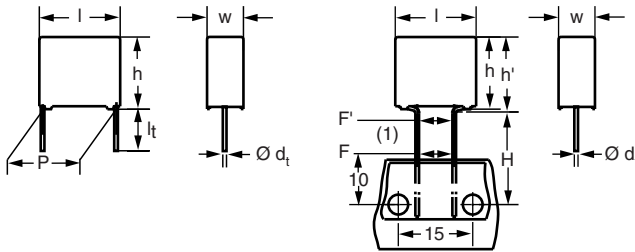


## Interference Suppression Film Capacitors MKP Radial Potted Type



Dimensions in mm

**Note**

(1)  $|F - F'| < 0.3 \text{ mm}$   
 $F = 7.5 + 0.6/-0.1 \text{ mm}$

**APPLICATIONS**

For standard across the line X1 applications.  
 See also Application Note:  
[www.vishay.com/doc?28153](http://www.vishay.com/doc?28153)

**REFERENCE STANDARDS**

"IEC 60384-14 ed-3 and EN 60384-14"  
 "IEC 60065, pass. flamm. class B"  
 UL1414; UL1283; CSA-C22.2 No. 8

**MARKING**

C-value; tolerance; rated voltage; sub-class; manufacturer's type designation; code for dielectric material; manufacturer location; manufacturer's logo; year, week and safety approvals.

**DIELECTRIC**

Polypropylene film

**ELECTRODES**

Metallized film

**CONSTRUCTION**

Mono construction

**RATED VOLTAGE**

AC 440 V; 50 to 60 Hz

**FEATURES**

15 to 27.5 mm lead pitch and 15 mm bent back to 7.5 mm.  
 Supplied loose in box, taped on ammpack or reel  
 RoHS compliant product



**RoHS**  
COMPLIANT

**PERMISSIBLE DC VOLTAGE**

DC 1000 V

**ENCAPSULATION**

Plastic case, epoxy resin sealed, flame retardant UL-class 94 V-0

**CLIMATIC TESTING CLASS ACC. TO IEC 60068-1**

55/105/56/B

**CAPACITANCE RANGE (E12 SERIES)**

E12 series 0.01 to 1  $\mu\text{F}$   
 Preferred values acc. to E6

**CAPACITANCE TOLERANCE**

$\pm 20 \%$ ;  $\pm 10 \%$ ;  $\pm 5 \%$

**LEADS**

Tinned wire

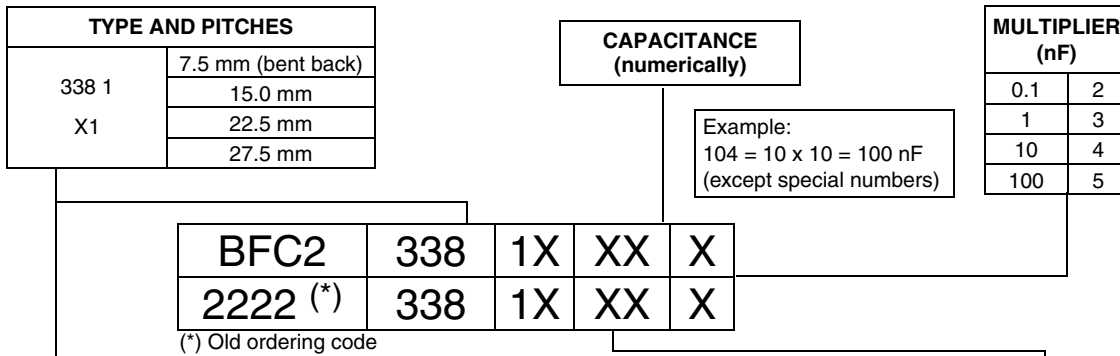
**MAXIMUM APPLICATION TEMPERATURE**

105 °C

**DETAIL SPECIFICATION**

For more detailed data and test requirements contact:  
[RFI@vishay.com](mailto:RFI@vishay.com)

