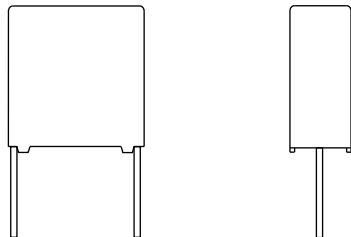


Interference Suppression Film Capacitor - Class Y2

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



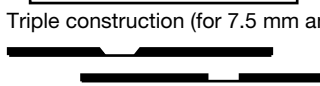
FEATURES

- AEC-Q200 qualified (rev. C) up to 105 °C
- Compliant with IEC 60381-14: AMD1 grade IIB for pitch ≥ 15 mm
 - THB: 85 °C / 85 % RH, 500 h at U_{RAC}
- Compliant with IEC 60381-14: AMD1 grade IA for pitch < 15 mm
 - THB: 40 °C / 93 % RH, 21 days at U_{RAC}
- High temperature capabilities, up to 125 °C
- Material categorization: for definitions of compliance please see www.vishay.com/doc?299912


RoHS
COMPLIANT

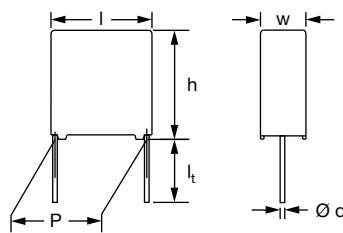
APPLICATIONS

- 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 µF to 0.47 µF (preferred values acc. to E6)
Capacitance tolerance	± 20 %, ± 10 %, ± 5 %
Rated AC voltage	300 V _{AC} ; 50 Hz to 60 Hz
Permissible DC voltage	1000 V _{DC} at 105 °C 1500 V _{DC} at 85 °C
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
Rated temperature	105 °C
Maximum permissible temperature	125 °C for limited time
Reference standards	IEC 60384-14:2013; IEC 60384-14:2013 / AMD1:2016 EN 60384-14:2013 + AMD1:2016 IEC 60065 requires pass. flamm. class B for volumes > 1750 mm ³ UL 60384-14 2 nd edition; ENEC; CSA E60384-1:14 3 rd edition
Dielectric	Polypropylene film
Electrodes	Metallized film
Construction	Series construction (for > 10 mm pitch)  Triple construction (for 7.5 mm and 10 mm pitch) 
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		CAPACITANCE (numerically)					MULTIPLIER (nF)	
338 6 Y2	7.5 mm						0.1	2
	7.5 mm (bent back)						1	3
	10.0 mm						10	4
	15.0 mm						100	5
	22.5 mm							
	27.5 mm							
		BFC2	338	6X	XX	X	Example: 104 = 10 x 10 = 100 nF (except special numbers)	
		2222 (*)	338	6X	XX	X		
		(*) old ordering code						

TYPE	PACKAGING	LEAD CONFIGURATION (see tables for details)	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) Lead length 3.5 mm ± 0.3 mm (pitch > 10 mm)	± 20 %	BFC2 338 60...
		Lead length 5.0 mm ± 1.0 mm		BFC2 338 62...
		Lead length 25.0 mm ± 2.0 mm		BFC2 338 64...
	Taped ammo ⁽¹⁾	Pitch = 7.5 mm H = 18.5 mm; P ₀ = 12.7 mm		BFC2 338 66...
	Taped reel	Pitch 7.5 mm only to 15 mm; H = 18.5 mm		BFC2 338 68...
		ALTERNATIVE PITCH SIZES		ON REQUEST
338 6 Y2	Loose in box	Lead length 3.5 mm + 1 mm / - 0.5 mm (pitch 7.5 mm and 10 mm) Lead length 3.5 mm ± 0.3 mm (pitch > 10 mm)	± 20 %	See tables for detail
		Lead length 5.0 mm ± 1.0 mm		
		Lead length 25.0 mm ± 2.0 mm		
		ALTERNATIVE TAPED VERSIONS		
338 6 Y2	Taped reel ⁽¹⁾	Pitch = 7.5 mm and 10.0 mm H = 18.5 mm; P ₀ = 12.7 mm; reel diameter = 500 mm	± 20 %	See tables for detail
		Pitch bent back to 7.5 mm H = 16.0 mm; P ₀ = 15.0 mm; reel diameter = 500 mm		
		ALTERNATIVE C-TOL.		
338 6 Y2	Loose in box	Lead length 3.5 mm + 1 mm / - 0.5 mm (pitch 7.5 mm and 10 mm) Lead length 3.5 mm ± 0.3 mm (pitch > 10 mm)	± 10 %	See tables for detail
			± 5 %	
		Lead length 5.0 mm ± 1.0 mm	± 10 %	
			± 5 %	
		Lead length 25.0 mm ± 2.0 mm	± 10 %	
		± 5 %		
	Taped ammo ⁽¹⁾	Pitch = 7.5 mm H = 18.5 mm; P ₀ = 12.7 mm	± 10 %	
			± 5 %	
	Taped reel ⁽¹⁾	Pitch bent back to 7.5 mm H = 16.0 mm; P ₀ = 15.0 mm; reel diameter = 500 mm	± 10 %	
			± 5 %	
Pitch = 7.5 mm and 10 mm H = 18.5 mm; P ₀ = 12.7 mm; reel diameter = 500 mm		± 10 %		
		± 5 %		

