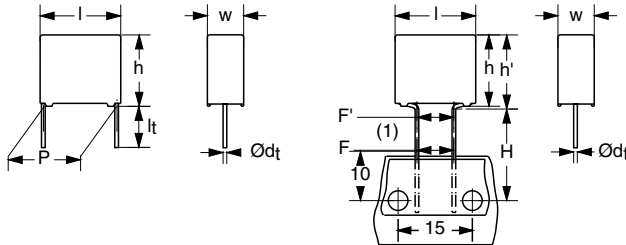


# Interference Suppression Film Capacitors

## MKP Radial Potted Type



Dimensions in mm

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

### APPLICATIONS

X2 class

For X2 electromagnetic interference suppression in across the line applications (50/60 Hz) with a maximum mains voltage of 275 Vac.

These capacitors are not intended for continuous pulse applications. For these situations, capacitors of the AC and Pulse program must be used.

### REFERENCE STANDARDS

"IEC 60384-14 2nd edition and EN 132400"

"IEC 60065, pass. flamm. class B"

250 V: CSA-C22.2 No 1; UL1414

275 V: CSA-C22.2 No 8; CCEE; ENEC; CQC

305 V: UL1283

### MARKING

C-value; tolerance; rated voltage; sub-class; manufacturer's type designation; code for dielectric material, only for pitch  $\geq 15\text{mm}$ ; manufacturer location; manufacturer's emblem; year and week

