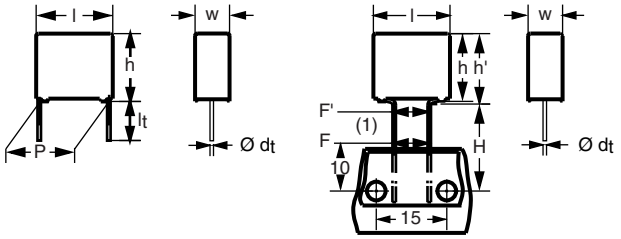
Interference Suppression Film Capacitors
MKP Radial Potted Type



Dimensions in mm
$|F - F''| < 0.3$ mm
$F = 7.5 + 0.6/- 0.1$ mm

APPLICATIONS

For standard across the line X2 applications

See also application note:
www.vishay.com/doc?28153

REFERENCE STANDARDS

"IEC 60384-14 ed 3 and EN 60384-14"
"IEC 60065 requires pass flamm class B"
UL1414; CSA-C22.2 No. 1
UL1283; CSA-E384-14, CQC

MARKING

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

DIELECTRIC

Polypropylene film

ELECTRODES

Metallized film

CONSTRUCTION

Mono construction

RATED VOLTAGE

AC 310 V; 50 to 60 Hz

FEATURES

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

RoHS compliant product

Pb-free

e3

RoHS COMPLIANT

PERMISSIBLE DC VOLTAGE

DC 630 V

ENCAPSULATION

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

CLIMATIC TESTING CLASS ACC. TO IEC 60068-1

55/110/56/B

CAPACITANCE RANGE (E12 SERIES)

E12 series 0.001 to 3.3 µF
Preferred values acc. to E6

CAPACITANCE TOLERANCE

± 20 %; ± 10 %; ± 5 %

LEADS

Tinned wire

MAXIMUM APPLICATION TEMPERATURE

$C \leq 470$ nF: 110 °C (125 °C for less than 1000 h)
$C > 470$ nF: 110 °C

DETAIL SPECIFICATION

For more detailed data and test requirements contact:
RFI@vishay.com

COMPOSITION OF CATALOG NUMBER

TYPE AND PITCHES	
338 2 X2	7.5 mm
	7.5 mm (bent back)
	10.0 mm
	15.0 mm
	22.5 mm
	27.5 mm

CAPACITANCE (numerically)

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

Example:
104 = 10 x 10 = 100 nF

BFC2	338	2X	XX	X
2222(*)	338	2X	XX	X

(*) Old ordering code

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 %	BFC2 338 20...
		Lead length 5.0 ± 1.0 mm		BFC2 338 22...
		Lead length 25.0 ± 2.0 mm		BFC2 338 24...
	Taped (2)	Pitch 7.5 mm or bent back to 7.5 mm		BFC2 338 26...
	PACKAGING	**ALTERNATIVE LARGER PITCH SIZES**	**C-TOL.**	**ON REQUEST**
	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		
	PACKAGING	**ALTERNATIVE TAPED VERSION (1)**		**ON REQUEST**
	Taped (2)	H = 18.5 mm; P_0 = 12.7 mm (2)	± 20 %	See tables for details
	PACKAGING	**ALTERNATIVE C-TOL**		**ON REQUEST**
	Loose in box	Lead length 3.5 + 1/- 0.5 mm or 3.5 ± 0.3 mm	± 10 % ± 5 %	See tables for details
		Lead length 5.0 ± 1.0 mm	± 10 % ± 5 %	
		Lead length 25.0 ± 2.0 mm	± 10 % ± 5 %	
	Taped (2)	Pitch 7.5 mm or bent back to 7.5 mm	± 10 % ± 5 %	
		H = 18.5 mm; P_0 = 12.7 mm	± 10 % ± 5 %	

Notes
(1) Taped on reel pitch = 27.5 mm is not available
(2) For detailed tape specifications refer to “Packaging Information” www.vishay.com/doc?28139 or end of catalog
(3) SPQ = Standard Packaging Quantity

SPECIFIC REFERENCE DATA

DESCRIPTION	VALUE	
Rated AC voltage (U_{Rac})	310 V	
Permisssible DC voltage (U_{Rdc})	630 V	
Tangent of loss angle:	at 1 kHz	at 10 kHz
C ≤ 470 nF	≤ 10 x 10^{-4}	≤ 20 x 10^{-4}
470 nF < C ≤ 1 µF	≤ 20 x 10^{-4}	≤ 70 x 10^{-4}
C > 1 µF	≤ 30 x 10^{-4}	-
Rated voltage pulse slope $(dU/dt)_R$ at 435 Vdc	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: C ≤ 1µF C > 1µF	 2200 V; 1 min 1800 V; 1 min	
Withstanding (AC) voltage between leads and case	2120 V; 1 min	
Max. application temperature for 0.001 µF ≤ C ≤ 0.47 µF	110 °C (125 °C for less than 1000 h)	
Max. application temperature for C > 0.47 µF	110 °C	

Pitch: 7.5 mm; C-tol. = ± 20 %

C (µF)	DIMENSIONS w x h x l (mm)	MASS (g) (2)	CATALOG NUMBER BFC2 338 ..... AND PACKAGING						
			LOOSE IN BOX					AMMOPACK (1)	
			Short leads			Long leads		H = 18.5 mm P_0 = 12.7 mm	
			l_t = 3.5 + 1/- 0.5 mm	l_t = 5.0 ± 1.0 mm	SPQ	l_t = 25.0 ± 2.0 mm	SPQ		SPQ
Pitch = 7.5 ± 0.4 mm; d_t = 0.50 ± 0.05 mm									
0.001	4.0 × 9.0 × 10.0	0.4	20102	22102	1500	24102	1000	26102	1250
0.0012			20122	22122		24122		26122	
0.0015			20152	22152		24152		26152	
0.0018			20182	22182		24182		26182	
0.0022			20222	22222		24222		26222	
0.0027			20272	22272		24272		26272	
0.0033			20332	22332		24332		26332	
0.0039			20392	22392		24392		26392	
0.0047			20472	22472		24472		26472	
0.0056			20562	22562		24562		26562	
0.0068			20682	22682		24682		26682	
0.0082			20822	22822		24822		26822	
0.01			20103	22103		24103		26103	
0.012			20123	22123		24123		26123	
0.015			20153	22153		24153		26153	
0.018			20183	22183		24183		26183	
0.022			20223	22223		24223		26223	
0.027			20273	22273	1000	24273	1250	26273	1000
0.033			20333	22333		24333		26333	
0.039	5.0 x 10.5 x 10.0	0.6	20393	22393	750	24393	1000	26393	750
0.047			20473	22473		24473		26473	