## COMPOSITION OF CATALOG NUMBER



TYPE	PACKAGING	LEAD CONFIGURATION	C-TOL	PREFERRED TYPES
338 1 X1	Loose in box	Lead length 3.5 ± 0.3 mm	± 20 %	BFC2 338 10 ...
		Lead length 5.0 ± 1.0 mm		BFC2 338 12 ...
		Lead length 25.0 ± 2.0 mm		BFC2 338 14 ...
	Taped on reel (1)	Bent back to 7.5 mm; H = 16.0 mm; P <sub>0</sub> = 15.0 mm; reel diameter = 500 mm		BFC2 338 16 ...
<b>ALTERNATIVE TAPED VERSIONS</b>				
338 1 X1 X1	Taped on reel (1)	H = 18.5 mm; for P <sub>0</sub> = 12.7 mm; reel diameter = 500 mm	± 20 %	BFC2 338 17 ...
<b>ALTERNATIVE C-TOL.</b>				
338 1 X1	Loose in box	Lead length 3.5 ± 0.3 mm	± 10 %	See tables for detail
			± 5 %	
		Lead length 5.0 ± 1.0 mm	± 10 %	
			± 5 %	
	Taped on reel (1)	Lead length 25.0 ± 2.0 mm	± 10 %	
			± 5 %	
		Bent back to 7.5 mm; H = 16.0 mm; P <sub>0</sub> = 15.0 mm; reel diameter = 500 mm	± 10 %	
			± 5 %	
H = 18.5 mm; P <sub>0</sub> = 12.7 mm; reel diameter = 500 mm	± 10 %			
	± 5 %			

### Note

(1) For detailed tape specification refer to Packaging Information: [www.vishay.com/doc?28139](http://www.vishay.com/doc?28139) or end of catalog

## SPECIFIC REFERENCE DATA

DESCRIPTION	VALUE
Rated AC voltage (U <sub>Rac</sub> )	440 V
Permissible DC voltage (U <sub>Rdc</sub> )	1000 V
Tangent of loss angle:	at 1 kHz      at 10 kHz
C ≤ 470 nF	≤ 10 x 10 <sup>-4</sup> ≤ 20 x 10 <sup>-4</sup>
C > 470 nF	≤ 20 x 10 <sup>-4</sup> ≤ 70 x 10 <sup>-4</sup>
Rated voltage pulse slope (dU/dt) <sub>R</sub> at 615 Vdc	
Pitch = 15 mm and 7.5 mm (bent back)	250 V/μs
Pitch = 22.5 mm	150 V/μs
Pitch = 27.5 mm	100 V/μs
R between leads, for C ≤ 0.33 μF at 100 V, 1 min	> 15 000 MΩ
RC between leads, for C > 0.33 μF at 100 V, 1 min	> 5000 s
R between leads and case, 100 V, 1 min	> 30 000 MΩ
Withstanding (DC) voltage (cut off current 10 mA), rise time 100 V/s	3400 V, 1 min
Withstanding (AC) voltage between leads and case	2380 V, 1 min
Maximum application temperature	105 °C



Interference Suppression Film Capacitors Vishay BCcomponents  
MKP Radial Potted Type

C - tol. = ± 20 %

C (µF)	DIMENSIONS w x h x l (mm)	MASS (g) <sup>(1)</sup>	CATALOG NUMBER BFC2 338 1XXXX AND PACKAGING						
			LOOSE IN BOX				TAPED		
			Short leads			Long leads		Reel diameter = 500 mm	
			$l_t =$ 3.5 ± 0.3 mm	$l_t =$ 5.0 ± 1.0 mm	SPQ	$l_t =$ 25.0 ± 2.0 mm	SPQ	H = 18.5 mm; P <sub>0</sub> = 12.7 mm	SPQ
<b>Pitch = 15.0 ± 0.4 mm; d<sub>t</sub> = 0.60 ± 0.06 mm</b>									
0.01	5.0 x 11.0 x 17.5	1.0	10103	12103	1000	14103	1000	17103	1100
0.012			10123	12123		14123		17123	
0.015			10153	12153		14153		17153	
0.018			10183	12183		14183		17183	
0.022			10223	12223		14223		17223	
0.027	6.0 x 12.0 x 17.5	1.4	10273	12273	1000	14273	1000	17273	900
0.033			10333	12333		14333		17333	
<b>Pitch = 15.0 ± 0.4 mm; d<sub>t</sub> = 0.80 ± 0.08 mm</b>									
0.039	7.0 x 13.5 x 17.5	1.8	10393	12393	750	14393	500	17393	800
0.047			10473	12473		14473		17473	
0.056	8.5 x 15.0 x 17.5	2.4	10563	12563	750	14563	500	17563	650
0.068			10683	12683		14683		17683	
0.082	10.0 x 16.5 x 17.5	3.0	10823	12823	500	14823	450	17823	600
0.1			10104	12104		14104		17104	
<b>Pitch = 22.5 ± 0.4 mm; d<sub>t</sub> = 0.80 ± 0.08 mm</b>									
0.12	8.5 x 18.0 x 26.0	3.8	10124	12124	200	14124	250	17124	450
0.15			10154	12154		14154		17154	
0.18	10.0 x 19.5 x 26.0	6.8	10184	12184	200	14184	200	17184	350
0.22			10224	12224		14224		17224	
<b>Pitch = 27.5 ± 0.4 mm; d<sub>t</sub> = 0.80 ± 0.08 mm</b>									
0.27	11.0 x 21.0 x 31.0	7.4	10274	12274	100	14274	125		
0.33	13.0 x 23.0 x 31.0	9.2	10334	12334	100	14334	125		
0.39	15.0 x 25.0 x 31.0	12.3	10394	12394	100	14394	125		
0.47			10474	12474		14474			
0.56	18.0 x 28.0 x 31.0	16.1	10564	12564	100	14564	100		
0.68			10684	12684		14684			
0.82	21.0 x 31.0 x 31.0	20.3	10824	12824	50	14824	75		
1.00			10105	12105		14105			

