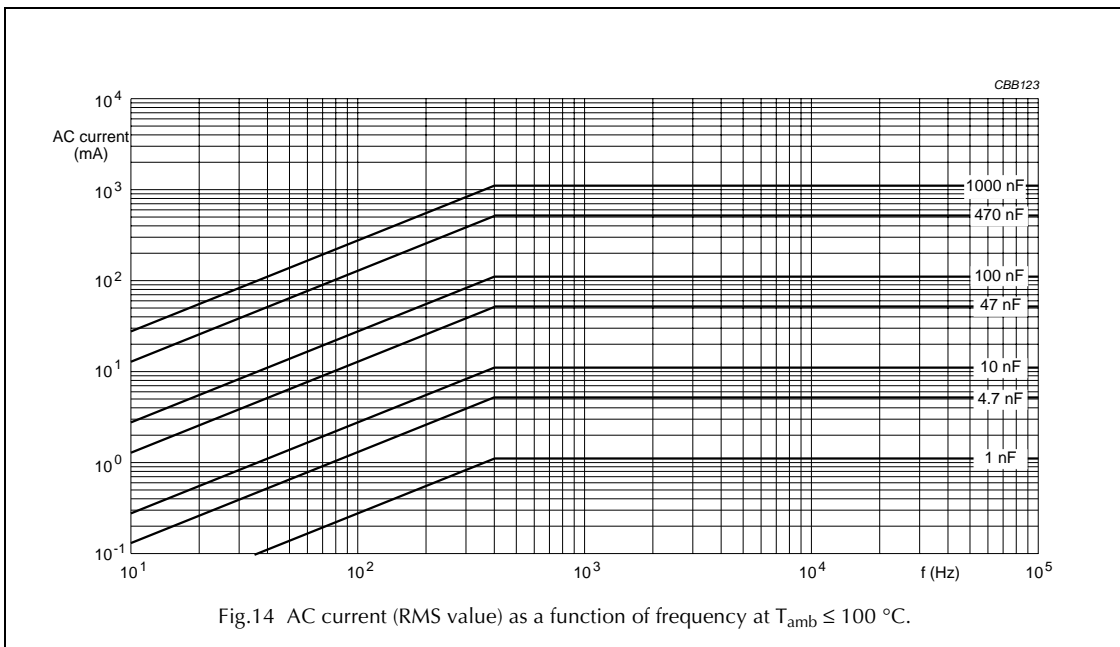
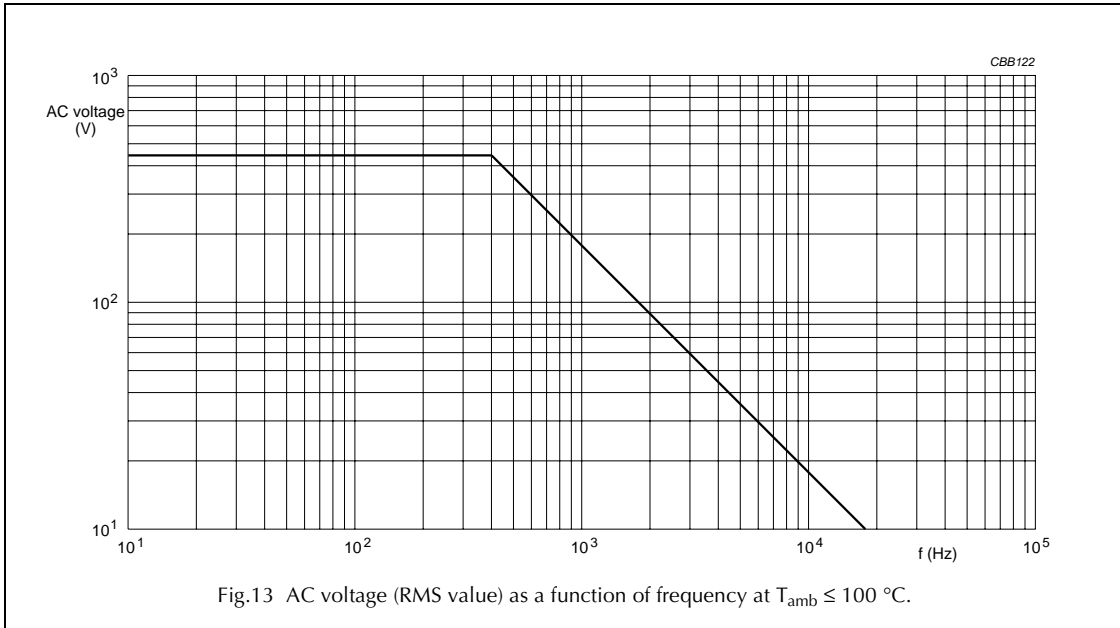
Resonant frequency



