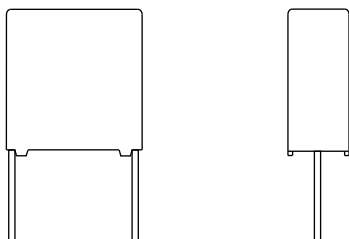


Interference Suppression Film Capacitor - Class Y2

Radial MKP 300 V_{AC} - Line to Ground Application



FEATURES

- 7.5 mm to 27.5 mm lead pitch
- AEC-Q200 qualified
- Robust design
- Material categorization:
For definitions of compliance please see www.vishay.com/doc?99912

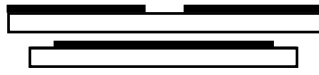
AUTOMOTIVE
GRADE

RoHS
COMPLIANT

APPLICATIONS

- Standard line bypass (between line and ground) Y2 applications
 - Line bypass application for continuous operation
- See also application note: www.vishay.com/doc?28153

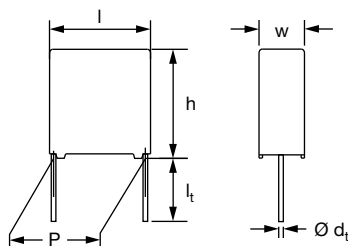
QUICK REFERENCE DATA

Capacitance range (E12 series)	0.001 μ F to 0.47 μ F (preferred values acc. to E6)
Capacitance tolerance	$\pm 20\%$, $\pm 10\%$, $\pm 5\%$
Rated AC voltage	300 V _{AC} ; 50 Hz to 60 Hz
Permissible DC voltage	1000 V _{DC}
Climatic testing class acc. to IEC 60068-1	55/105/56/C for product volumes ≤ 1750 mm ³ 55/105/56/B for volumes > 1750 mm ³
Maximum application temperature	105 °C
Reference standards	IEC 60384-14 and EN 60384-14 IEC 60065 requires pass. flamm. class B for volumes > 1750 mm ³ UL 60384-14; ENEC; CSA E 384-14-95
Dielectric	Polypropylene film
Electrodes	Metallized film
Construction	Series construction  Triple construction 
Encapsulation	Plastic case, epoxy resin sealed, flame retardant class UL 94 V-0
Leads	Tinned wire
Marking	C-value; tolerance; rated voltage; sub-class; manufacturer's type designation; code for dielectric material; manufacturer location, year and week; manufacturer's logo or name; safety approvals

Note

- For more detailed data and test requirements, contact rfi@vishay.com

DIMENSIONS





COMPOSITION OF CATALOG NUMBER

TYPE AND PITCHES	
338 6 Y2	7.5 mm
	10.0 mm
	15.0 mm
	22.5 mm
	27.5 mm

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

CAPACITANCE (numerically)				
BFC2	338	6X	XX	X
2222 (*)	338	6X	XX	X

Example:
104 = 10 x 10 = 100 nF
(except special numbers)

(*) old ordering code

TYPE	PACKAGING	STANDARD DIMENSIONS	C-TOL.	PREFERRED TYPES
338 6 Y2	Loose in box	Lead length 3.5 mm + 1 mm/- 0.5 mm (pitch 7.5 mm and 10 mm)	20 %	BFC2 338 60
		Lead length 3.5 mm ± 0.3 mm (pitch > 10 mm)		BFC2 338 62
		Lead length 5 mm ± 1 mm		BFC2 338 64
		Lead length 25 mm ± 2 mm		BFC2 338 66
	Taped ammo	Pitch 7.5 mm only; H = 18.5 mm; P ₀ = 12.7 mm	10 %	BFC2 338 68
	Taped reel	Pitch 7.5 mm to 15 mm; H = 18.5 mm		BFC2 338 61
	Loose in box	Lead length 3.5 mm + 1 mm/- 0.5 mm (pitch 7.5 mm and 10 mm)		BFC2 338 63
		Lead length 3.5 mm ± 0.3 mm (pitch > 10 mm)		BFC2 338 65
		Lead length 5 mm ± 1 mm		BFC2 338 67
		Lead length 25 mm ± 2 mm		BFC2 338 68
	Taped ammo	Pitch 7.5 mm only; H = 18.5 mm; P ₀ = 12.7 mm		
	Taped reel	Pitch 7.5 mm to 15 mm; H = 18.5 mm		
TYPE	PACKAGING	ALTERNATIVE PITCH SIZES AND TOLERANCES	C-TOL.	PREFERRED TYPES
338 6 Y2		Packaging like 20 % and alternative pitch sizes	5 %	See tables for details
		Alternative pitch size	10 %/20 %	

Note

(1) For detailed tape specification refer to "Packaging Information" www.vishay.com/doc?28139