### DIELECTRIC

Polypropylene film

### ELECTRODES

Metallized film

### CONSTRUCTION

Mono construction

### FEATURES

7.5 to 27.5 mm lead pitch. Supplied loose in box, taped on ammpack or reel

Lead (Pb)-free product

RoHS-compliant product

### RATED VOLTAGE

AC 275 V; 50 to 60 Hz

### PERMISSIBLE DC VOLTAGE

DC 630 V

### ENCAPSULATION

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

### CLIMATIC TESTING CLASS ACC. TO EN 60068-1

55/105/56/B

### CAPACITANCE RANGE (E12 SERIES)

E12 series 0.001 to 3.3  $\mu\text{F}$

Preferred values acc. to E6

### CAPACITANCE TOLERANCE

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

### LEADS

Tinned wire

### RATED TEMPERATURE

105 °C

### MAXIMUM APPLICATION TEMPERATURE

105 °C

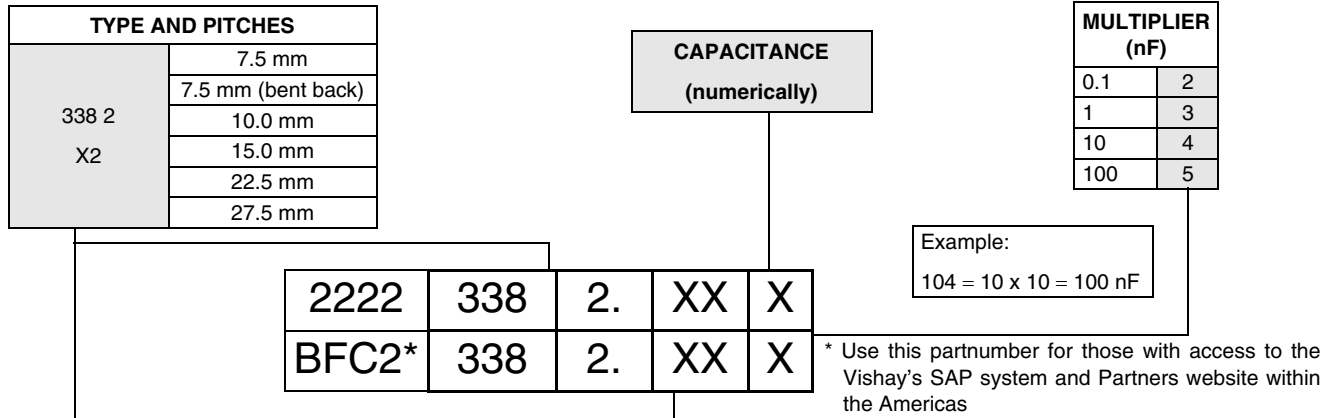
### DETAIL SPECIFICATION

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



**RoHS**  
COMPLIANT

## COMPOSITION OF CATALOG NUMBER



TYPE	PACKAGING	STANDARD DIMENSIONS	C-TOL	PREFERRED TYPES
338 2 X2	loose in box	lead length 3.5 + 1/- 0.5 mm or 3.5 ± 0.3 mm	± 20 %	20
		lead length 5.0 ± 1.0 mm		22
lead length 25.0 ± 2.0 mm		24		
taped	pitch 7.5 mm or bent back to 7.5 mm	26		
		<b>ALTERNATIVE LARGER PITCH SIZES</b>		<b>ON REQUEST</b>
338 2 X2	loose in box	lead length 3.5 + 1/- 0.5 mm or 3.5 ± 0.3 mm	± 20 %	see tables for details
		lead length 5.0 ± 1.0 mm		
		lead length 25.0 ± 2.0 mm		
		<b>ALTERNATIVE TAPED VERSION</b>		<b>ON REQUEST</b>
338 2 X2	taped	H = 18.5 mm; for P <sub>0</sub> = 12.7 mm	± 20 %	see tables for details
		<b>ALTERNATIVE C-TOL</b>		<b>ON REQUEST</b>
338 2 X2	loose in box	lead length 3.5 + 1/- 0.5 mm or 3.5 ± 0.3 mm	± 10 %	see tables for details
		lead length 5.0 ± 1.0 mm	± 10 %	
		lead length 25.0 ± 2.0 mm	± 10 %	
	taped	pitch 7.5 mm or bent back to 7.5 mm	± 10 %	see tables for details
		H = 18.5 mm; for P <sub>0</sub> = 12.7 mm	± 10 %	
	loose in box	lead length 3.5 + 1/- 0.5 mm or 3.5 ± 0.3 mm	± 5 %	contact: filmcaps.roeselare@vishay.com
		lead length 5.0 ± 1.0 mm	± 5 %	
		lead length 25.0 ± 2.0 mm	± 5 %	
	taped	pitch 7.5 mm or bent back to 7.5 mm	± 5 %	
		H = 18.5 mm; for P <sub>0</sub> = 12.7 mm	± 5 %	

## SPECIFIC REFERENCE DATA MKP 338 2 275 VAC

DESCRIPTION	VALUE		
	at 1 kHz	at 10 kHz	at 100 kHz
Tangent of loss angle:			
C ≤ 470 nF	≤ 10 × 10 <sup>-4</sup>	≤ 20 × 10 <sup>-4</sup>	≤ 100 × 10 <sup>-4</sup>
470 nF < C ≤ 1 μF	≤ 20 × 10 <sup>-4</sup>	≤ 70 × 10 <sup>-4</sup>	-
C > 1 μF	≤ 30 × 10 <sup>-4</sup>	-	-
Rated voltage pulse slope (dU/dt) <sub>R</sub> 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 Vishay BCcomponents  
MKP Radial Potted Type

$U_{Rac} = 275 V$ ;  $C-tol = \pm 20 \%$

C ( $\mu F$ )	DIMENSIONS <sup>(1)</sup> w × H (h') × L (mm)	MASS (g)	CATALOG NUMBER 2222 338 ..... AND PACKAGING										
			LOOSE IN BOX					TAPED					
			Short leads			long leads			SPQ				
			lt = 3.5 + 1/- 0.5 mm <sup>(2)</sup>	lt = 5.0 ± 1.0 mm	SPQ	lt = 25.0 ± 2.0 mm	SPQ						
<b>Pitch = 7.5 ± 0.4 mm; d<sub>t</sub> = 0.50 ± 0.05 mm</b>							<b>ammopack: H = 18.5 mm; P<sub>0</sub> = 12.7 mm</b>						
0.001	4.0 × 9.0 × 10.0	0.5	20102	22102	1500	24102	1000	26102	1250				
0.0015			20152	22152		24152		26152					
0.0022			20222	22222		24222		26222					
0.0033			20332	22332		24332		26332					
0.0047			20472	22472		24472		26472					
0.0068			20682	22682		24682		26682					
0.01			20103	22103		24103		26103					
0.015			20153	22153		24153		26153					
0.022			20223	22223		24223		26223					
0.033	5.0 × 10.5 × 10.0	0.9	20333	22333	1000	24333	1250	26333	1000				
0.047	6.0 × 11.5 × 10.0	1.0	20473	22473	750	24473	1000	26473	750				
<b>Pitch = 10.0 ± 0.4 mm; d<sub>t</sub> = 0.60 ± 0.06 mm</b>							<b>ammopack: H = 18.5 mm; P<sub>0</sub> = 12.7 mm</b>						
0.001	4.0 × 10.0 × 12.5	0.6	21102	23102	1000	25102	1250						
0.0015			21152	23152		25152							
0.0022			21222	23222		25222							
0.0033			21332	23332		25332							
0.0047			21472	23472		25472							
0.0068			21682	23682		25682							
0.01			5.0 × 11.0 × 12.5	0.9		21103				23103	1000	25103	1000
0.015						21153				23153		25153	
0.022						21223				23223		25223	
0.033	21333	23333			25333								
0.047	21473	23473	25473										
0.068	6.0 × 12.0 × 12.5	1.0	20683	22683	750	24683	750	27683	500				
0.1			20104	22104		24104		27104					
<b>Original pitch = 10.0 mm; bent back pitch = 7.5 ± 0.4 mm; d<sub>t</sub> = 0.60 ± 0.06 mm</b>							<b>reel: diameter = 500 mm<sup>(3)</sup> H = 16.0 mm; P<sub>0</sub> = 15.0 mm</b>						
0.068	6.0 × 12.0 (14.0) × 12.5	1.0						26683	1500				
0.1			26104										