Interference suppression film capacitors

MKP 338 1 X1

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



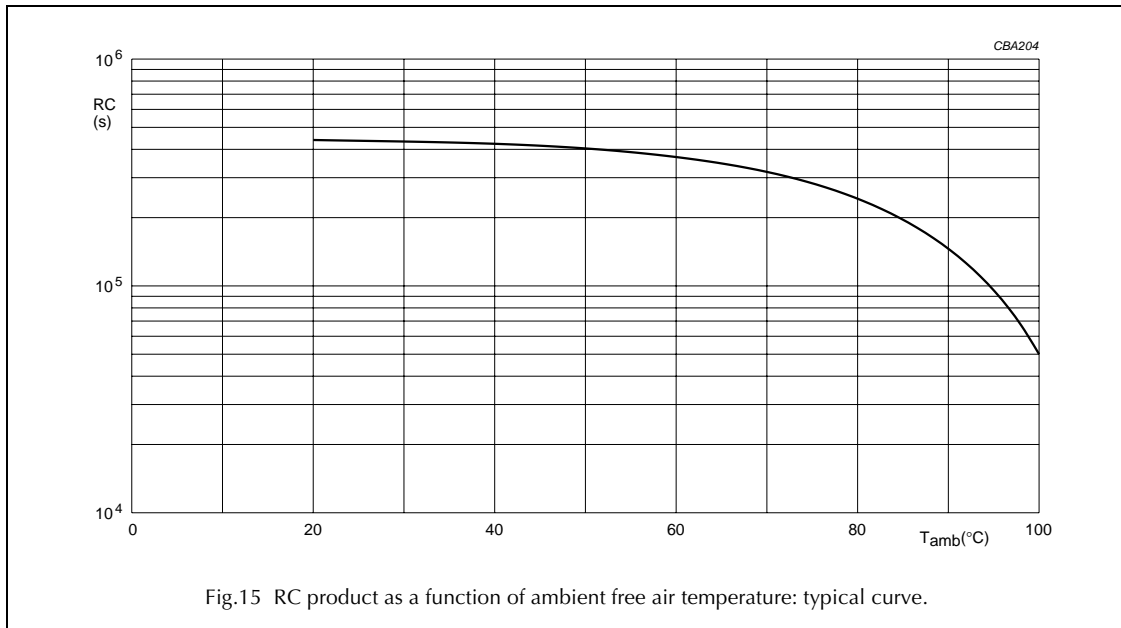
Interference suppression film capacitors**MKP 338 1 X1****Insulation resistance**

Fig.15 RC product as a function of ambient free air temperature: typical curve.

APPLICATION NOTES

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

Interference suppression film capacitors

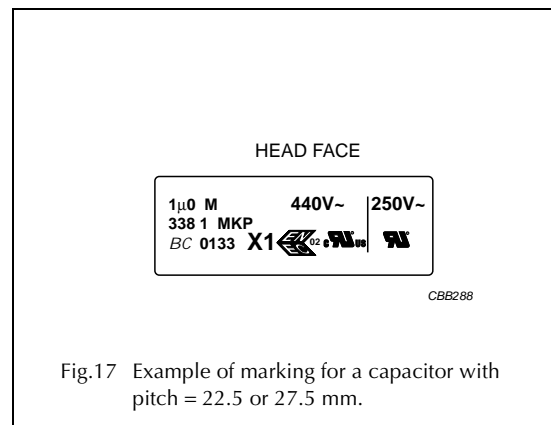
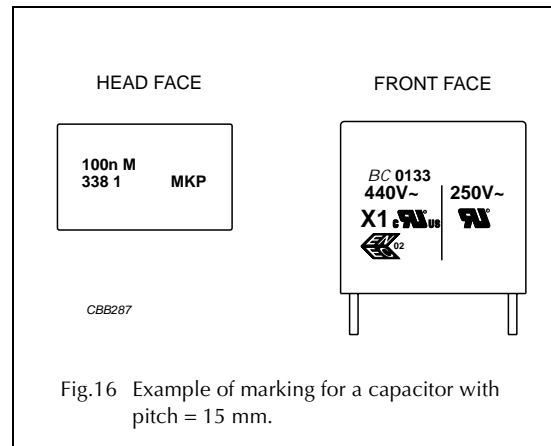
MKP 338 1 X1