SPECIFIC REFERENCE DATA		
DESCRIPTION	VALUE	
Rated AC voltage (U _{RAC})	300 V	
Permissible DC voltage (U _{RDC})	1000 V	
Tangent of loss angle	at 1 kHz	at 10 kHz
C ≤ 470 nF	≤ 10 x 10 ⁻⁴	≤ 20 x 10 ⁻⁴
Rated voltage pulse slope (dU/dt) _R at 420 V _{DC}	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) ⁽¹⁾ ; rise time ≤ 1000 V/s	3400 V; 1 min	
Withstanding (AC) voltage between leads and case	2100 V; 1 min	
Maximum application temperature	105 °C	

Note

(1) See "Voltage Proof Test for Metalized Film Capacitors": www.vishay.com/doc?28169



ELECTRICAL DATA AND ORDERING INFORMATION - PITCH 7.5 mm												
U _{RAC} (V)	CAP. (μF)	DIMENSIONS w x h x l (mm)	MASS (g) ⁽³⁾	CATALOG NUMBER BFC2 338 6X XXX AND PACKAGING								
				LOOSE IN BOX					AMMOPACK		REEL Ø = 500 mm ⁽¹⁾⁽²⁾	
				SHORT LEADS			LONG LEADS					
				l _t = 3.5 mm + 1 mm/ - 0.5 mm	l _t = 5.0 mm ± 1.0 mm	SPQ	l _t = 25.0 mm ± 2.0 mm	SPQ	H = 18.5 mm; P ₀ = 12.7 mm	SPQ	H = 18.5 mm; P ₀ = 12.7 mm	SPQ
300	PITCH = 7.5 mm ± 0.4 mm; d _t = 0.50 mm ± 0.05 mm; C-tol. = ± 20 % (U _{RDC} = 1000 V)											
	0.0010	4.0 x 9.0 x 10.0	0.4	60102	62102	1500	64102	1000	66102	1250	68129	2500
	0.0012			60122	62122		64122		66122		68131	
	0.0015			60152	62152		64152		66152		68132	
	0.0018			60182	62182		64182		66182		68133	
	0.0022			60222	62222		64222		66222		68134	
	0.0027			60272	62272		64272		66272		68135	
	0.0033	5.0 x 10.5 x 10.0	0.4	60332	62332	1000	64332	1250	66332	1000	68136	2000
	0.0039			60392	62392		64392		66392		68137	
	0.0047	6.0 x 11.5 x 10.0	0.8	60472	62472	750	64472	1000	66472	750	68138	1900
	0.0056			60562	62562		64562		66562		68139	
	PITCH = 7.5 mm ± 0.4 mm; d _t = 0.50 mm ± 0.05 mm; C-tol. = ± 10 % (U _{RDC} = 1000 V)											
	0.0010	4.0 x 9.0 x 10.0	0.4	61102	63102	1500	65102	1000	67102	1250	68179	2500
	0.0012			61122	63122		65122		67122		68181	
	0.0015			61152	63152		65152		67152		68182	
	0.0018			61182	63182		65182		67182		68183	
	0.0022			61222	63222		65222		67222		68184	
	0.0027			61272	63272		65272		67272		68185	
	0.0033	5.0 x 10.5 x 10.0	0.4	61332	63332	1000	65332	1250	67332	1000	68186	2000
	0.0039			61392	63392		65392		67392		68187	
	0.0047	6.0 x 11.5 x 10.0	0.8	61472	63472	750	65472	1000	67472	750	68188	1900
	0.0056			61562	63562		65562		67562		68189	
	PITCH = 7.5 mm ± 0.4 mm; d _t = 0.50 mm ± 0.05 mm; C-tol. = ± 5 % (U _{RDC} = 1000 V)											
	0.0010	4.0 x 9.0 x 10.0	0.4	68215	68225	1500	68235	1000	68335	1250	68346	2500
	0.0012			68216	68226		68236		68336		68347	
	0.0015			68217	68227		68237		68337		68348	
	0.0018			68218	68228		68238		68338		68349	
	0.0022			68219	68229		68239		68339		68351	
	0.0027	5.0 x 10.5 x 10.0	0.4	68221	68231	1000	68241	1250	68341	1000	68352	2000
	0.0033			68222	68232		68242		68342		68353	
	0.0039	6.0 x 11.5 x 10.0	0.8	68223	68233	750	68243	1000	68343	750	68354	1900
0.0047	68224			68234	68244		68344		68355			

Notes

- SPQ = Standard Packing Quantity

⁽¹⁾ H = In-tape height; P₀ = Sprocket hole distance; for detailed specifications refer to packaging information: www.vishay.com/doc?28139