Notes
(1) H = In-tape height, P_0 = Sprocket hole distance; for detailed specifications refer to packaging information
(2) Weight for short lead product only

Pitch: 7.5 mm; C-tol. = ± 10 %

C (µF)	DIMENSIONS w x h x l (mm)	MASS (g) (2)	CATALOG NUMBER BFC2 338 ..... AND PACKAGING						
			LOOSE IN BOX					AMMOPACK (1)	
			Short leads			Long leads		H = 18.5 mm P_0 = 12.7 mm	
			l_t = 3.5 + 1/- 0.5 mm	l_t = 5.0 ± 1.0 mm	SPQ	l_t = 25.0 ± 2.0 mm	SPQ		SPQ
Pitch = 7.5 ± 0.4 mm; d_t = 0.50 ± 0.05 mm									
0.001	4.0 x 9.0 x 10.0	0.4	28101	28301	1500	28501	1000	28701	1250
0.0012			28102	28302		28502		28702	
0.0015			28103	28303		28503		28703	
0.0018			28104	28304		28504		28704	
0.0022			28105	28305		28505		28705	
0.0027			28106	28306		28506		28706	
0.0033			28107	28307		28507		28707	
0.0039			28108	28308		28508		28708	
0.0047			28109	28309		28509		28709	
0.0056			28111	28311		28511		28711	
0.0068			28112	28312		28512		28712	
0.0082			28113	28313		28513		28713	
0.01			28114	28314		28514		28714	
0.012			28115	28315		28515		28715	
0.015			28116	28316		28516		28716	
0.018			28117	28317		28517		28717	
0.022			28118	28318		28518		28718	
0.027			28119	28319	1000	28519	1250	28719	1000
0.033	5.0 x 10.5 x 10.0	0.6	28121	28321		28521		28721	
0.039			28122	28332	750	28522	1000	28722	750
0.047	6.0 x 11.5 x 10.0	0.8	28123	28323		28523		28723	

Notes
(1) H = In-tape height, P_0 = Sprocket hole distance; for detailed specifications refer to packaging information
(2) Weight for short lead product only

Pitch: 7.5 mm; C-tol. = ± 5 %

C (µF)	DIMENSIONS w x h x l (mm)	MASS (g) (2)	CATALOG NUMBER BFC2 338 ..... AND PACKAGING						
			LOOSE IN BOX					AMMOPACK (1)	
			Short leads			Long leads		H = 18.5 mm P_0 = 12.7 mm	
			l_t = 3.5 + 1/- 0.5 mm (2)	l_t = 5.0 ± 1.0 mm	SPQ	l_t = 25.0 ± 2.0 mm	SPQ		SPQ
Pitch = 7.5 ± 0.4 mm; d_t = 0.50 ± 0.05 mm									
0.001	4.0 x 9.0 x 10.0	0.4	28201	28401	1500	28601	1000	28801	1250
0.0012			28202	28402		28602		28802	
0.0015			28203	28403		28603		28803	
0.0018			28204	28404		28604		28804	
0.0022			28205	28405		28605		28805	
0.0027			28206	28406		28606		28806	
0.0033			28207	28407		28607		28807	
0.0039			28208	28408		28608		28808	
0.0047			28209	28409		28609		28809	
0.0056			28211	28411		28611		28811	
0.0068			28212	28412		28612		28812	
0.0082			28213	28413		28613		28813	
0.01			28214	28414		28614		28814	
0.012			28215	28415		28615		28815	
0.015			28216	28416		28616		28816	
0.018			28217	28417		28617		28817	
0.022			28218	28418		28618		28818	
0.027			28219	28419	1000	28619	1250	28819	1000
0.033	5.0 x 10.5 x 10.0	0.6	28221	28421	1000	28621	1250	28821	1000
0.039			28222	28422	750	28622	1000	28822	750
0.047	6.0 x 11.5 x 10.0	0.8	28223	28423	750	28623	1000	28823	750

Notes
(1) H = In-tape height, P_0 = Sprocket hole distance; for detailed specifications refer to packaging information
(2) Weight for short lead product only

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

C (µF)	DIMENSIONS w x h x l (mm)	MASS (g) (2)	CATALOG NUMBER BFC2 338 ..... AND PACKAGING	
			REEL (500 mm) (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				
0.056	5.0 x 13.0 x 12.5	0.82	26563	1600
0.068			26683	
0.082	6.0 x 14.0 x 12.5	1.1	26823	1600
0.1			26104	
Bent back pitch = 7.5 ± 0.4 mm; d_t = 0.60 ± 0.06 mm				
0.12	5.0 x 13.0 x 17.5	1.0	26124	800
0.15	6.0 x 14.0 x 17.5	1.4	26154	700
0.18			26184	
Bent back pitch = 7.5 ± 0.4 mm; d_t = 0.60 ± 0.06 mm				
0.22	7.0 x 15.5 x 17.5	1.8	26224	550
0.27	8.5 x 17.0 x 17.5	2.4	26274	550
0.33			26334	500

Notes

(1) Reel diameter = 356 mm is available on request
(2) Weight for short lead product only

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

C (µF)	DIMENSIONS w x h x l (mm)	MASS (g) (2)	CATALOG NUMBER BFC2 338 .....AND PACKAGING	
			REEL (500 mm) (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				
0.056 0.068	5.0 x 13.0 x 12.5	0.82	28724 28725	1600
0.082	6.0 x 14.0 x 12.5	1.1	28726	1600
Bent back pitch = 7.5 ± 0.4 mm; d_t = 0.60 ± 0.06 mm				
0.1	5.0 x 13.0 x 17.5	1.0	28727	800
0.12 0.15	6.0 x 14.0 x 17.5	1.4	28728 28729	700
Bent back pitch = 7.5 ± 0.4 mm; d_t = 0.80 ± 0.08 mm				
0.18 0.22	7.0 x 15.5 x 17.5	1.8	28731 28732	550
0.27 0.33	8.5 x 17.0 x 17.5	2.4	28733 29168	500