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

C ( $\mu$ F)	DIMENSIONS <sup>(1)</sup> w × H (h') × L (mm)	MASS (g)	CATALOG NUMBER 2222 338 ..... AND PACKAGING						
			LOOSE IN BOX					TAPED	
			Short leads			long leads			SPQ
			l <sub>t</sub> = 3.5 + 1/- 0.5 mm <sup>(2)</sup>	l <sub>t</sub> = 5.0 ± 1.0 mm	SPQ	l <sub>t</sub> = 25.0 ± 2.0 mm	SPQ		
<b>Pitch = 15.0 ± 0.4 mm; d<sub>t</sub> = 0.60 ± 0.06 mm</b>							<b>reel: diameter = 500 mm H = 18.5 mm; P<sub>0</sub> = 12.7 mm</b>		
0.01	5.0 × 11.0 × 17.5	1.2	29076	29096	1000	29116	1000	29141	1100
0.015			29078	29098		29118		29145	
0.022			29081	29101		29121		29149	
0.033			29083	29103		29123		29154	
0.047			29085	29105		29125		29158	
0.068			21683	23683		25683		29163	
0.1			21104	23104		25104		29166	
<b>Pitch = 15.0 ± 0.4 mm; d<sub>t</sub> = 0.80 ± 0.08 mm</b>							<b>reel: diameter = 500 mm H = 18.5 mm; P<sub>0</sub> = 12.7 mm</b>		
0.15	7.0 × 13.5 × 17.5	1.9	20154	22154	750	24154	500	27154	800
0.22	8.5 × 15.0 × 17.5	2.6	20224	22224	750	24224	500	27224	650
0.33	10.0 × 16.5 × 17.5	3.1	20334	22334	500	24334	450	27334	600
<b>Original pitch = 15.0 mm; bent back pitch = 7.5 ± 0.4 mm; d<sub>t</sub> = 0.80 ± 0.08 mm</b>							<b>reel: diameter = 500 mm<sup>(3)</sup> H = 16.0 mm; P<sub>0</sub> = 15.0 mm</b>		
0.15	7.0 × 13.5 (15.5) × 17.5	1.9					26154	700	
0.22	8.5 × 15.0 (17.0) × 17.5	2.6					26224	550	
0.33	10.0 × 16.5 (18.5) × 17.5	3.1					26334	500	
<b>Pitch = 22.5 ± 0.4 mm; d<sub>t</sub> = 0.80 ± 0.08 mm</b>							<b>reel: diameter = 500 mm H = 18.5 mm; P<sub>0</sub> = 12.7 mm</b>		
0.15	6.0 × 15.5 × 26.0	2.9	21154	23154	300	25154	250	29265	600
0.22	7.0 × 16.5 × 26.0	3.2	21224	23224	200	25224	250	29267	500
0.33			21334	23334		25334		29269	
0.47	8.5 × 18.0 × 26.0	4.4	20474	22474	200	24474	250	27474	450
0.56			20564	22564		24564		27564	
0.68	10.0 × 19.5 × 26.0	5.5	20684	22684	200	24684	200	27684	350
1	12.0 × 22.0 × 26.0	7.8	20105	22105	150	24105	200	27105	300
<b>Pitch = 27.5 ± 0.4 mm; d<sub>t</sub> = 0.80 ± 0.08 mm</b>							<b>reel: diameter = 500 mm H = 18.5 mm; P<sub>0</sub> = 12.7 mm</b>		
0.47	9.0 × 19.0 × 31.0	5.5	21474	23474	100	25474	150		
0.68	11.0 × 21.0 × 31.0	7.8	21684	23684	100	25684	125		
1.0			21105	23105		25105			
1.5	15.0 × 25.0 × 31.0	12.8	20155	22155	100	24155	125		
2.2	18.0 × 28.0 × 31.0	17.2	20225	22225	100	24225	100		
3.3	21.0 × 31.0 × 31.0	20.4	20335	22335	50	24335	75		