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 _{DC} at 105 °C 1500 V _{DC} at 85 °C	
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	
Rated temperature	105 °C	
Maximum permissible temperature	125 °C up to 500 h	

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 0.0012 0.0015 0.0018 0.0022 0.0027	4.0 x 9.0 x 10.0	0.4	60102 60122 60152 60182 60222 60272	62102 62122 62152 62182 62222 62272	1500	64102 64122 64152 64182 64222 64272	1000	66102 66122 66152 66182 66222 66272	1250	68129 68131 68132 68133 68134 68135	2500						
	0.0033 0.0039			5.0 x 10.5 x 10.0	0.4		60332 60392		62332 62392		1000		64332 64392	1250	66332 66392	1000	68136 68137	2000
	0.0047 0.0056						6.0 x 11.5 x 10.0		0.8				60472 60562		62472 62562		750	
	PITCH = 7.5 mm ± 0.4 mm; d _t = 0.50 mm ± 0.05 mm; C-TOL. = ± 10 % (U _{RDC} = 1000 V)																	
	0.0010 0.0012 0.0015 0.0018 0.0022 0.0027			4.0 x 9.0 x 10.0	0.4		61102 61122 61152 61182 61222 61272		63102 63122 63152 63182 63222 63272		1500		65102 65122 65152 65182 65222 65272	1000	67102 67122 67152 67182 67222 67272	1250	68179 68181 68182 68183 68184 68185	2500
	0.0033 0.0039						5.0 x 10.5 x 10.0		0.4				61332 61392		63332 63392		1000	
	0.0047 0.0056	6.0 x 11.5 x 10.0	0.8			61472 61562		63472 63562		750		65472 65562	1000		67472 67562			
	PITCH = 7.5 mm ± 0.4 mm; d _t = 0.50 mm ± 0.05 mm; C-TOL. = ± 5 % (U _{RDC} = 1000 V)																	
	0.0010 0.0012 0.0015 0.0018 0.0022	4.0 x 9.0 x 10.0	0.4			68215 68216 68217 68218 68219	68225 68226 68227 68228 68229	1500	68235 68236 68237 68238 68239	1000		68335 68336 68337 68338 68339	1250		68346 68347 68348 68349 68351		2500	
	0.0027 0.0033					5.0 x 10.5 x 10.0	0.4		68221 68222			68231 68232			1000			
	0.0039 0.0047			6.0 x 11.5 x 10.0	0.8				68223 68224		68233 68234	750		68243 68244		1000		68343 68344

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	1000	68409	1250	-	-	68418	1400				
	0.0012			68393	68402		68411				68419					
	0.0015			68394	68403		68412				68421					
	0.0018			68395	68404		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	1000	68112	1000			68141		1100			
	0.0056			68102	68107		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	1000	68454	1250			-		-	68463	1400	
	0.0012			68437	68446		68455							68464		
	0.0015			68438	68447		68456		68465							
	0.0018			68439	68448		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	1000	68168	1000	68191	1100						
	0.0056			68161	68165		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	1000	68498	1250	-	-		68507		1400		
	0.0012			68482	68491		68499					68508				
	0.0015			68483	68492		68501					68509				
	0.0018			68484	68493		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	1000	68254	1000			68357	1100				
	0.0056			68246	68251		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	500	65393 65473				450	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						
	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	12.0 x 22.0 x 26.0	7.8	68274	68299		68325						
0.12	68275			68301	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	9.2	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		68331 68332	100									
	0.39	21.0 x 31.0 x 31.0	20.3	68282	68307		50	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-4 (2013))	300 V _{AC}	1 nF to 470 nF	ENEC16/FI/21/01048/A1	www.vishay.com/doc?28212
UL 60384-14 2 nd edition	300 V _{AC}	1 nF to 470 nF	E354331	www.vishay.com/doc?28189
CSA E60384-1:14 3 rd edition	300 V _{AC}	1 nF to 470 nF	E354331	
CB-test certificate	300 V _{AC}	1 nF to 470 nF	FI-39810/A1	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 bandoleers 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:

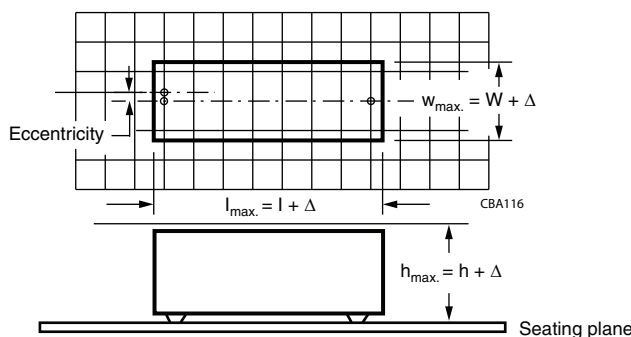
- For pitches ≤ 15 mm capacitors shall be mechanically fixed by the leads
- For larger pitches the capacitors shall be mounted in the same way and the body clamped

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

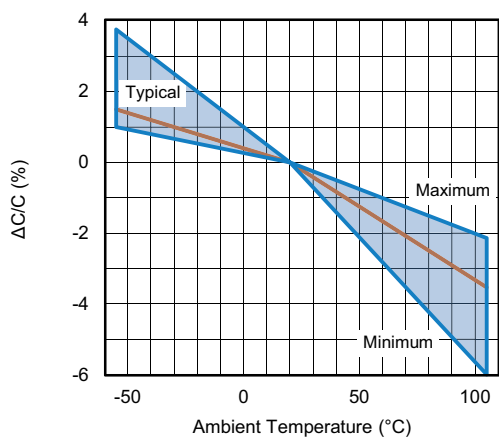
Ratings and Characteristics Reference Conditions

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 %.

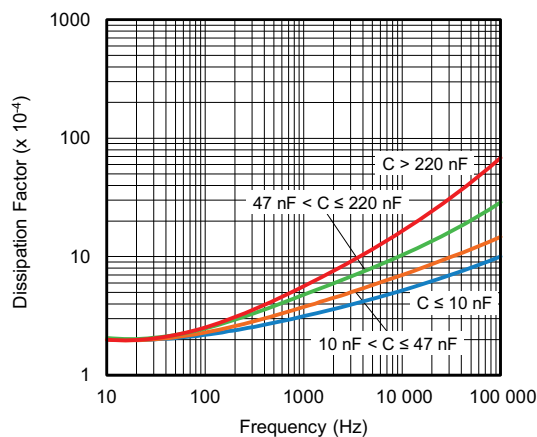
For reference testing, a conditioning period shall be applied over 96 h ± 4 h by heating the products in a circulating air oven at the rated temperature and a relative humidity not exceeding 20 %.



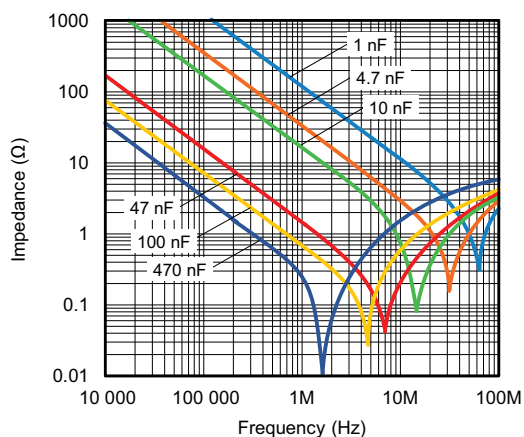
CHARACTERISTICS



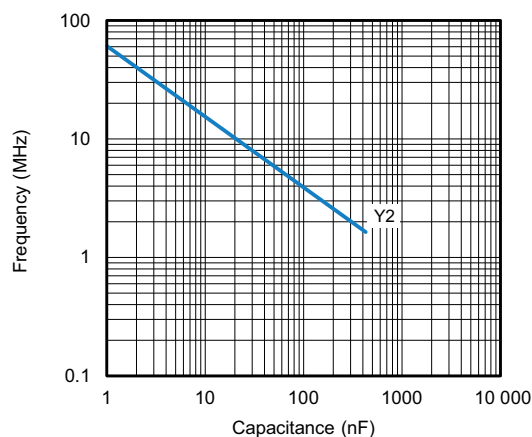
Capacitance as a function of ambient temperature (typical curve)