⁽²⁾ Reel diameter = 365 mm is available on request

⁽³⁾ Weight for short lead product only



ELECTRICAL DATA AND ORDERING INFORMATION - PITCH 10 mm												
U _{RAC} (V)	CAP. (μF)	DIMENSIONS w x h x l (mm)	MASS (g) ⁽³⁾	CATALOG NUMBER BFC2 338 6X XXX AND PACKAGING								
				LOOSE IN BOX					AMMOPACK		REEL Ø = 500 mm ⁽¹⁾⁽²⁾	
				SHORT LEADS			LONG LEADS					
				l _t = 3.5 mm + 1 mm/ - 0.5 mm	l _t = 5.0 mm ± 1.0 mm	SPQ	l _t = 25.0 mm ± 2.0 mm	SPQ	H = 18.5 mm; P ₀ = 12.7 mm	SPQ	H = 18.5 mm; P ₀ = 12.7 mm	SPQ
300	PITCH = 10.0 mm ± 0.4 mm; d _t = 0.60 mm ± 0.06 mm; C-tol. = ± 20 % (U _{RDC} = 1000 V)											
	0.0010	4.0 x 10.0 x 12.5	0.6	68392	68401		68409	1250	-	-	68418	1400
	0.0012			68393	68402		68411				68419	
	0.0015			68394	68403		68412				68421	
	0.0018			68395	68404	1000	68413				68422	
	0.0022			68396	68405		68414				68423	
	0.0027			68397	68406		68415				68424	
	0.0033			68398	68407		68416				68425	
	0.0039			68399	68408		68417				68426	
	0.0047	5.0 x 11.0 x 12.5	0.82	68101	68106		68112	1000			68141	1100
	0.0056			68102	68107	1000	68113				68142	
	0.0068			68103	68108		68114				68143	
	0.0082	6.0 x 12.0 x 12.5	1.1	68104	68109	750	68115	750			68144	900
	0.010			68105	68111		68116				68145	
	PITCH = 10.0 mm ± 0.4 mm; d _t = 0.60 mm ± 0.06 mm; C-tol. = ± 10 % (U _{RDC} = 1000 V)											
	0.0010	4.0 x 10.0 x 12.5	0.6	68436	68445		68454	1250	-	-	68463	1400
	0.0012			68437	68446		68455				68464	
	0.0015			68438	68447		68456				68465	
	0.0018			68439	68448	1000	68457				68466	
	0.0022			68441	68449		68458				68467	
	0.0027			68442	68451		68459				68468	
	0.0033			68443	68452		68461				68469	
	0.0039			68444	68453		68462				68471	
	0.0047	5.0 x 11.0 x 12.5	0.82	68159	68164		68168	1000			68191	1100
	0.0056			68161	68165	1000	68169				68192	
	0.0068	6.0 x 12.0 x 12.5	1.1	68162	68166	750	68171	750			68193	900
	0.0082			68163	68167		68172				68194	
	PITCH = 10.0 mm ± 0.4 mm; d _t = 0.60 mm ± 0.06 mm; C-tol. = ± 5 % (U _{RDC} = 1000 V)											
	0.0010	4.0 x 10.0 x 12.5	0.6	68481	68489		68498	1250	-	-	68507	1400
	0.0012			68482	68491		68499				68508	
	0.0015			68483	68492		68501				68509	
	0.0018			68484	68493	1000	68502				68511	
	0.0022			68485	68494		68503				68512	
	0.0027			68486	68495		68504				68513	
	0.0033			68487	68496		68505				68514	
	0.0039			68488	68497		68506				68515	
	0.0047	5.0 x 11.0 x 12.5	0.82	68245	68249		68254	1000			68357	1100
	0.0056			68246	68251	1000	68255				68358	
	0.0068	6.0 x 12.0 x 12.5	1.1	68247	68252	750	68256	750			68359	900
	0.0082			68248	68253		68257				68361	

Notes

- SPQ = Standard Packing Quantity

(1) H = In-tape height; P₀ = Sprocket hole distance; for detailed specifications refer to packaging information: www.vishay.com/doc?28139