Notes

- (1) Weight for short lead products only
- SPQ = Standard Packing Quantity

Bent back pitch 7.5 mm (only taped); C-tol. = ± 20 %

C (µF)	DIMENSIONS w x h x l (mm)	MASS (g) <sup>(2)</sup>	CATALOG NUMBER BFC2 338 1XXXX AND PACKAGING						
			LOOSE IN BOX				TAPED		
			Short leads			Long leads		Reel diameter = 500 mm <sup>(1)</sup>	
			$l_t =$ 3.5 ± 0.3 mm	$l_t =$ 5.0 ± 1.0 mm	SPQ	$l_t =$ 25.0 ± 2.0 mm	SPQ	H = 16.0 mm; P <sub>0</sub> = 15.0 mm	SPQ
<b>Original pitch = 15.0 mm; bent back pitch = 7.5 ± 0.4 mm; d<sub>t</sub> = 0.60 ± 0.06 mm</b>									
0.010	5.0 x 13.0 x 17.5	1.0						16103	950
0.012								16123	
0.015								16153	
0.018								16183	
0.022								16223	
0.027	6.0 x 14.0 x 17.5	1.4						16273	800
0.033								16333	
<b>Original pitch = 15.0 mm; bent back pitch = 7.5 ± 0.4 mm; d<sub>t</sub> = 0.80 ± 0.08 mm</b>									
0.039	7.0 x 15.5 x 17.5	1.8						16393	700
0.047								16473	
0.056	8.5 x 17.0 x 17.5	1.4						16563	550
0.068								16683	
0.082	10.0 x 18.5 x 17.5	3.0						16823	500
0.100								16104	

Notes

- (1) Weight for short lead products only
- SPQ = Standard Packing Quantity

# MKP 338 1 X1



## Vishay BCcomponents Interference Suppression Film Capacitors MKP Radial Potted Type

C-tol. = ± 10 %

C (µF)	DIMENSIONS w x h x l (mm)	MASS (g) <sup>(1)</sup>	CATALOG NUMBER BFC2 338 1XXXX AND PACKAGING						
			LOOSE IN BOX					TAPED	
			Short leads			Long leads		Reel diameter = 500 mm <sup>(1)</sup>	
			$l_t = 3.5 \pm 0.3$ mm	$l_t = 5.0 \pm 1.0$ mm	SPQ	$l_t = 25.0 \pm 2.0$ mm	SPQ	H = 18.5 mm; P <sub>0</sub> = 12.7 mm	SPQ
<b>Pitch = 15.0 ± 0.4 mm; d<sub>t</sub> = 0.60 ± 0.06 mm</b>									
0.010	5.0 x 11.0 x 17.5	1.0	18114	18314	1000	18514	1000	18914	1100
0.012			18115	18315		18515		18915	
0.015			18116	18316		18516		18916	
0.018			18117	18317		18517		18917	
0.022	6.0 x 12.0 x 17.5	1.4	18118	18318	1000	18518	1000	18918	900
0.027			18119	18319		18519		18919	
<b>Pitch = 15.0 ± 0.4 mm; d<sub>t</sub> = 0.80 ± 0.08 mm</b>									
0.033	7.0 x 13.5 x 17.5	1.8	18121	18321	750	18521	500	18921	800
0.039			18122	18322		18522		18922	
0.047	8.5 x 15.0 x 17.5	2.4	18123	18323	750	18523	500	18923	650
0.056			18124	18324		18524		18924	
0.068	10.0 x 16.5 x 17.5	3.0	18125	18325	500	18525	450	18925	600
0.082			18126	18326		18526		18926	
<b>Pitch = 22.5 ± 0.4 mm; d<sub>t</sub> = 0.80 ± 0.08 mm</b>									
0.10	7.0 x 16.5 x 26.0	2.9	18127	18327	200	18527	250	18927	550
0.12	8.5 x 18.0 x 26.0	3.8	18128	18328	200	18528	250	18928	450
0.15			18129	18329		18529		18929	
0.18	10.0 x 19.5 x 26.0	6.8	18131	18331	200	18531	200	18931	350
<b>Pitch = 27.5 ± 0.4 mm; d<sub>t</sub> = 0.80 ± 0.08 mm</b>									
0.22	11.0 x 21.0 x 31.0	7.4	18132	18332	100	18532	125	18932	500
0.27			18133	18333		18533			
0.33	13.0 x 23.0 x 31.0	9.2	18134	18334	100	18534	125		
0.39	15.0 x 25.0 x 31.0	12.3	18135	18335	100	18535	125		
0.47			18136	18336		18536			
0.56	18.0 x 28.0 x 31.0	16.1	18137	18337	100	18537	100		
0.68			18138	18338		18538			
0.82	21.0 x 31.0 x 31.0	20.3	18139	18339	50	18539	75		