MARKING

Product marking

The capacitors are marked by laser print; on the top for pitch ≥ 22.5 mm (see Fig.17), or on the top and one side for pitch = 15 mm (see Fig.16) with the following information:

1. Rated capacitance code in accordance with "IEC 60062"
2. Tolerance on rated capacitance; M = $\pm 20\%$; K = $\pm 10\%$; J = $\pm 5\%$
3. Rated (AC) voltage (440 V)
4. Sub-class (e.g. X1)
5. Manufacturer's type designation (e.g. 338 1)
6. Code for dielectric material (MKP)
7. Manufacturer
8. Year and week of manufacture (e.g. 0020)
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.






Interference suppression film capacitors

MKP 338 1 X1

Package marking

The package containing the capacitors is marked as shown Fig.18.

BCcomponents
 MADE IN BELGIUM
 INTERF. SUPPR. FILM CAPACITORS
 MKP RADIAL POTTED TYPE
 0.01µF ±20% 440V~ 55/100/56/B

X1   

440 V~ | **250 V~**

WO: 12345678

ORIG **A170** RPC **HQ** 1234

TYPE **MKP 338 1**

QTY **1000** DATE **0105**

COBEND **2222 338 10103**

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
8	Product type description
9	Quantity and production period, year and week code
10	Product code (12NC)

Fig.18 Barcode label.

Interference suppression film capacitors**MKP 338 1 X1****QUICK REFERENCE TEST REQUIREMENTS**

TEST	PROCEDURE (quick reference)	REQUIREMENTS
Robustness of leads		
Tensile strength: "IEC 60068-2-21"	load 10 N; 10 s	no visible damage legible marking $ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 80 \times 10^{-4}$ at 10 kHz
Bending: "IEC 60068-2-21"	load 5 N; $4 \times 90^\circ$	
Resistance to soldering heat: "IEC 60068-2-20"	solder bath: 260 °C; 10 s solder bath: 350 °C; 3.5 s	
Component solvent resistance	isopropyl alcohol; 23 °C; 5 minutes	
Robustness of component		
Rapid change of temperature: "IEC 60068-2-14"	5 cycles 1 cycle = 30 minutes at -55 °C and 30 minutes at 100 °C	$ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 80 \times 10^{-4}$ at 10 kHz
Vibration: "IEC 60068-2-6"	10 to 55 Hz; amplitude 0.75 mm; 6 hours	
Shock: "IEC 60068-2-27"	half sinewave; 490 m/s ² ; 11 ms	
Climatic sequence		
Dry heat: "IEC 60068-2-2"	16 hours; 100 °C	$ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 80 \times 10^{-4}$ at 10 kHz $R_{ins} \geq 50\%$ of specified value
Damp heat, cyclic, test Db, first cycle: "IEC 60068-2-30"		
Cold: "IEC 60068-2-1"	2 hours; -55 °C	
Damp heat, cyclic, test Db, remaining cycles: "IEC 60068-2-30"		
Voltage proof: "IEC 60384-14"	$V_p = 1900$ 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 $V_p = 1900$ V (DC); 1 minute	$ \Delta C/C \leq 5\%$ $\Delta \tan \delta \leq 70 \times 10^{-4}$ $R_{ins} \geq 50\%$ of specified value
Endurance (AC): "IEC 60384-14"	3×4.0 kV pulse voltage 1000 hours; $1.25 \times U_{Rac}$ at 100 °C; once per hour; 0.1 s; 1000 V (RMS) via resistor of 47 Ω ; $V_p = 1900$ V (DC); 1 minute	$ \Delta C/C \leq 10\%$ $\Delta \tan \delta \leq 80 \times 10^{-4}$ at 10 kHz $R_{ins} \geq 50\%$ of specified value

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

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

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