(2) Reel diameter = 365 mm is available on request

(3) Weight for short lead product only



ELECTRICAL DATA AND ORDERING INFORMATION - PITCH 15 mm																			
U _{RAC} (V)	CAP. (μF)	DIMENSIONS w x h x l (mm)	MASS (g) ⁽³⁾	CATALOG NUMBER BFC2 338 6X XXX AND PACKAGING															
				LOOSE IN BOX					AMMOPACK		REEL Ø = 500 mm ⁽¹⁾⁽²⁾								
				SHORT LEADS			LONG LEADS												
				l _t = 3.5 mm ± 0.3 mm	l _t = 5.0 mm ± 1.0 mm	SPQ	l _t = 25.0 mm ± 2.0 mm	SPQ	H = 18.5 mm; P ₀ = 12.7 mm	SPQ	H = 18.5 mm; P ₀ = 12.7 mm	SPQ							
300	PITCH = 15.0 mm ± 0.4 mm; d _t = 0.60 mm ± 0.06 mm; C-tol. = ± 20 % (U _{RDC} = 1000 V)																		
	0.0068 0.0082 0.010 0.012	5.0 x 11.0 x 17.5	1.0	60682 60822 60103 60123	62682 62822 62103 62123	1000	64682 64822 64103 64123	1000	-	-	68146 68147 68148 68149	1100							
	0.015 0.018			6.0 x 12.0 x 17.5	1.4		60153 60183				62153 62183		64153 64183	68151 68152	900				
	PITCH = 15.0 mm ± 0.4 mm; d _t = 0.80 mm ± 0.08 mm; C-tol. = ± 20 % (U _{RDC} = 1000 V)																		
	0.022 0.027			7.0 x 13.5 x 17.5	1.8		60223 60273				62223 62273		750	64223 64273	500	-	-	68153 68154	800
	0.033 0.039	8.5 x 15.0 x 17.5	2.4			60333 60393	62333 62393	750			64333 64393	500	68155 68156	650					
	0.047 0.056			10.0 x 16.5 x 17.5	3.0	60473 60563	62473 62563	500			64473 64563		450		68157 68158			600	
	PITCH = 15.0 mm ± 0.4 mm; d _t = 0.60 mm ± 0.06 mm; C-tol. = ± 10 % (U _{RDC} = 1000 V)																		
	0.0068 0.0082 0.010 0.012	5.0 x 11.0 x 17.5	1.0	61682 61822 61103 61123	63682 63822 63103 63123	1000	65682 65822 65103 65123	1000	-	-	68202 68203 68204 68205	1100							
	0.015 0.018			6.0 x 12.0 x 17.5	1.4		61153 61183				63153 63183		65153 65183	68206 68207	900				
	PITCH = 15.0 mm ± 0.4 mm; d _t = 0.80 mm ± 0.08 mm; C-tol. = ± 10 % (U _{RDC} = 1000 V)																		
	0.022 0.027 0.033			7.0 x 13.5 x 17.5	1.8		61223 61273 61333				63223 63273 63333		750	65223 65273 65333	500	-	-	68208 68209 68211	800
	0.039 0.047	8.5 x 15.0 x 17.5	2.4			61393 61473	63393 63473	65393 65473			68212 68213	600							
	0.047			10.0 x 16.5 x 17.5	3	61473	63473	500			65473		450	68213	600				
	PITCH = 15.0 mm ± 0.4 mm; d _t = 0.60 mm ± 0.06 mm; C-tol. = ± 5 % (U _{RDC} = 1000 V)																		
	0.0068 0.0082 0.010	5.0 x 11.0 x 17.5	1.0	68258 68259 68261	68284 68285 68286	1000	68309 68311 68312	1000	-	-	68381 68382 68383	1100							
	0.012 0.015			6.0 x 12.0 x 17.5	1.4		68262 68263				68287 68288		68313 68314	68384 68385	900				
	PITCH = 15.0 mm ± 0.4 mm; d _t = 0.80 mm ± 0.08 mm; C-tol. = ± 5 % (U _{RDC} = 1000 V)																		
	0.018 0.022			7.0 x 13.5 x 17.5	1.8		68264 68265				68289 68291		750	68315 68316	500	-	-	68386 68387	800
	0.027 0.033	8.5 x 15.0 x 17.5	2.4			68266 68267	68292 68293	68317 68318			68388 68389	650							
	0.039			10.0 x 16.5 x 17.5	3.0	68268	68294	500			68319		450	68391	600				

Notes

- SPQ = Standard Packing Quantity

(1) H = In-tape height; P₀ = Sprocket hole distance; for detailed specifications refer to packaging information: www.vishay.com/doc?28139

(2) Reel diameter = 365 mm is available on request

(3) Weight for short lead product only



ELECTRICAL DATA AND ORDERING INFORMATION - PITCH 22.5 mm															
U _{RAC} (V)	CAP. (μF)	DIMENSIONS w x h x l (mm)	MASS (g) ⁽³⁾	CATALOG NUMBER BFC2 338 6X XXX AND PACKAGING											
				LOOSE IN BOX					AMMOPACK		REEL Ø = 500 mm ⁽¹⁾⁽²⁾				
				SHORT LEADS			LONG LEADS								
				l _t = 3.5 mm ± 0.3 mm	l _t = 5.0 mm ± 1.0 mm	SPQ	l _t = 25.0 mm ± 2.0 mm	SPQ	H = 18.5 mm; P ₀ = 12.7 mm	SPQ	H = 18.5 mm; P ₀ = 12.7 mm	SPQ			
300	PITCH = 22.5 mm ± 0.4 mm; d _t = 0.80 mm ± 0.08 mm; C-tol. = ± 20 % (U _{RDC} = 1000 V)														
	0.047 0.056	7.0 x 16.5 x 26.0	2.9	68123 68124	68125 68126	200	68127 68128	250	-	-	-	-			
	0.068 0.082	8.5 x 18.0 x 26.0	3.8	60683 60823	62683 62823	200	64683 64823	250							
	0.10	10.0 x 19.5 x 26.0	6.8	60104	62104	200	64104	200							
	0.12 0.15	12.0 x 22.0 x 26.0	7.8	60124 60154	62124 62154	150	64124 64154	200							
	PITCH = 22.5 mm ± 0.4 mm; d _t = 0.80 mm ± 0.08 mm; C-tol. = ± 10 % (U _{RDC} = 1000 V)														
	0.047	7.0 x 16.5 x 26.0	2.9	68173	68175	200	68177	250	-	-	-	-			
	0.056	8.5 x 18.0 x 26.0	3.8	68174	68176		68178								
	0.068			61683	63683		65683								
	0.082 0.10	10.0 x 19.5 x 26.0	6.8	61823 61104	63823 63104	150	65823 65104	200							
	0.12 0.15	12.0 x 22.0 x 26.0	7.8	61124 61154	63124 63154		65124 65154	200							
	PITCH = 22.5 mm ± 0.4 mm; d _t = 0.80 mm ± 0.08 mm; C-tol. = ± 5 % (U _{RDC} = 1000 V)														
	0.047	7.0 x 16.5 x 26.0	2.9	68269	68295	200	68321	250	-	-	-	-			
	0.056	8.5 x 18.0 x 26.0	3.8	68271	68296		68322								
	0.068			68272	68297		68323								
	0.082	10.0 x 19.5 x 26.0	6.8	68273	68298	150	68324	200							
0.10 0.12	12.0 x 22.0 x 26.0	7.8	68274 68275	68299 68301	68325 68326										