### Notes

- <sup>(1)</sup> Weight for short lead products only
- SPQ = Standard Packing Quantity

Bent back pitch 7.5 mm (only taped); C-tol. = ± 10 %

C (µF)	DIMENSIONS w x h x l (mm)	MASS (g) <sup>(2)</sup>	CATALOG NUMBER BFC2 338 1XXXX AND PACKAGING						
			LOOSE IN BOX					TAPED	
			Short leads			Long leads		Reel diameter = 500 mm <sup>(1)</sup>	
			$l_t = 3.5 \pm 0.3$ mm	$l_t = 5.0 \pm 1.0$ mm	SPQ	$l_t = 25.0 \pm 2.0$ mm	SPQ	H = 18.5 mm; P <sub>0</sub> = 12.7 mm	SPQ
<b>Original pitch = 15.0 mm; bent back pitch = 7.5 ± 0.4 mm; d<sub>t</sub> = 0.60 ± 0.06 mm</b>									
0.010	5.0 x 13.0 x 17.5	1.0						18714	950
0.012								18715	
0.015								18716	
0.018								18717	
0.022	6.0 x 14.0 x 17.5	1.4						18718	800
0.027								18719	
<b>Original pitch = 15.0 mm; bent back pitch = 7.5 ± 0.4 mm; d<sub>t</sub> = 0.80 ± 0.08 mm</b>									
0.033	7.0 x 15.5 x 17.5	1.8						18721	700
0.039								18722	
0.047	8.5 x 17.0 x 17.5	2.4						18723	550
0.056								18724	
0.068	10.0 x 18.5 x 17.5	3.0						18725	500
0.082								18726	

### Notes

- <sup>(1)</sup> Reel diameter = 356 mm is available on request
- <sup>(2)</sup> Weight for short lead products only
- SPQ = Standard Packing Quantity



Interference Suppression Film Capacitors Vishay BCcomponents  
MKP Radial Potted Type

C-tol. = ± 5 %

C (µF)	DIMENSIONS w x h x l (mm)	MASS (g) <sup>(1)</sup>	CATALOG NUMBER BFC2 338 1XXXX AND PACKAGING						
			LOOSE IN BOX				TAPED		
			Short leads			Long leads		Reel diameter = 500 mm	
			$l_t =$ 3.5 ± 0.3 mm	$l_t =$ 5.0 ± 1.0 mm	SPQ	$l_t =$ 25.0 ± 2.0 mm	SPQ	H = 18.5 mm; P <sub>0</sub> = 12.7 mm	SPQ
<b>Pitch = 15.0 ± 0.4 mm; d<sub>t</sub> = 0.60 ± 0.06 mm</b>									
0.010	5.0 x 11.0 x 17.5	1.0	18214	18414	1000	18614	1000	18934	1100
0.012			18215	18415		18615		18935	
0.015			18216	18416		18616		18936	
0.018			18217	18417		18617		18937	
0.022	6.0 x 12.0 x 17.5	1.4	18218	18418	1000	18618	1000	18938	900
0.027			18219	18419		18619		18939	
<b>Pitch = 15.0 ± 0.4 mm; d<sub>t</sub> = 0.80 ± 0.08 mm</b>									
0.033	7.0 x 13.5 x 17.5	1.8	18221	18421	750	18621	500	18941	800
0.039			18222	18422		18622		18942	
0.047	8.5 x 15.0 x 17.5	2.4	18223	18423	750	18623	500	18943	650
0.056			18224	18424		18624		18944	
0.068	10.0 x 16.5 x 17.5	3.0	18225	18425	500	18625	450	18945	600
0.082			18226	18426		18626		18946	
<b>Pitch = 22.5 ± 0.4 mm; d<sub>t</sub> = 0.80 ± 0.08 mm</b>									
0.10	8.5 x 18.0 x 26.0	3.8	18227	18427	200	18627	250	18947	450
0.12			18228	18428		18628		18948	
0.15	10.0 x 19.5 x 26.0	4.4	18229	18429	200	18629	200	18949	350
0.18			18231	18431		18631		18951	
<b>Pitch = 27.5 ± 0.4 mm; d<sub>t</sub> = 0.80 ± 0.08 mm</b>									
0.22	11.0 x 21.0 x 31.0	7.4	18232	18432	100	18632	125		
0.27	13.0 x 23.0 x 31.0	9.2	18233	18433	100	18633	125		
0.33			18234	18434		18634			
0.39	15.0 x 25.0 x 31.0	12.3	18235	18435	100	18635	125		
0.47			18236	18436		18636			
0.56	18.0 x 28.0 x 31.0	16.1	18237	18437	100	18637	100		
0.68			18238	18438		18638			
0.82	21.0 x 31.0 x 31.0	20.3	18239	18439	50	18639	75		