Notes

(1) Reel diameter = 356 mm is available on request

(2) Weight for short lead product only

Bent back pitch: 7.5 mm (only taped); C-tol. = ± 5 %

C (µF)	DIMENSIONS w x h x l (mm)	MASS (g) (2)	CATALOG NUMBER BFC2 338 ..... AND PACKAGING	
			REEL (500 mm) (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				
0.056 0.068 0.082	6.0 x 14.0 x 12.5	1.1	28824 28825 28826	1600
Bent back pitch = 7.5 ± 0.4 mm; d_t = 0.60 ± 0.06 mm				
0.1	5.0 x 13.0 x 17.5	1.0	28827	800
0.12 0.15	6.0 x 14.0 x 17.5	1.4	28828 28829	700
Bent back pitch = 7.5 ± 0.4 mm; d_t = 0.60 ± 0.06 mm				
0.18	7.0 x 15.5 x 17.5	1.8	28831	550
0.22	8.5 x 17.0 x 17.5	2.4	28832	550
0.27			28833	500

Notes

(1) Reel diameter = 356 mm is available on request

(2) Weight for short lead product only

Pitch: 10.0 mm; C-tol. = ± 20 %

C (µF)	DIMENSIONS w x h x l (mm)	MASS (g) (2)	CATALOG NUMBER BFC2 338 ..... AND PACKAGING						
			LOOSE IN BOX					AMMOPACK (1)	
			Short leads			Long leads		H = 18.5 mm P_0 = 12.7 mm	
			l_t = 3.5 + 1/- 0.5 mm	l_t = 5.0 ± 1.0 mm	SPQ	l_t = 25.0 ± 2.0 mm	SPQ		SPQ
Pitch = 10.0 ± 0.4 mm; d_t = 0.60 ± 0.06 mm									
0.001	4.0 x 10.0 x 12.5	0.6	21102	23102	1000	25102	1250	Not available	
0.0012			21122	23122		25122			
0.0015			21152	23152		25152			
0.0018			21182	23182		25182			
0.0022			21222	23222		25222			
0.0027			21272	23272		25272	1000		
0.0033			21332	23332		25332			
0.0039			21392	23392		25392			
0.0047			21472	23472		25472			
0.0056			21562	23562		25562			
0.0068			21682	23682		25682			
0.0082			21822	23822		25822			
0.01			21103	23103		25103			
0.012			21123	23123		25123			
0.015			21153	23153		25153			
0.018			21183	23183		25183			
0.022			21223	23223		25223			
0.027			21273	23273		25273			
0.033			21333	23333		25333			
0.039			21393	23393		25393			
0.047			21473	23473		25473			
0.056	5.0 x 11.0 x 12.5	0.82	20563	22563	750	24563	750	27563	500
0.068			20683	22683		24683		27683	
0.082	6.0 x 12.0 x 12.5	1.1	20823	22823	750	24823	750	27823	500
0.1			20104	22104		24104		27104	

Notes
(1) H = In-tape height, P_0 = Sprocket hole distance; for detailed specifications refer to packaging information
(2) Weight for short lead product only

Pitch: 10.0 mm; C-tol. = ± 10 %

C (µF)	DIMENSIONS w x h x l (mm)	MASS (g) (2)	CATALOG NUMBER BFC2 338 ..... AND PACKAGING						
			LOOSE IN BOX					AMMOPACK (1)	
			Short leads			Long leads		H = 18.5 mm P_0 = 12.7 mm	
			l_t = 3.5 + 1/- 0.5 mm	l_t = 5.0 ± 1.0 mm	SPQ	l_t = 25.0 ± 2.0 mm	SPQ		SPQ
Pitch = 10.0 ± 0.4 mm; d_t = 0.60 ± 0.06 mm									
0.001	4.0 x 10.0 x 12.5	0.6	29194	29217	1000	29241	1250	Not available	
0.0012			29195	29218		29242			
0.0015			29196	29219		29243			
0.0018			29197	29221		29244			
0.0022			29198	29222		29245			
0.0027			29199	29223		29246	1000		
0.0033			29201	29224		29247			
0.0039			29202	29225		29248			
0.0047			29203	29226		29249			
0.0056			29204	29227		29251			

Pitch: 10.0 mm; C-tol. = ± 10 %

C (µF)	DIMENSIONS w x h x l (mm)	MASS (g) (2)	CATALOG NUMBER BFC2 338 ..... AND PACKAGING						
			LOOSE IN BOX					AMMOPACK (1)	
			Short leads			Long leads		H = 18.5 mm P_0 = 12.7 mm	
			l_t = 3.5 + 1/- 0.5 mm	l_t = 5.0 ± 1.0 mm	SPQ	l_t = 25.0 ± 2.0 mm	SPQ		SPQ
0.0068	4.0 x 10.0 x 12.5	0.6	29205	29228	1000	29252	1000	Not available	
0.0082			29206	29229		29253			
0.01			29207	29231		29254			
0.012			29208	29232		29255			
0.015			29209	29233		29256			
0.018			29211	29234		29257			
0.022			29212	29235		29258			
0.027			29213	29236		29259			
0.033			29214	29237		29261			
0.039			29215	29238		29262			
0.047			29216	29239		29263			
0.056	5.0 x 11.0 x 12.5	0.82	28124	28324	750	28524	750	28924	500
0.068			28125	28325		28525		28925	
0.082	6.0 x 12.0 x 12.5	1.1	28126	28326	750	28526	750	28926	500

Notes
(1) H = In-tape height, P_0 = Sprocket hole distance; for detailed specifications refer to packaging information
(2) Weight for short lead product only

Pitch: 10.0 mm; C-tol. = ± 5 %

C (µF)	DIMENSIONS w x h x l (mm)	MASS (g) (2)	CATALOG NUMBER BFC2 338 ..... AND PACKAGING						
			LOOSE IN BOX					AMMOPACK (1)	
			Short leads			Long leads		H = 18.5 mm P_0 = 12.7 mm	
			l_t = 3.5 + 1/- 0.5 mm	l_t = 5.0 ± 1.0 mm	SPQ	l_t = 25.0 ± 2.0 mm	SPQ		SPQ
Pitch = 10.0 ± 0.4 mm; d_t = 0.60 ± 0.06 mm									
0.056	5.0 x 11.0 x 12.5	0.82	28224	28424	750	28624	750	28944	500
0.068	6.0 x 12.0 x 12.5	1.1	28225	28425	750	28625	750	28945	500
0.082			28226	28426		28626		28946	