### Notes

- h = height for straight leads and h' = height for bent back leads.
- l<sub>t</sub> = 3.5 ± 0.3 mm for pitch = 15 mm; 22.5 mm and 27.5 mm.
- Reel diameter = 356 mm is available on request.



Interference Suppression Film Capacitors Vishay BCcomponents  
MKP Radial Potted Type

$U_{Rac} = 275 V$ ;  $C-tol = \pm 10 \%$

C ( $\mu F$ )	DIMENSIONS <sup>(1)</sup> w × H (h') × L (mm)	MASS (g)	CATALOG NUMBER 2222 338 ..... AND PACKAGING						
			LOOSE IN BOX					TAPED	
			Short leads			long leads			SPQ
			lt = 3.5 + 1/- 0.5 mm <sup>(2)</sup>	lt = 5.0 ± 1.0 mm	SPQ	lt = 25.0 ± 2.0 mm	SPQ		
<b>Pitch = 7.5 ± 0.4 mm; d<sub>t</sub> = 0.50 ± 0.05 mm</b>							<b>ammopack: H = 18.5 mm; P<sub>0</sub> = 12.7 mm</b>		
0.001	4.0 × 9.0 × 10.0	0.5	28101	28301	1500	28501	1000	28701	1250
0.0015			28103	28303		28503		28703	
0.0022			28105	28305		28505		28705	
0.0033			28107	28307		28507		28707	
0.0047			28109	28309		28509		28709	
0.0068			28112	28312		28512		28712	
0.01			28114	28314		28514		28714	
0.015			28116	28316		28516		28716	
0.022			28118	28318		28518		28718	
0.033	5.0 × 10.5 × 10.0	0.9	28121	28321	1000	28521	1250	28721	1000
0.047	6.0 × 11.5 × 10.0	1.0	28123	28323	750	28523	1000	28723	750
<b>Pitch = 10.0 ± 0.4 mm; d<sub>t</sub> = 0.60 ± 0.06 mm</b>							<b>ammopack: H = 18.5 mm; P<sub>0</sub> = 12.7 mm</b>		
0.001	4.0 × 10.0 × 12.5	0.6	29194	29217	1000	29241	1250		
0.0015			29196	29219		29243			
0.0022			29198	29222		29245			
0.0033	5.0 × 11.0 × 12.5	0.9	29201	29224	1000	29247	1000		
0.0047			29203	29226		29249			
0.0068			29205	29228		29252			
0.01			29207	29231		29254			
0.015			29209	29233		29256			
0.022			29212	29235		29258			
0.033			29214	29237		29261			
0.047			29216	29239		29263			
0.068	6.0 × 12.0 × 12.5	1.0	28125	28325	750	28525	750	28925	500
<b>Original pitch = 10.0 mm; bent back pitch = 7.5 ± 0.4 mm; d<sub>t</sub> = 0.60 ± 0.06 mm</b>							<b>reel: diameter = 500 mm<sup>(3)</sup> H = 16.0 mm; P<sub>0</sub> = 15.0 mm</b>		
0.068	6.0 × 12.0 (14.0) × 12.5	1.0					28725	1500	