Notes

- (1) Weight for short lead products only
- SPQ = Standard Packing Quantity

Bent back pitch (only taped); C-tol. = ± 5 %

C (µF)	DIMENSIONS w x h x l (mm)	MASS (g) <sup>(2)</sup>	CATALOG NUMBER BFC2 338 1XXXX AND PACKAGING						
			LOOSE IN BOX				TAPED		
			Short leads			Long leads		Reel diameter = 500 mm <sup>(1)</sup>	
			$l_t =$ 3.5 ± 0.3 mm	$l_t =$ 5.0 ± 1.0 mm	SPQ	$l_t =$ 25.0 ± 2.0 mm	SPQ	H = 16.0 mm; P <sub>0</sub> = 15.0 mm	SPQ
<b>Original pitch = 15.0 mm; bent back pitch = 7.5 ± 0.4 mm; d<sub>t</sub> = 0.60 ± 0.06 mm</b>									
0.010	5.0 x 13.0 x 17.5	1.0						18814	950
0.012								18815	
0.015								18816	
0.018								18817	
0.022	6.0 x 14.0 x 17.5	1.4						18818	800
0.027								18819	
<b>Original pitch = 15.0 mm; bent back pitch = 7.5 ± 0.4 mm; d<sub>t</sub> = 0.80 ± 0.08 mm</b>									
0.033	7.0 x 15.5 x 17.5	1.8						18821	700
0.039								18822	
0.047	8.5 x 17.0 x 17.5	2.4						18823	550
0.056								18824	
0.068	10.0 x 18.5 x 17.5	3.0						18825	500
0.082								18826	



Notes

- (1) Reel diameter = 356 mm is available on request
- (2) Weight for short lead products only
- SPQ = Standard Packing Quantity

## APPROVALS

SAFETY APPROVALS X1	VOLTAGE	VALUE	FILE NUMBERS
EN 60384-14 (ENEC) (= IEC 60384-14 ed-3)	440 Vac	10 nF to 1 $\mu$ F	F1 2008060
UL1414	250 Vac	10 nF to 1 $\mu$ F	E112471
UL1283	440 Vac	10 nF to 100 nF	E109565
UL1283 and (CSA-C22.2 No. 8)	440 Vac	100 nF to 1 $\mu$ F	E109565
CB-Test Certificate	440 Vac	10 nF to 1 $\mu$ F	F1 5256

The Enec-approval together with the CB-Certificate replace all national 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; Switzerland and United Kingdom.

## MOUNTING

### Normal Use

The capacitors are designed for mounting on printed-circuit boards. The capacitors packed in bandoliers are designed for mounting in printed-circuit boards by means of automatic insertion machines.