Notes
(1) H = In-tape height, P_0 = Sprocket hole distance; for detailed specifications refer to packaging information
(2) Weight for short lead product only

Pitch: 15.0 mm; C-tol. = ± 20 %

C (µF)	DIMENSIONS w x h x l (mm)	MASS (g) (3)	CATALOG NUMBER BFC2 338 ..... AND PACKAGING						
			LOOSE IN BOX					REEL (500 mm) (1) (2)	
			Short leads			Long leads		H = 18.5 mm P_0 = 12.7 mm	
			l_t = 3.5 ± 0.3 mm	l_t = 5.0 ± 1.0 mm	SPQ	l_t = 25.0 ± 2.0 mm	SPQ		SPQ
Pitch = 15 ± 0.4 mm; d_t = 0.60 ± 0.06 mm									
0.01	5.0 x 11.0 x 17.5	1.0	29076	29096	1000	29116	1000	29141	1100
0.012			29077	29097		29117		29143	
0.015			29078	29098		29118		29145	
0.018			29079	29099		29119		29147	
0.022			29081	29101		29121		29149	
0.027			29082	29102		29122		29152	
0.033			29083	29103		29123		29154	
0.039			29084	29104		29124		29156	

Pitch: 15.0 mm; C-tol. = ± 20 %

C (µF)	DIMENSIONS w x h x l (mm)	MASS (g) (3)	CATALOG NUMBER BFC2 338 ..... AND PACKAGING						
			LOOSE IN BOX					REEL (500 mm) (1) (2)	
			Short leads			Long leads		H = 18.5 mm P_0 = 12.7 mm	
			l_t = 3.5 ± 0.3 mm	l_t = 5.0 ± 1.0 mm	SPQ	l_t = 25.0 ± 2.0 mm	SPQ		SPQ
0.047			29085	29105		29125		29158	
0.056			21563	23563		25563		29161	
0.068		1.0	21683	23683	1000	25683	1000	29163	1100
0.082			21823	23823		25823		29165	
0.1			21104	23104		25104		29166	
0.12			20124	22124	1000	24124	1000	27124	900
0.15	6.0 x 12.0 x 17.5	1.4	20154	22154	750	24154	500	27154	800
0.18			20184	22184		24184		27184	
Pitch = 15 ± 0.4 mm; d_t = 0.80 ± 0.08 mm									
0.22	7.0 x 13.5 x 17.5	1.8	20224	22224	750	24224	500	27224	650
0.27	8.5 x 15.0 x 17.5	2.4	20274	22274	750	24274	500	27274	650
0.33			20334	22334	500	24334	450	27334	600

Notes
(1) H = In-tape height, P_0 = Sprocket hole distance; for detailed specifications refer to packaging information
(2) Reel diameter = 356 mm is available on request
(3) Weight for short lead product only

Pitch: 15.0 mm; C-tol. = ± 10 %

C (µF)	DIMENSIONS w x h x l (mm)	MASS (g) (3)	CATALOG NUMBER BFC2 338 ..... AND PACKAGING						
			LOOSE IN BOX					REEL (500 mm) (1) (2)	
			Short leads			Long leads		H = 18.5 mm P_0 = 12.7 mm	
			l_t = 3.5 + 1/- 0.3 mm	l_t = 5.0 ± 1.0 mm	SPQ	l_t = 25.0 ± 2.0 mm	SPQ		SPQ
Pitch = 15 ± 0.4 mm; d_t = 0.60 ± 0.06 mm									
0.01			29066	29086		29106		29139	
0.012			29067	29087		29107		29142	
0.015			29068	29088		29108		29144	
0.018			29069	29089		29109		29146	
0.022			29071	29091		29111		29148	
0.027			29072	29092	1000	29112	1000	29151	1100
0.033	5.0 x 11.0 x 17.5	1.0	29073	29093		29113		29153	
0.039			29074	29094		29114		29155	
0.047			29075	29095		29115		29157	
0.056			29126	29131		29135		29159	
0.068			29127	29132		29136		29162	
0.082			29128	29133		29137		29164	
0.1			28127	28327	1000	28527	1000	28927	900
0.12	6.0 x 12.0 x 17.5	1.4	28128	28328	750	28528	500	28928	800
0.15			28129	28329		28529		28929	
Pitch = 15 ± 0.4 mm; d_t = 0.80 ± 0.08 mm									
0.18	7.0 x 13.5 x 17.5	1.8	28131	28331	750	28531	500	28931	650
0.22			28132	28332		28532		28932	
0.27	8.5 x 15.0 x 17.5	2.4	28133	28333	500	28533	450	28933	600
0.33			29129	29134		29138		29167	

Notes
(1) H = In-tape height, P_0 = Sprocket hole distance; for detailed specifications refer to packaging information
(2) Reel diameter = 356 mm is available on request
(3) Weight for short lead product only

Pitch: 15.0 mm; C-tol. = ± 5 %

C (µF)	DIMENSIONS w x h x l (mm)	MASS (g) (3)	CATALOG NUMBER BFC2 338 ..... AND PACKAGING						
			LOOSE IN BOX					REEL (500 mm) (1) (2)	
			Short leads			Long leads		H = 18.5 mm P_0 = 12.7 mm	
			l_t = 3.5 + 1/- 0.3 mm	l_t = 5.0 ± 1.0 mm	SPQ	l_t = 25.0 ± 2.0 mm	SPQ		SPQ
Pitch = 15 ± 0.4 mm; d_t = 0.60 ± 0.06 mm									
0.1	5.0 x 11.0 x 17.5	1.0	28227	28427	1000	28627	1000	28947	900
0.12	6.0 x 12.0 x 17.5	1.4	28228	28428	750	28628	500	28948	800
0.15			28229	28429		28629		28949	
Pitch = 15 ± 0.4 mm; d_t = 0.80 ± 0.08 mm									
0.18	7.0 x 13.5 x 17.5	1.8	28231	28431	750	28631	500	28951	650
0.22	8.5 x 15.0 x 17.5	2.4	28232	28432	750	28632	500	28952	650
0.27			28233	28433	500	28633	450	28953	600