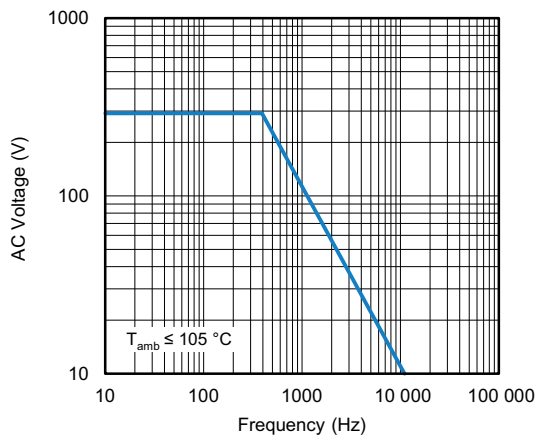
Tangent of loss angle as a function of frequency (typical curve)



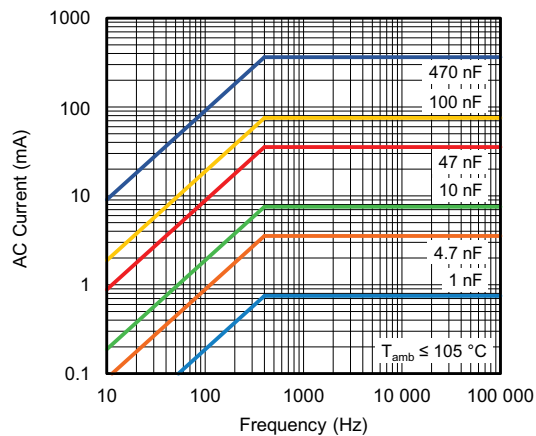
Impedance as a function of frequency (typical curve)



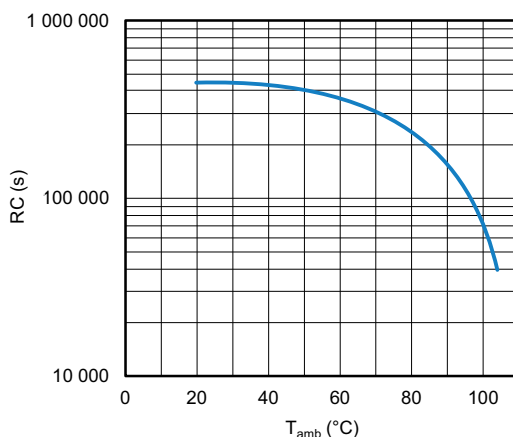
Resonant frequency as a function of capacitance (typical curve)



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 Y2 electromagnetic interference suppression in **standard line bypass applications** (between line and ground) (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.
- 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 420 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 ed-4 (2013) 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	



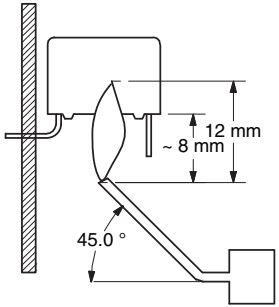
GROUP C INSPECTION REQUIREMENTS		
SUB-CLAUSE NUMBER AND TEST	CONDITIONS	PERFORMANCE REQUIREMENTS
SUB-GROUP C1A PART OF SAMPLE OF SUB-GROUP C1		
4.19 Component solvent resistance	Isopropylalcohol at room temperature Method: 2 Immersion time: 5 min ± 0.5 min Recovery time: min. 1 h, max. 2 h	
4.4.2 Final 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 ± 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: $R = \frac{420 V_{DC}}{1.5 \times C (dU/dt)}$	
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
SUB-GROUP C5		
4.16 Radio frequency characteristic	Resonance frequency	≥ 0.9 times the value as specified in section "Resonant Frequency" of this specification