Notes

- SPQ = Standard Packing Quantity

⁽¹⁾ H = In-tape height; P₀ = Sprocket hole distance; for detailed specifications refer to packaging information: www.vishay.com/doc?28139

⁽²⁾ Reel diameter = 365 mm is available on request

⁽³⁾ Weight for short lead product only

ELECTRICAL DATA AND ORDERING INFORMATION - PITCH 27.5 mm																
U _{RAC} (V)	CAP. (μF)	DIMENSIONS w x h x l (mm)	MASS (g) ⁽³⁾	CATALOG NUMBER BFC2 338 6X XXX AND PACKAGING												
				LOOSE IN BOX					AMMOPACK		REEL Ø = 500 mm ⁽¹⁾⁽²⁾					
				SHORT LEADS			LONG LEADS									
				l _t = 3.5 mm ± 0.3 mm	l _t = 5.0 mm ± 1.0 mm	SPQ	l _t = 25.0 mm ± 2.0 mm	SPQ	H = 18.5 mm; P ₀ = 12.7 mm	SPQ	H = 18.5 mm; P ₀ = 12.7 mm	SPQ				
300	PITCH = 27.5 mm ± 0.4 mm; d _t = 0.80 mm ± 0.08 mm; C-tol. = ± 20 % (U _{RDC} = 1000 V)															
	0.18 0.22	13.0 x 23.0 x 31.0	9.2	60184 60224	62184 62224	100	64184 64224	125	-	-	-	-				
	0.27	15.0 x 25.0 x 31.0	12.3	60274	62274	100	64274	125								
	0.33 0.39	18.0 x 28.0 x 31.0	16.1	60334 60394	62334 62394	100	64334 64394	100								
	0.47	21.0 x 31.0 x 31.0	20.3	60474	62474	50	64474	75								
	PITCH = 27.5 mm ± 0.4 mm; d _t = 0.80 mm ± 0.08 mm; C-tol. = ± 10 % (U _{RDC} = 1000 V)															
	0.18 0.22	13.0 x 23.0 x 31.0 15.0 x 25.0 x 31.0	9.2 12.3	61184 61224	63184 63224	100	65184 65224	125	-	-	-	-				
	0.27 0.33	18.0 x 28.0 x 31.0	16.1	61274 61334	63274 63334		65274 65334						100			
	0.39 0.47	21.0 x 31.0 x 31.0	20.3	61394 61474	63394 63474	50	65394 65474	75								
	PITCH = 27.5 mm ± 0.4 mm; d _t = 0.80 mm ± 0.08 mm; C-tol. = ± 5 % (U _{RDC} = 1000 V)															
	0.15 0.18	13.0 x 23.0 x 31.0	9.2	68276 68277	68302 68303	100	68327 68328	125					-	-	-	-
	0.22	15.0 x 25.0 x 31.5	12.3	68278	68304		68329									
	0.27 0.33	18.0 x 28.0 x 31.5	16.1	68279 68281	68305 68306		50	68331 68332	100							
	0.39	21.0 x 31.0 x 31.0	20.3	68282	68307			68333	75							

Notes

- SPQ = Standard Packing Quantity

⁽¹⁾ H = In-tape height; P₀ = Sprocket hole distance; for detailed specifications refer to packaging information: www.vishay.com/doc?28139

⁽²⁾ Reel diameter = 365 mm is available on request

⁽³⁾ Weight for short lead product only

APPROVALS				
SAFETY APPROVALS Y2	VOLTAGE	VALUE	FILE NUMBERS	LINK
EN 60384-14 (ENEC) (= IEC 60384-14 ed-3)	300 V _{AC}	1 nF to 470 nF	FI 2013002	www.vishay.com/doc?28212
UL 60384-14	300 V _{AC}	1 nF to 470 nF	E354331	www.vishay.com/doc?28189
CSA-E384-14-95	300 V _{AC}	1 nF to 470 nF	E354331	
CB-test certificate	300 V _{AC}	1 nF to 470 nF	FI 7754	www.vishay.com/doc?28213
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