Notes
(1) H = In-tape height, P_0 = Sprocket hole distance; for detailed specifications refer to packaging information
(2) Reel diameter = 356 mm is available on request
(3) Weight for short lead product only

Pitch: 22.5 mm; C-tol. = ± 20 %

C (µF)	DIMENSIONS w x h x l (mm)	MASS (g) (3)	CATALOG NUMBER BFC2 338 ..... AND PACKAGING						
			LOOSE IN BOX					REEL (500 mm) (1) (2)	
			Short leads			Long leads		H = 18.5 mm P_0 = 12.7 mm	
			l_t = 3.5 ± 0.5 mm	l_t = 5.0 ± 1.0 mm	SPQ	l_t = 25.0 ± 2.0 mm	SPQ		SPQ
Pitch = 22.5 ± 0.4 mm; d_t = 0.80 ± 0.08 mm									
0.12	6.0 x 15.5 x 26.0	2.4	21124	23124	300	25124	250	29264	600
0.15			21154	23154		25154		29265	
0.18			21184	23184	200	25184	250	29266	500
0.22			21224	23224		25224		29267	
0.27			21274	23274		25274		29268	
0.33			21334	23334		25334		29269	
0.39	7.0 x 16.5 x 26.0	2.9	20394	22394	200	24394	250	27394	450
0.47			20474	22474		24474		27474	
0.56	8.5 x 18.0 x 26.0	3.8	20564	22564	200	24564	200	27564	350
0.68			20684	22684		24684		27684	
0.82	10.0 x 19.5 x 26.0	6.8	20824	22824	150	24824	200	27824	300
1.0			20105	22105		24105		27105	

Notes
(1) H = In-tape height, P_0 = Sprocket hole distance; for detailed specifications refer to packaging information
(2) Reel diameter = 356 mm is available on request
(3) Weight for short lead product only

Pitch: 22.5 mm; C-tol. = ± 10 %

C (µF)	DIMENSIONS w x h x l (mm)	MASS (g) (3)	CATALOG NUMBER BFC2 338 ..... AND PACKAGING						
			LOOSE IN BOX					REEL (500 mm) (1) (2)	
			Short leads			Long leads		H = 18.5 mm P_0 = 12.7 mm	
			l_t = 3.5 ± 0.5 mm	l_t = 5.0 ± 1.0 mm	SPQ	l_t = 25.0 ± 2.0 mm	SPQ		SPQ
Pitch = 22.5 ± 0.4 mm; d_t = 0.80 ± 0.08 mm									
0.12	6.0 x 15.5 x 26.0	2.4	29169	29175	300	29181	250	29271	600
0.15			29171	29176		29182		29272	
0.18			29172	29177	200	29183	250	29273	500
0.22			29173	29178		29184		29274	
0.27			29174	29179		29185		29275	
0.33			28134	28334		28534		28934	450
0.39	7.0 x 16.5 x 26.0	2.9	28135	28335	200	28535	250	28935	450
0.47			28136	28336		28536	200	28936	350
0.56	8.5 x 18.0 x 26.0	3.8	28137	28337		28537		28937	
0.68	10.0 x 19.5 x 26.0	6.8	28138	28338	150	28538		28938	300
0.82			28139	28339		28539		28939	

Notes
(1) H = In-tape height, P_0 = Sprocket hole distance; for detailed specifications refer to packaging information
(2) Reel diameter = 356 mm is available on request
(3) Weight for short lead product only

Pitch: 22.5 mm; C-tol. = ± 5 %

C (µF)	DIMENSIONS w x h x l (mm)	MASS (g) (3)	CATALOG NUMBER BFC2 338 ..... AND PACKAGING						
			LOOSE IN BOX					REEL (500 mm) (1) (2)	
			Short leads			Long leads		H = 18.5 mm P_0 = 12.7 mm	
			l_t = 3.5 ± 0.5 mm	l_t = 5.0 ± 1.0 mm	SPQ	l_t = 25.0 ± 2.0 mm	SPQ		SPQ
Pitch = 22.5 ± 0.4 mm; d_t = 0.80 ± 0.08 mm									
0.33	7.0 x 16.5 x 26.0	2.9	28234	28434	200	28634	250	28954	450
0.39			28235	28435		28635		28955	
0.47	8.5 x 18.0 x 26.0	3.8	28236	28436	200	28636	200	28956	350
0.56			28237	28437		28637		28957	
0.68	10.0 x 19.5 x 26.0	6.8	28238	28438	150	28638	200	28958	300
0.82	12.0 x 22.0 x 26.0	7.8	28239	28439	150	28639	200	28959	300

Notes
(1) H = In-tape height, P_0 = Sprocket hole distance; for detailed specifications refer to packaging information
(2) Reel diameter = 356 mm is available on request
(3) Weight for short lead product only

Pitch: 27.5 mm; C-tol. = ± 20 %

C (µF)	DIMENSIONS w x h x l (mm)	MASS (g) (1)	CATALOG NUMBER BFC2 338 ..... AND PACKAGING				
			LOOSE IN BOX				
			Short leads			Long leads	
			l_t = 3.5 ± 0.5 mm	l_t = 5.0 ± 1.0 mm	SPQ	l_t = 25.0 ± 2.0 mm	SPQ
Pitch = 27.5 ± 0.4 mm; d_t = 0.80 ± 0.08 mm							
0.39	9.0 x 19.0 x 31.0	5.5	21394	23394	100	25394	150
0.47			21474	23474		25474	
0.56			21564	23564		25564	125
0.68			21684	23684		25684	
0.82			21824	23824		25824	
1.0	11.0 x 21.0 x 31.0	7.4	21105	23105		25105	
1.2			20125	22125		24125	
1.5	13.0 x 23.0 x 31.0	9.2	20155	22155		24155	
1.8			20185	22185		24185	100
2.2	15.0 x 25.0 x 31.0	12.3	20225	22225		24225	
2.7	18.0 x 28.0 x 31.0	16.1	20275	22275	50	24275	75
3.3			20335	22335		24335	