GROUP C INSPECTION REQUIREMENTS		
SUB-CLAUSE NUMBER AND TEST	CONDITIONS	PERFORMANCE REQUIREMENTS
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 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.
SUB-GROUP ADDITIONAL TEST (FOR PITCH ≥ 15 mm)		
Damp heat steady state with voltage	RH: 85 %, temperature: 85 °C; Voltage: 300 V _{AC} , duration: 500 h	
Initial measurements	Capacitance Tangent of loss angle: at 10 kHz	
Final measurements	Visual examination Capacitance Tangent of loss angle Insulation resistance	No visible damage Legible marking $\Delta C/C \leq 10\%$ of the value with initial measurement Increase of $\tan \delta \leq 0.024$ Compared to values with initial measurement $\geq 50\%$ of values specified in section "Insulation Resistance" of this specification
SUB-GROUP ADDITIONAL TEST		
Damp heat steady state with voltage	RH: 40 %, temp.: 93 °C Voltage: 300 V _{AC} , duration: 21 days	
Initial measurements	Capacitance Tangent of loss angle: at 10 kHz	
Final measurements	Visual examination Capacitance Tangent of loss angle Insulation resistance	No visible damage Legible marking $\Delta C/C \leq 10\%$ of the value with initial measurement Increase of $\tan \delta \leq 0.024$ Compared to values with initial measurement $\geq 50\%$ of values specified in section "Insulation Resistance" of this specification



TEST CONDITIONS AND REQUIREMENTS ACCORDING AEC-Q200 REVISION C				
NO.	TEST NAME	REFERENCE	TEST CONDITIONS	PERFORMANCE REQUIREMENTS
1	Pre- and post-stress electrical test	-	-	User spec.
2	High temperature exposure (storage)	MIL-STD 202 method 108	1000 h; 105 °C; unpowered	$ \Delta C/C \leq \pm 5 \%$ Increase of $\tan \delta$ 0.008 for $C \leq 1 \mu\text{F}$ at 10 kHz $IR \geq 50 \%$ of initial requirement
3	Temperature cycling	JESD22 method JA-104	1000 cycles: -55 °C to +105 °C 10 min. dwell time each	$ \Delta C/C \leq \pm 5 \%$ Increase of $\tan \delta = 0.008$ at 10 kHz $IR \geq 50 \%$ of initial requirement
4	Moisture resistance	MIL-STD 202 method 106	10 cycles at 24 h/cycle, unpowered	$ \Delta C/C \leq \pm 5 \%$ Increase of $\tan \delta$ 0.008 for $C \leq 1 \mu\text{F}$ at 10 kHz $IR \geq 50 \%$ of initial requirement
5	Biased humidity	MIL-STD 202 method 103	1000 h; 40 °C; 93 % RH with U_{RAC}	$ \Delta C/C \leq \pm 10 \%$ Increase of $\tan \delta$ 0.008 for $C \leq 1 \mu\text{F}$ at 10 kHz $IR \geq 50 \%$ of initial requirement
6	Operational life	MIL-STD 202 method 108	$T_{amb} = 105 \text{ °C}$; 1000 h; $U_{test} = 1 \times U_{RAC}$	$ \Delta C/C \leq \pm 10 \%$ Increase of $\tan \delta$ 0.008 for $C \leq 1 \mu\text{F}$ at 10 kHz $IR \geq 50 \%$ of initial requirement
7	Terminal strength (lead)	MIL-STD 202 method 211	Leaded device lead integrity only.	$ \Delta C/C \leq \pm 5 \%$ Increase of $\tan \delta$ 0.008 for $C \leq 1 \mu\text{F}$ at 10 kHz $IR = \text{initial requirement}$
8	Resistance to solvents	MIL-STD 202 method 215	Short term	No visual damage Legible marking
9	Mechanical shock	MIL-STD 202 method 213	Figure a of method 213, condition C	No visual damage
10	Vibration	MIL-STD 202 method 204	5 g's for 20 min; 12 cycles, 3 orientations	No visual damage
11	Resistance to soldering heat	MIL-STD 202 method 210	260 °C; 10 s	$ \Delta C/C \leq \pm 5 \%$ Increase of $\tan \delta$ 0.008 for $C \leq 1 \mu\text{F}$ at 10 kHz $IR = \text{initial requirement}$
12	Solderability	J-STD-002	235 °C / 5 s	Good tinning as evidence by free flowing of the solder with wetting of terminations > 95 %
13	Electrical characterization	User spec.	-	User spec.
14	Flammability	UL 94	Electrical test not required	Maximum permitted burning time < 10 s



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