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:

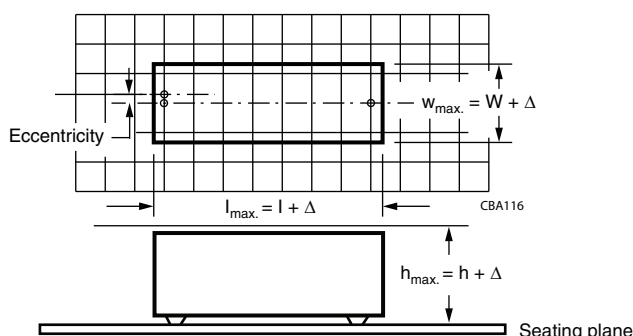
- For pitches ≤ 15 mm capacitors shall be mechanically fixed by the leads
- For larger pitches the capacitors shall be mounted in the same way and the body clamped

Space Requirements on Printed-Circuit Board

The maximum space for length ($l_{max.}$), width ($w_{max.}$), and height ($h_{max.}$) of film capacitors to take in account on the printed-circuit board is shown in the drawings:

- For products with pitch ≤ 15 mm, $\Delta w = \Delta l = 0.3$ mm; $\Delta h = 0.1$ mm
- For products with 15 mm $<$ pitch, ≤ 27.5 mm, $\Delta w = \Delta l = 0.5$ mm; $\Delta h = 0.1$ mm

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



SOLDERING CONDITIONS

For general soldering conditions and wave soldering profile, we refer to the application note:

“Soldering Guidelines for Film Capacitors”: www.vishay.com/doc?28171

Storage Temperature

$T_{stg} = -25$ °C to $+35$ °C with RH maximum 75 % without condensation

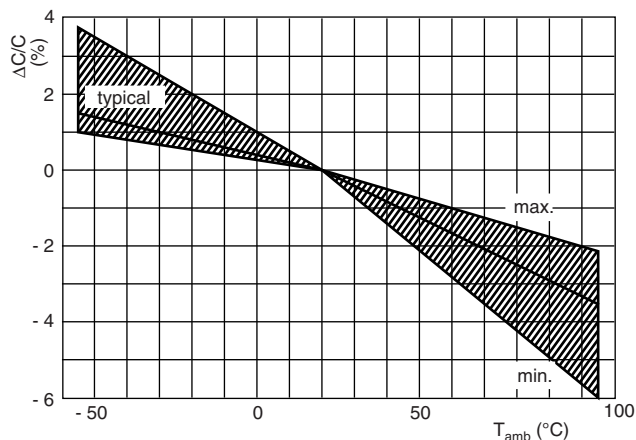
Ratings and Characteristics Reference Conditions

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

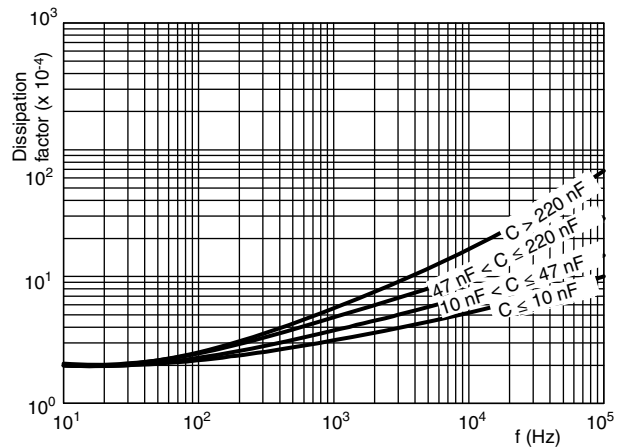
For reference testing, a conditioning period shall be applied over 96 h ± 4 h by heating the products in a circulating air oven at the rated temperature and a relative humidity not exceeding 20 %.