Note

(1) Weight for short lead product only

31.0 mm Pitch: 27.5 mm C-tol. = ± 10 %

C (µF)	DIMENSIONS w x h x l (mm)	MASS (g) (1)	CATALOG NUMBER BFC2 338 ..... AND PACKAGING				
			LOOSE IN BOX				
			Short leads			Long leads	
			lt = 3.5 ± 0.5 mm(2)	lt = 5.0 ± 1.0 mm	SPQ	lt = 25.0 ± 2.0 mm	SPQ
Pitch = 27.5 ± 0.4 mm; d_t = 0.80 ± 0.08 mm							
1.0	11.0 x 21.0 x 31.0	7.4	28141	28341	100	28541	125
1.2			28142	28342		28542	
1.5	13.0 x 23.0 x 31.0	9.2	28143	28343		28543	
1.8	15.0 x 25.0 x 31.0	12.3	28144	28344		28544	100
2.2			28145	28345	50	28545	75
2.7	18.0 x 28.0 x 31.0	16.1	28146	28346		28546	

Note

(1) Weight for short lead product only

Pitch: 27.5 mm; C-tol. = ± 5 %

C (µF)	DIMENSIONS w x h x l (mm)	MASS (g) (1)	CATALOG NUMBER BFC2 338 ..... AND PACKAGING				
			LOOSE IN BOX				
			Short leads			Long leads	
			l_t = 3.5 ± 0.5 mm	l_t = 5.0 ± 1.0 mm	SPQ	l_t = 25.0 ± 2.0 mm	SPQ
Pitch = 27.5 ± 0.4 mm; d_t = 0.80 ± 0.08 mm							
1	11.0 x 21.0 x 31.0	7.4	28241	28441	100	28641	125
1.2	13.0 x 23.0 x 31.0	9.2	28242	28442	100	28642	125
1.5			28243	28443		28643	
1.8	15.0 x 25.0 x 31.0	12.3	28244	28444	100	28644	100
2.2	18.0 x 28.0 x 31.0	16.1	28245	28445	50	28645	75
2.7			28246	28446		28646	

Note

(1) Weight for short lead product only

SAFETY APPROVALS X2	VOLTAGE	VALUE	FILE NUMBERS
EN 60384-14 (ENEC) (= IEC 60384-14 ed 3)	310 Vac	1 nF to 3.3 µF	FI 2008038
UL1414; CSA-C22.2 No.1	250 Vac	1 nF to 1 µF	E112471
UL 1283	305 Vac	1 nF to 3.3 µF	E109565
CSA-E384-14	310 Vac	1 nF to 3.3 µF	Pending
CQC	310 Vac	1 nF to 3.3 µF	CQC07001018685 (F) CQC07001021279 (L) CQC03001003071 (S)
CB-test certificate	310 Vac	1 nF to 3.3 µF	FI 5123
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; Sweden; 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 pinted-circuit boards by means of automatic insertion machines. For detailed tape specifications refer to “Packaging Information”. www.vishay.com/doc?28139

Specific method of mounting to withstand vibration and shock

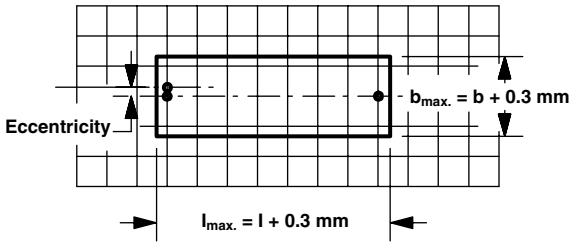
In order to withstand vibration and shock tests, it must be insured that the stand-off pips are in good contact with the printed-circuit board:

- 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 the drawing:

- Eccentricity as in drawing. The maximum eccentricity is smaller than or equal to lead diameter of the product concerned
- Product heigth 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.



Storage temperature

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

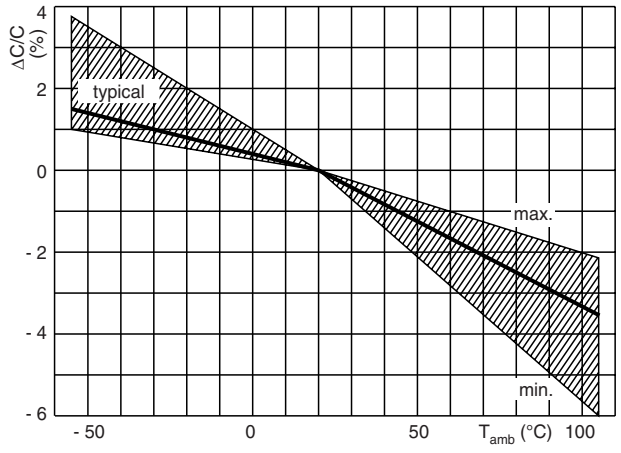
Ratings and characteristics reference conditions

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

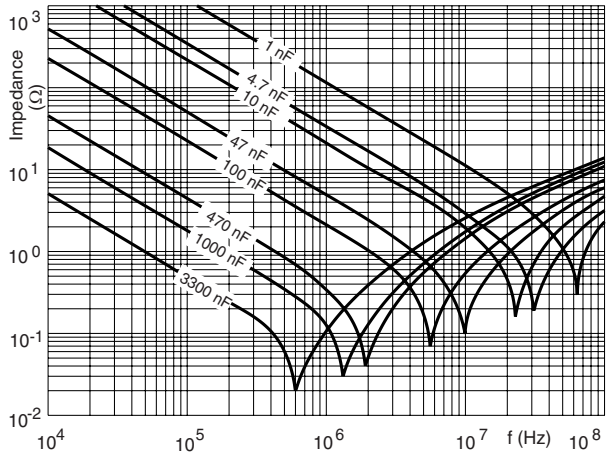
For reference testing, a conditioning period shall be applied over 96 ± 4 hours by heating the products in a circulating air oven at the rated temperature and a relative humidity not exceeding 20 %.