For detailed tape specifications refer to:

“Packaging Information”: [www.vishay.com/doc?28139](http://www.vishay.com/doc?28139) or end of catalog

### Specific Method of Mounting to Withstand Vibration and Shock

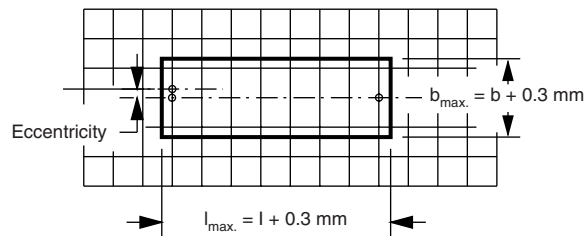
In order to withstand vibration and shock tests, it must be ensured that the stand-off pips are in good contact with the printed-circuit board:

- For pitches  $\leq 15$  mm capacitors shall be mechanically fixed by the leads
- For longer 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 drawing:

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



CBA116

### Storage Temperature

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

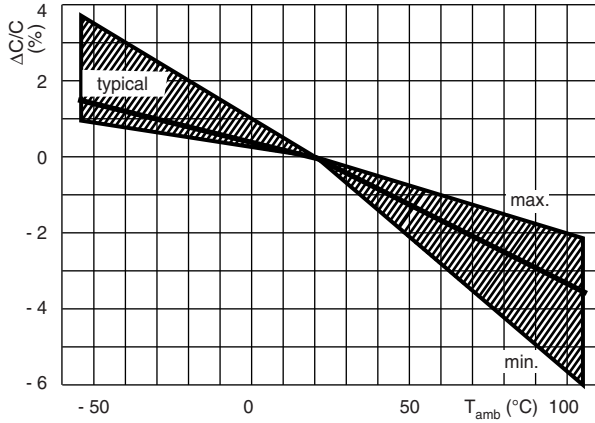
### Ratings and Characteristics Reference Conditions

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

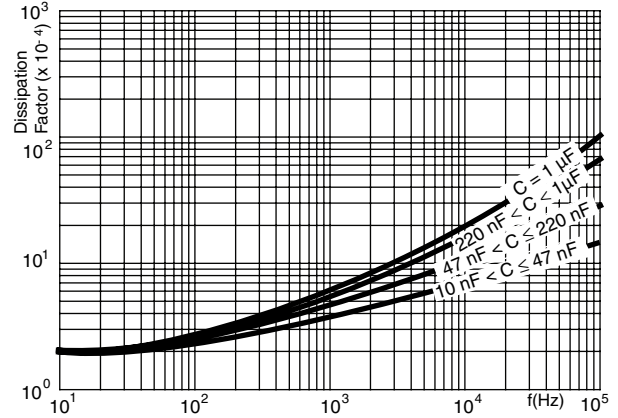
For reference testing, a conditioning period shall be applied over  $96$  h  $\pm 4$  h by heating the products in a circulating air oven at the rated temperature and a relative humidity not exceeding 20 %.

### CHARACTERISTICS

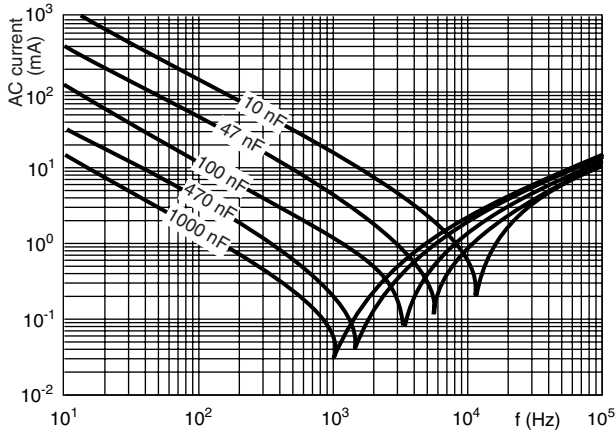
Capacitance as a function of ambient temperature (typical curve)



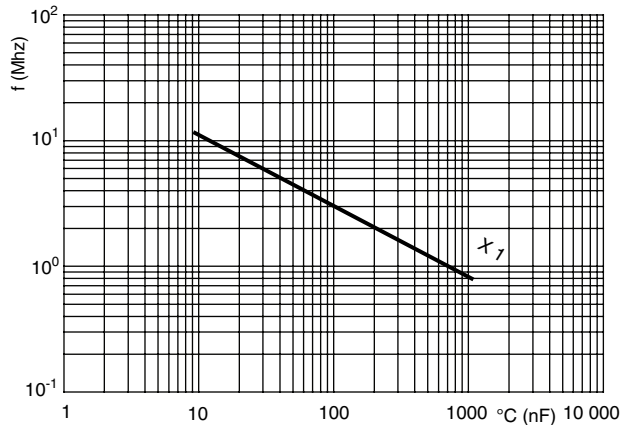
Tangent of loss angle as a function of frequency (typical curve)