# MKP 338 2 X2



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

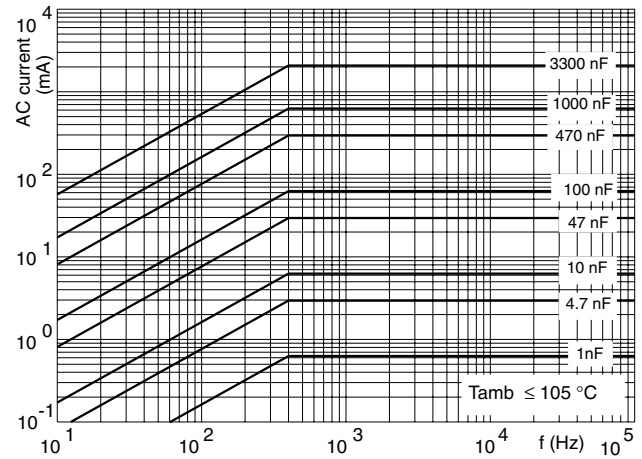
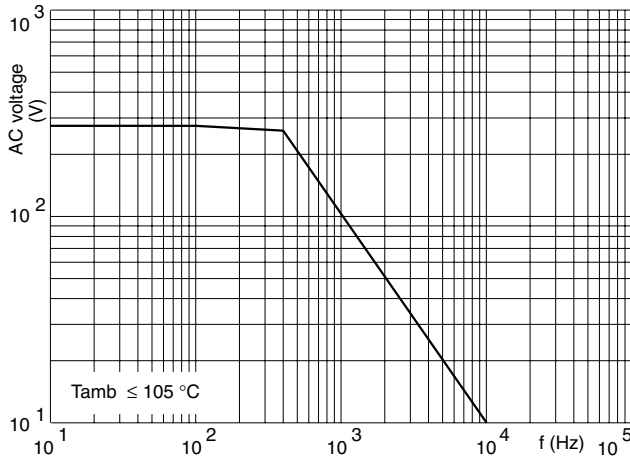
C ( $\mu$ F)	DIMENSIONS <sup>(1)</sup> w × H (h') × L (mm)	MASS (g)	CATALOG NUMBER 2222 338 ..... AND PACKAGING						
			LOOSE IN BOX					TAPED	
			Short leads			long leads			SPQ
			l <sub>t</sub> = 3.5 + 1/- 0.5 mm <sup>(2)</sup>	l <sub>t</sub> = 5.0 ± 1.0 mm	SPQ	l <sub>t</sub> = 25.0 ± 2.0 mm	SPQ		
<b>Pitch = 15.0 ± 0.4 mm; d<sub>t</sub> = 0.60 ± 0.06 mm</b>							<b>reel: diameter = 500 mm H = 18.5 mm; P<sub>0</sub> = 12.7 mm</b>		
0.01	5.0 × 11.0 × 17.5	1.2	29066	29086	1000	29106	1000	29139	1100
0.015			29068	29088		29108		29144	
0.022			29071	29091		29111		29148	
0.033			29073	29093		29113		29153	
0.047			29075	29095		29115		29157	
0.068			29127	29132		29136		29162	
0.1	6.0 × 12.0 × 17.5	1.4	28127	28327	1000	28527	1000	28927	900
<b>Original pitch = 15.0 mm; bent back pitch = 7.5 ± 0.4 mm; d<sub>t</sub> = 0.60 ± 0.06 mm</b>							<b>reel: diameter = 500 mm<sup>(3)</sup> H = 16.0 mm; P<sub>0</sub> = 15.0 mm</b>		
0.1	6.0 × 12.0 (14.0) × 17.5	1.4						28727	800
<b>Pitch = 15.0 ± 0.4 mm; d<sub>t</sub> = 0.80 ± 0.08 mm</b>									
0.15	7.0 × 13.5 × 17.5	1.9	28129	28329	750	28529	500	28929	800
0.18			28131	28331		28531			
0.22	8.5 × 15.0 × 17.5	2.6	28132	28332	750	28532	500	28932	650
0.33	10.0 × 16.5 × 17.5	3.1	29129	29134	500	29138	450	29167	600
<b>Original pitch = 15.0 mm; bent back pitch = 7.5 ± 0.4 mm; d<sub>t</sub> = 0.80 ± 0.08 mm</b>							<b>reel: diameter = 500 mm<sup>(3)</sup> H = 16.0 mm; P<sub>0</sub> = 15.0 mm</b>		
0.15	7.0 × 13.5 (15.5) × 17.5	1.9						28729	700
0.22	8.5 × 15.0 (17.0) × 17.5	2.6						28732	550
0.33	10.0 × 16.5 (18.5) × 17.5	3.1						29168	500
<b>Pitch = 22.5 ± 0.4 mm; d<sub>t</sub> = 0.80 ± 0.08 mm</b>							<b>reel: diameter = 500 mm H = 18.5 mm; P<sub>0</sub> = 12.7 mm</b>		
0.15	6.0 × 15.5 × 26.0	2.9	29171	29176	300	29182	250	29272	600
0.22	7.0 × 16.5 × 26.0	3.2	29173	29178	200	29184	250	29274	500
0.33	8.5 × 18.0 × 26.0	4.4	28134	28334	200	28534	250	28934	450
0.47	10.0 × 19.5 × 26.0	5.5	28136	28336	200	28536	200	28936	350
0.68	12.0 × 22.0 × 26.0	7.8	28138	28338	150	28538	200	28938	300
<b>Pitch = 27.5 ± 0.4 mm; d<sub>t</sub> = 0.80 ± 0.08 mm</b>							<b>reel: diameter = 500 mm H = 18.5 mm; P<sub>0</sub> = 12.7 mm</b>		
1	13.0 × 23.0 × 31.0	10.4	28141	28341	100	28541	125		
1.5	15.0 × 25.0 × 31.0	12.8	28143	28343	100	28543	125		
2.2	21.0 × 31.0 × 31.0	20.4	28145	28345	50	28545	75		