CHARACTERISTICS

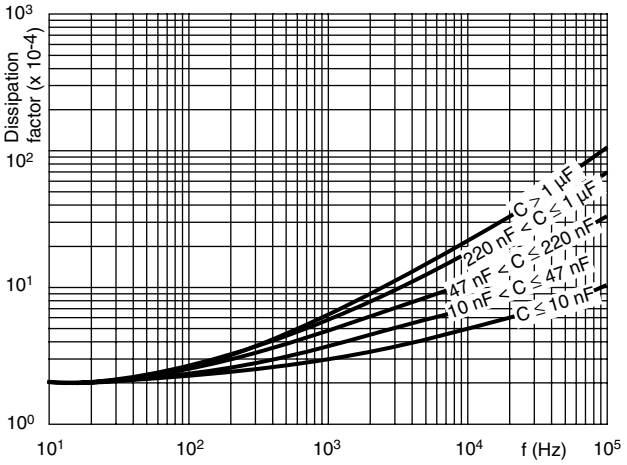
Capacitance as a function of ambient temperature (typical curve)



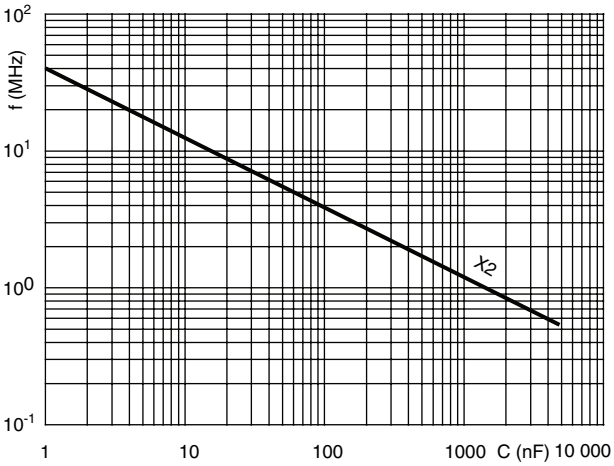
Impedance as a function of frequency (typical curve)



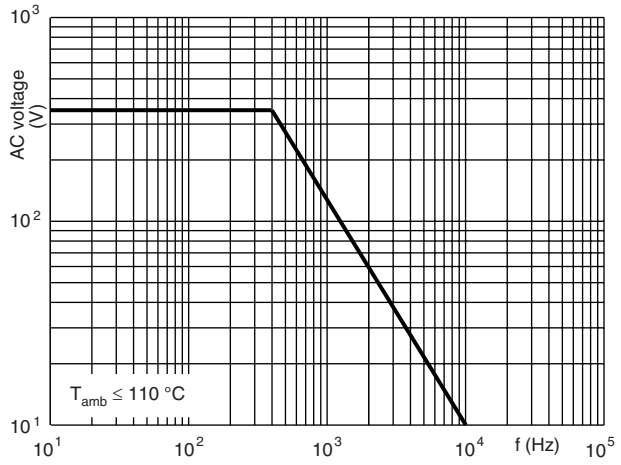
Tangent of loss angle as a function of frequency (typical curve)



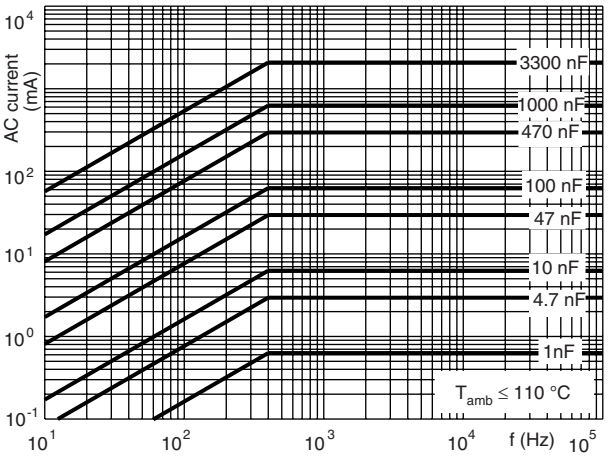
Resonant frequency as a function of capacitance (typical curve)

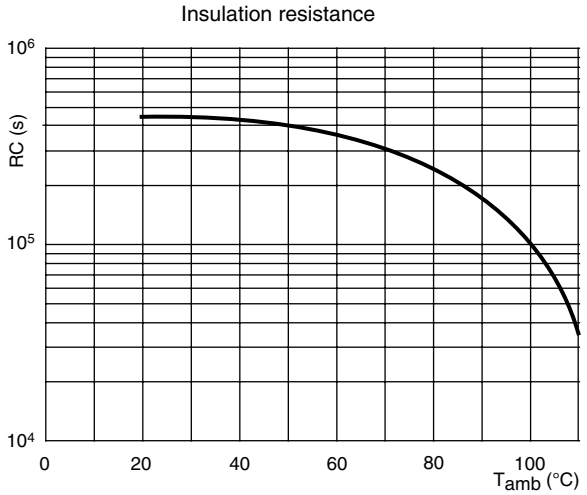


Max. RMS voltage as a function of frequency (typical curve)



Max. RMS current as a function of frequency (typical curve)





APPLICATION NOTES

- For X2 electromagnetic interference suppression in **standard across the line applications** (50/60 Hz) with a maximum mains voltage of 310 Vac
- For series impedance applications we refer to the application note 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 110 °C (125 °C for less than 1000 h) for C ≤ 470 nF and 110 °C for C > 470 nF
- 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 435 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, IEC Publication IEC 60384-14 ed-3 and “Specific Reference Data”

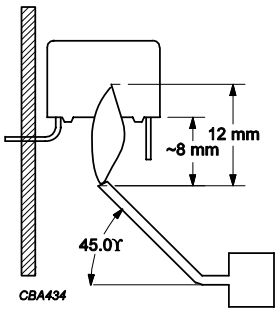
Group C inspection requirements

SUB-CLAUSE NUMBER AND TEST	CONDITIONS	PERFORMANCE REQUIREMENTS
SUB-GROUP C1A PART OF SAMPLE OF SUB-GROUP C1		
4.1 Dimensions (detail)		As specified in chapters “General Data” of this specification
Initial measurements	Capacitance	
	Tangent of loss angle:	
	For C ≤ 1 µF at 10 kHz	
	For C > 1 µF at 1 kHz	
4.3 Robustness of terminations	Tensile: load 10 N; 10 s	No visible damage
	Bending: load 5 N; 4 x 90°	