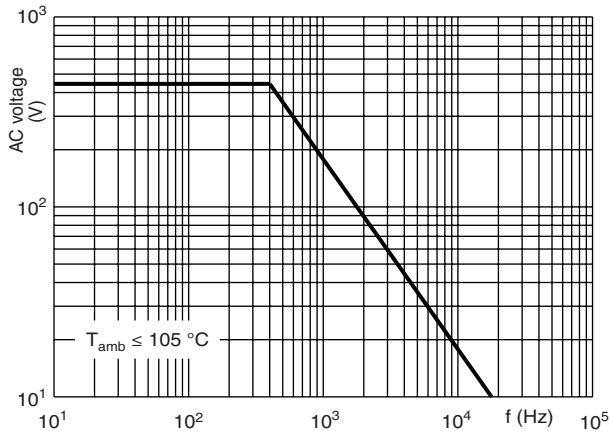
Impedance as a function of frequency (typical curve)



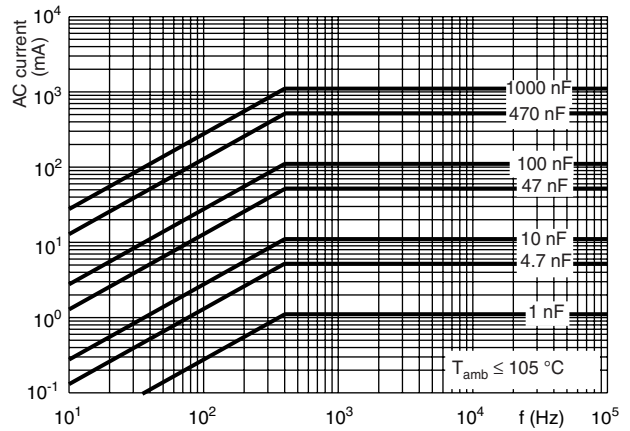
Resonant frequency as a function of capacitance (typical curve)



Max. RMS voltage as a function of frequency

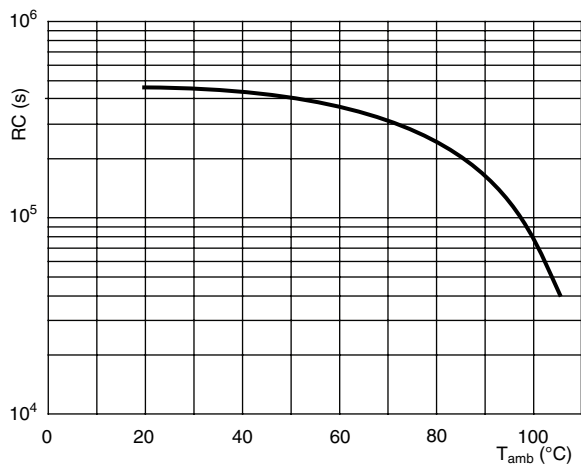


Max. RMS current as a function of frequency





Insulation resistance as a function of ambient temperature



## APPLICATION NOTES

- For X1 electromagnetics interference suppression in **standard across the line applications** (50/60 Hz) with a maximum mains voltage of 440 Vac.
- For series impedance applications we refer to Application Note [www.vishay.com/doc?28153](http://www.vishay.com/doc?28153)
- These capacitors are not intended for continuous pulse applications. For these situations, capacitors of the AC and pulse programs must be used.
- 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 Vdc and divided by the applied voltage.





**INSPECTION REQUIREMENTS**

**General Notes:**

1. Sub-clause numbers of tests and performance requirements refer to the “Sectional Specification, Publication IEC 60384-14 ed-3 and Specific Reference Data.”

**Group C Inspection Requirements**

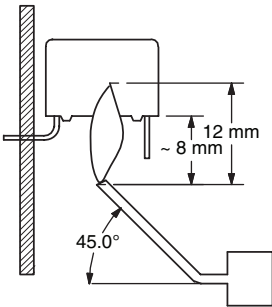
SUB-CLAUSE NUMBER AND TEST	CONDITIONS	PERFORMANCE REQUIREMENTS
<b>SUB-GROUP C1A PART OF SAMPLE OF SUB-GROUP C1</b>		
4.1 Dimensions (detail)  Initial measurements	Capacitance Tangent of loss angle at 10 kHz	As specified in chapters “General data” of this specification
4.3 Robustness o terminations	Tensile: load 10 N; 10 s Bending: load 5 N; 4 x 90°	No visible damage
4.4 Resistance to soldering heat	No pre-drying Method: 1A Solder bath: 280 °C ± 5 °C Duration: 10 s	
4.19 Component solvent resistance	Isopropylalcohol at room temperature Method: 2 Immersion time: 5 ± 0.5 min Recovery time: Min. 1 h, max 2 h	
4.4.2 Final measurements	Visual examination  Capacitance  Tangent of loss angle  Insulation resistance	No visible damage Legible marking  $ \Delta C/C  \leq 5\%$ of the value measured initially  Increase of $\tan \delta \leq 0.008$ Compared to values measured initially  As specified in section “Insulation resistance” of this specification
<b>SUB-GROUP C1B PART OF SAMPLE OF SUB-GROUP C1</b>		
Initial measurements	Capacitance Tangent of loss angle at 10 kHz	
4.20 Solvent resistance of the marking	Isopropylalcohol at room temperature Method: 1 Rubbing material: cotton wool Immersion time: 5 ± 0.5 min	No visible damage Legible marking
4.6 Rapid change of temperature	0A = - 55 °C 0B = + 105 °C 5 cycles  Duration t = 30 min	