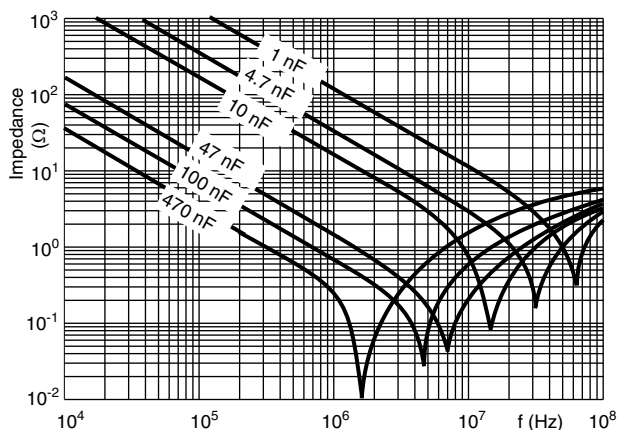
CHARACTERISTICS



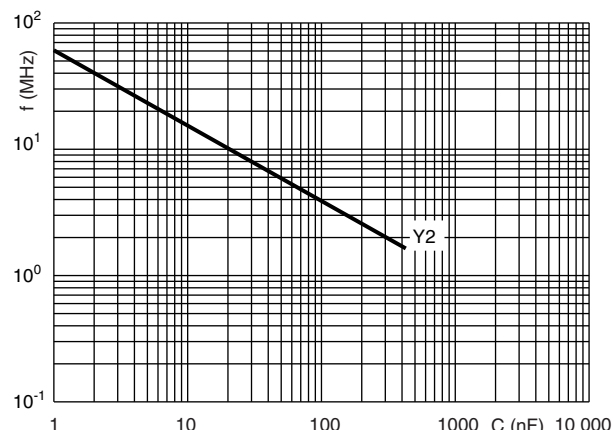
Capacitance as a function of ambient temperature (typical curve)



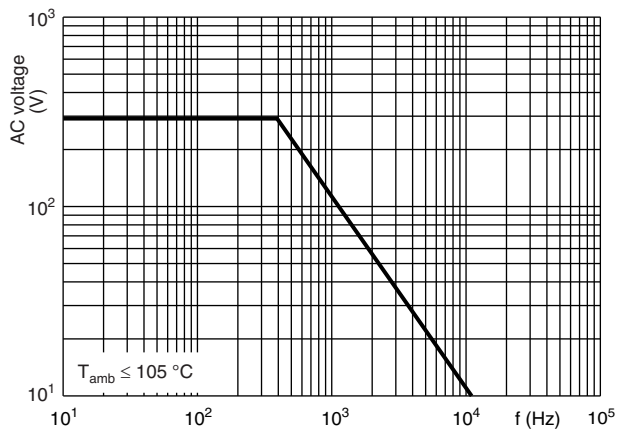
Tangent of loss angle as a function of frequency (typical curve)



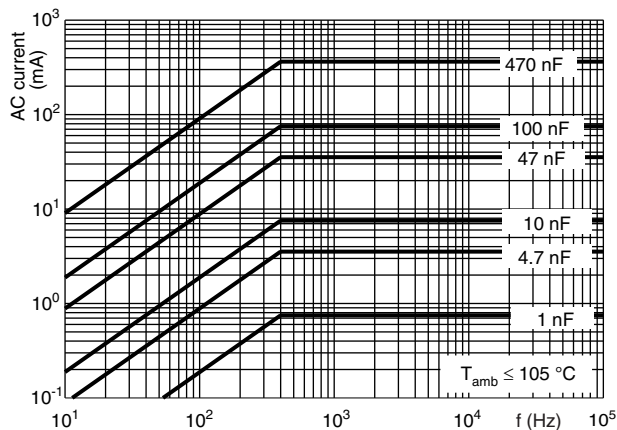
Impedance as a function of frequency (typical curve)



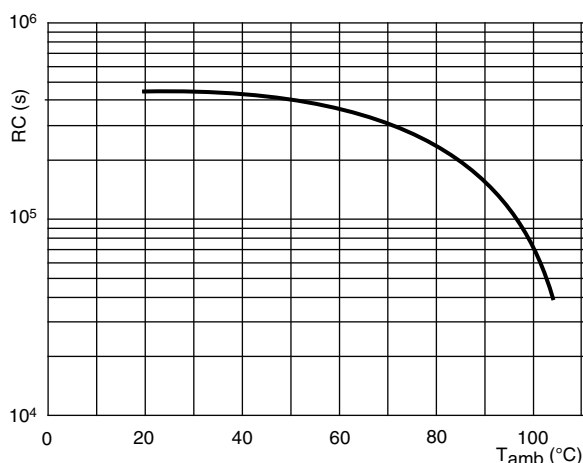
Resonant frequency as a function of capacitance (typical curve)



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 X2 electromagnetic interference suppression in **standard across the line application** (50 Hz/60 Hz) with a maximum mains voltage of 300 V_{AC}.
- For series impedance applications we refer to the application note: www.vishay.com/doc?28153.
- For capacitors connected in parallel, normally the proof voltage and possibly the rated voltage must be reduced. For information depending of the capacitance value and the number of parallel connections contact: rfi@vishay.com.
- These capacitors are not intended for continuous pulse applications. For these situations, capacitors of the AC and pulse program must be used.
- The maximum ambient temperature must not exceed 105 °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 V_{DC} and divided by the applied voltage.