SUB-CLAUSE NUMBER AND TEST	CONDITIONS	PERFORMANCE REQUIREMENTS
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 hour, max 2 hours	
4.4.2 Final measurements	Visual examination	No visible damage Legible marking
	Capacitance	¦ΔC/C¦ ≤ 5 % of the value measured initially.
	Tangent of loss angle	Increase of tan δ: ≤ 0.008 for: C ≤ 1 µF or ≤ 0.005 for: C > 1 µF Compared to values measured initially
	Insulation resistance	As specified in section "Insulation Resistance" of this specification
SUB-GROUP C1B PART OF SAMPLE OF SUB-GROUP C1		
Initial measurements	Capacitance Tangent of loss angle: For C ≤ 1 µF at 10 kHz For C > 1 µF at 1 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	θA = - 55 °C θB = + 110 °C 5 cycles Duration t = 30 min	
4.6.1 Inspection	Visual examination	No visible damage
4.7 Vibration (see note 3.1)	Mounting: see Section "Mounting" of this specification Procedure B4 Frequency range: 10 to 55 Hz. Amplitude: 0.75 mm or Acceleration 98 m/s² (whichever is less severe) Total duration 6 hours.	
4.7.2 Final inspection	Visual examination	No visible damage
4.9 Shock (see note 3)	Mounting: see Section "Mounting" for more information Pulse shape: half sine Acceleration: 490 m/s² Duration of pulse: 11 ms	

SUB-CLAUSE NUMBER AND TEST	CONDITIONS	PERFORMANCE REQUIREMENTS
4.9.2 Final measurements	Visual examination Capacitance Tangent of loss angle Insulation resistance	No visible damage ¦ΔC/C¦ ≤ 5 % of the value measured initially. Increase of tan δ: ≤ 0.008 for: C ≤ 1 µF or ≤ 0.005 for: C > 1 µF Compared to values measured initially As specified in section "Insulation Resistance" of this specification
SUB-GROUP C1 COMBINED SAMPLE OF SPECIMENS OF SUB-GROUPS C1A AND C1B		
4.11 Climatic sequence		
4.11.1 Initial measurements	Capacitance Measured in 4.4.2 and 4.9.2 Tangent of loss angle: Measured initially in C1A and C1B	
4.11.2 Dry heat	Temperature: 110 °C	
4.11.3 Damp heat cyclic Test Db First cycle	Duration: 16 hours	
4.11.4 Cold	Temperature: - 55 °C	
4.11.5 Damp heat cyclic Test Db remaining cycles	Duration: 2 hours	
4.11.6 Final measurements	Visual examination Capacitance Tangent of loss angle Voltage proof 1350 Vdc; 1 min between terminations Insulation resistance	No visible damage Legible marking ¦ΔC/C¦ ≤ 5 % of the value measured in 4.11.1. Increase of tan δ: ≤ 0.008 for: C ≤ 1 µF or ≤ 0.005 for: C > 1 µF Compared to values measured in 4.11.1. No permanent breakdown or flash-over ≥ 50 % of values specified in section "Insulation Resistance" of this specification
SUB GROUP C2		
4.12 Damp heat steady state	56 days; 40 °C; 90 to 95 % RH no load	
4.12.1 Initial measurements	Capacitance Tangent of loss angle: at 1 kHz	

SUB-CLAUSE NUMBER AND TEST	CONDITIONS	PERFORMANCE REQUIREMENTS
4.12.3 Final measurements	Visual examination	No visible damage Legible marking
	Capacitance	¦ΔC/C¦ ≤ 5 % of the value measured in 4.12.1.
	Tangent of loss angle	Increase of tan δ: ≤ 0. 008 for: C ≤ 1 µF or ≤ 0. 005 for: C > 1 µF Compared to values measured in 4.12.1.
	Voltage proof 1350 Vdc; 1 min between term.	No permanent breakdown or flash-over
	Insulation resistance	≥ 50 % of values specified in section “Insulation Resistance” of this specification
SUB-GROUP C3		
4.13.1 Initial measurements	Capacitance Tangent of loss angle: For C ≤ 1 µF at 10 kHz For C > 1 µF at 1 kHz	
4.13 Impulse voltage	3 successive impulses, full wave, peak voltage: X2: 2.5 kV for C ≤ 1 µF X2: 2.5 kV/√C for C > 1 µF Max.24 pulses	No selfhealing breakdowns or flashover
4.14 Endurance	Duration: 1000 h 1.25 x U_{Rac} at 110 °C Once in every hour the voltage is increased to 1000 V (RMS) for 0.1 s via resistor of 47 Ω ± 5 %	
4.14.7 Final measurements	Visual examination	No visible damage Legible marking
	Capacitance	¦ΔC/C¦ ≤ 10 % compared to values measured in 4.13.1.
	Tangent of loss angle	Increase of tan δ: ≤ 0.008 for: C ≤ 1 µF or ≤ 0.005 for: C > 1 µF Compared to values measured in 4.13.1.
	Voltage proof 1350 Vdc; 1 min between terminations. 2120 Vac; 1 min between terminations and case.	No permanent breakdown or flash-over
	Insulation resistance	≥ 50 % of values specified in section “Insulation Resistance” of this specification

SUB-CLAUSE NUMBER AND TEST	CONDITIONS	PERFORMANCE REQUIREMENTS
SUB-GROUP C4		
4.15 Charge and discharge	10 000 cycles Charge to 435 Vdc Discharge resistance: $R = \frac{435\ Vdc}{1.25 \times C\ (dU/dt)}$	
4.15.1 Initial measurements	Capacitance Tangent of loss angle: For C ≤ 1 µF at 10 kHz For C > 1 µF at 1 kHz	
4.15.3 Final measurements	Capacitance	¦ΔC/C¦ ≤ 10 % compared to values measured in 4.15.1.
	Tangent of loss angle	Increase of tan δ: ≤ 0.008 for: C ≤ 1 µF or ≤ 0.005 for: C > 1 µF Compared to values measured in 4.15.1.
	Insulation resistance	≥ 50 % of values specified in section “Insulation Resistance” of this specification
SUB-GROUP C5		
4.16 Radio frequency characteristic	Resonance frequency	≥ 0.9 times the value as specified in section “Resonant Frequency” of this specification
SUB-GROUP C6		
4.17 Passive flammability Class B	Bore of gas jet: Ø 0.5 mm Fuel: butane Test duration for actual volume V in mm³: V ≤ 250: 10 s 250 < V . 500: 20 s 500 < V . 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.
SUB-GROUP C7		
4.18 Active flammability	20 cycles of 2.5 kV discharges on the test capacitor connected to U_{Rac}	The cheese cloth around the capacitors shall not burn with a flame. No electrical measurements are required.

Disclaimer

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