Interference Suppression Film Capacitors Vishay BCcomponents  
MKP Radial Potted Type

SUB-CLAUSE NUMBER AND TEST	CONDITIONS	PERFORMANCE REQUIREMENTS
<b>SUB-GROUP C2</b>		
4.12 Damp heat steady state	56 days, 40 °C, 90 to 95 % RH No load	
4.12.1 Initial measurements  4.12.3 Final measurements	Capacitance Tangent of loss angle at 1 kHz  Visual examination  Capacitance  Tangent of loss angle  Voltage proof 1900 Vdc; 1 min between terminations  Insulation resistance	No visible damage Legible marking  $ \Delta C/C  \leq 5\%$ of the value measured in 4.12.1.  Increase of $\tan \delta \leq 0.008$ Compared to values measured in 4.12.1.  No permanent breakdown or flash-over  $\geq 50\%$ of values specified in section "Insulation resistance" of this specification
<b>SUB-GROUP C3</b>		
4.13.1 Initial measurements  4.13 Impulse voltage  4.14 Endurance  4.14.7 Final measurements	Capacitance Tangent of loss angle at 10 kHz  3 successive impulses, full wave, peak voltage: X1: 4 kV Max. 24 pulses  Duration: 1000 h $1.25 \times U_{RAC}$ at 105 °C Once in every hour the voltage is increased to $1000 V_{RMS}$ for 0.1 s via resistor of $47 \Omega \pm 5\%$  Visual examination  Capacitance  Tangent of loss angle  Voltage proof 1900 Vdc; 1 min between terminations 2380 Vac; 1 min between terminations and case.  Insulation resistance	No self healing breakdowns or flash-over      No visible damage Legible marking  $ \Delta C/C  \leq 10\%$ compared to values measured in 4.13.1.  Increase of $\tan \delta \leq 0.008$ Compared to values measured in 4.13.1.  No permanent breakdown or flash-over  $\geq 50\%$ of values specified in section "Insulation resistance" of this specification
<b>SUB-GROUP C4</b>		
4.15 Charge and discharge  4.15.1 Initial measurements	10 000 cycles  Charged to 615 Vdc Discharge resistance: $R = \frac{615 \text{ Vdc}}{1.5 \times C (dU/dt)}$  Capacitance Tangent of loss angle at 10 kHz	

SUB-CLAUSE NUMBER AND TEST	CONDITIONS	PERFORMANCE REQUIREMENTS
4.15.3 Final measurements	Capacitance  Tangent of loss angle  Insulation resistance	$ \Delta C/C  \leq 10\%$ compared to values measured in 4.15.1.  Increase of $\tan \delta \leq 0.008$ Compared to values measured in 4.15.1.  $\geq 50\%$ of values specified in section "Insulation resistance" of this specification
<b>SUB-GROUP C5</b>		
4.16 Radio frequency characteristic	Resonance frequency	$\geq 0.9$ times value as specified in section "Resonant frequency" of this specification
<b>SUB-GROUP C6</b>		
4.17 Passive flammability Class B	Bore of gas jet: $\varnothing 0.5$ mm Fuel: Butane Test duration for actual volume $V$ in $\text{mm}^3$ : $V \leq 250$ : 10 s $250 < V \leq 500$ : 20 s $500 < V \leq 1750$ : 30 s $V > 1750$ : 60 s One flame application  	After removing test flame from capacitor, the capacitor must not continue to burn for more than 10 s. No burning particle must drop from the sample.
<b>SUB-GROUP C7</b>		
4.18 Active flammability	20 cycles of 4 kV discharges on the test capacitor connected to $U_{\text{Rac}}$	The cheese cloth around the capacitors shall not burn with a flame. No electrical measurements are required.



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