### Notes

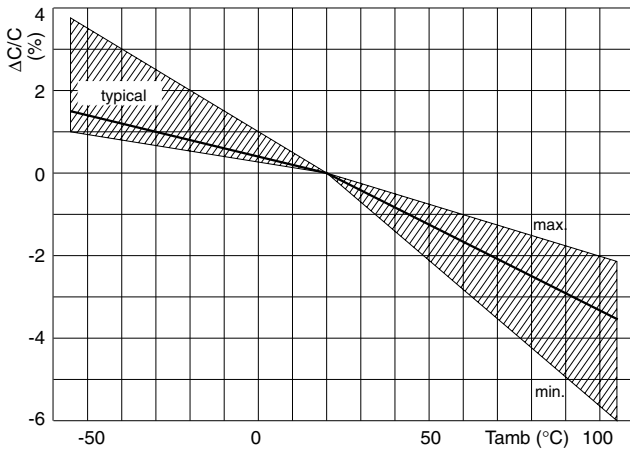
- h = height for straight leads and h' = height for bent back leads.
- l<sub>t</sub> = 3.5 ± 0.3 mm for pitch = 15 mm; 22.5 mm and 27.5 mm.
- Reel diameter = 356 mm is available on request.



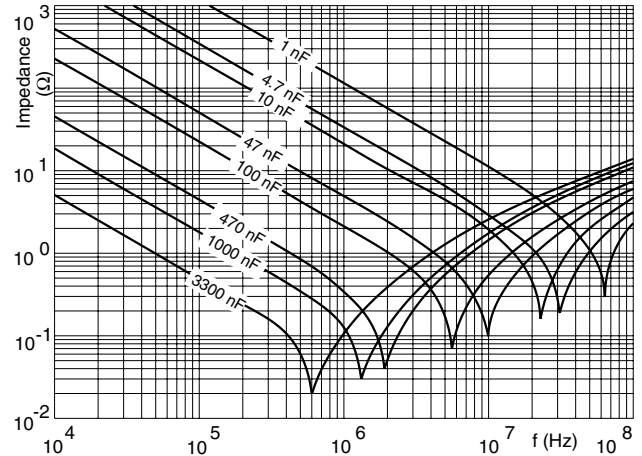
**MAXIMUM RMS VOLTAGE AND AC CURRENT (SENEWAVE) AS A FUNCTION OF FREQUENCY**



**CAPACITANCE**



**IMPEDANCE**



**APPROVALS**

COUNTRY	SPECIFICATION	ELECTRICAL VALUES	FILE NUMBERS	APPROVAL MARK
U.S.A. (for AC 250 V) (for AC 305 V)	UL1414 UL1283	1 nF to 1 μF 1 nF to 3.3 μF	E112471 E109565	
Canada (for AC 250 V) (for AC 275 V)	CSA-C22.2 No.1 CSA-C22.2 No.8	1 nF to 1 μF 1 nF to 3.3 μF	1087424 (LR94054-15) 1078568	
China	CQC	1 nF to 3.3 μF	CQC03001003071 (Shanghai factory) CQC03001004373 (Roeselare factory)	
CB TEST CERTIFICATE (for AC 275 V)		1 nF to 3.3 μF: 55/105/56/B	FI 1095A2 and FI 1709	
Europe	EN132400 IEC 60384-14 2 <sup>nd</sup> edition	1 nF to 3.3 μF	ENEC/B05/2001	



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