INSPECTION REQUIREMENTS

General Notes

Sub-clause numbers of tests and performance requirements refer to the “Sectional Specification, Publication IEC 60384-14 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: at 10 kHz	
4.3 Robustness of 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	



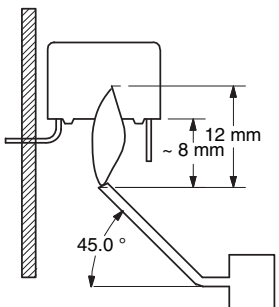
GROUP C INSPECTION REQUIREMENTS		
SUB-CLAUSE NUMBER AND TEST	CONDITIONS	PERFORMANCE REQUIREMENTS
SUB-GROUP C1A PART OF SAMPLE OF SUB-GROUP C1		
4.19 Component solvent resistance	Isopropylalcohol at room temperature Method: 2 Immersion time: 5 min $\pm$ 0.5 min Recovery time: Min. 1 h, max. 2 h	
4.4.2 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
SUB-GROUP C1B PART OF SAMPLE OF SUB-GROUP C1		
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 min $\pm$ 0.5 min	No visible damage Legible marking
4.6 Rapid change of temperature	$\theta A = -55\text{ }^{\circ}\text{C}$ $\theta B = +105\text{ }^{\circ}\text{C}$ 5 cycles Duration $t = 30\text{ min}$	
4.6.1 Inspection	Visual examination	No visible damage
4.7 Vibration	Mounting: See section "Mounting" of this specification Procedure B4: Frequency range: 10 Hz to 55 Hz Amplitude: 0.75 mm or Acceleration 98 m/s ² (whichever is less severe) Total duration 6 h	
4.7.2 Final inspection	Visual examination	No visible damage
4.9 Shock	Mounting: See Section "Mounting" for more information Pulse shape: Half sine Acceleration: 490 m/s ² Duration of pulse: 11 ms	
4.9.2 Final measurements	Visual examination Capacitance Tangent of loss angle Insulation resistance	No visible damage $ \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



GROUP C INSPECTION REQUIREMENTS		
SUB-CLAUSE NUMBER AND TEST	CONDITIONS	PERFORMANCE REQUIREMENTS
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: 105 °C Duration: 16 h	
4.11.3 Damp heat cyclic Test Db First cycle		
4.11.4 Cold	Temperature: - 55 °C Duration: 2 h	
4.11.5 Damp heat cyclic Test Db remaining cycles		
4.11.6 Final measurements	Visual examination Capacitance Tangent of loss angle Voltage proof 2250 V _{DC} ; 1 min between terminations Insulation resistance	No visible damage Legible marking $ \Delta C/C \leq 5\%$ of the value measured in 4.11.1. Increase of $\tan \delta \leq 0.008$ Compared to values measured in 4.11.1 No permanent breakdown or flash-over $\geq 50\%$ 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 Capacitance	
4.12.1 Initial measurements	Tangent of loss angle at 1 kHz	
4.12.3 Final measurements	Visual examination Capacitance Tangent of loss angle Voltage proof 2250 V _{DC} ; 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 $\tan \delta \leq 0.007$ 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



GROUP C INSPECTION REQUIREMENTS		
SUB-CLAUSE NUMBER AND TEST	CONDITIONS	PERFORMANCE REQUIREMENTS
SUB-GROUP C3		
4.13.1 Initial measurements	Capacitance Tangent of loss angle: at 10 kHz	
4.13 Impulse voltage	3 successive impulses, full wave, peak voltage: X1: 5 kV Max. 24 pulses	No selfhealing breakdowns or flash-over
4.14 Endurance	Duration: 1000 h 1.7 x 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 Ω ± 5 %	
4.14.7 Final measurements	Visual examination	No visible damage Legible marking
	Capacitance	$ \Delta C/C \leq 10\%$ compared to values measured in 4.13.1.
	Tangent of loss angle	Increase of $\tan \delta \leq 0.008$ Compared to values measured in 4.13.1.
	Voltage proof 2250 V _{DC} ; 1 min between terminations 2100 V _{AC} ; 1 min between terminations and case	No permanent breakdown or flash-over
	Insulation resistance	$\geq 50\%$ of values specified in section "Insulation Resistance" of this specification
SUB-GROUP C4		
4.15 Charge and discharge	10 000 cycles charged to 420 V _{DC} Discharge resistance:	
	$R = \frac{420 \text{ V}_{DC}}{1.5 \times C (dU/dt)}$	
4.15.1 Initial measurements	Capacitance Tangent of loss angle: at 10 kHz	
4.15.3 Final measurements	Capacitance	$ \Delta C/C \leq 10\%$ compared to values measured in 4.15.1.
	Tangent of loss angle	Increase of $\tan \delta \leq 0.008$ Compared to values measured in 4.15.1.
	Insulation resistance	$\geq 50\%$ of values specified in section "Insulation Resistance" of this specification

GROUP C INSPECTION REQUIREMENTS		
SUB-CLAUSE NUMBER AND TEST	CONDITIONS	PERFORMANCE REQUIREMENTS
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: $\varnothing 0.5$ mm Fuel: Butane Test duration for actual volume V in 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.
SUB-GROUP C7		
4.18 Active flammability	20 cycles of 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.



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