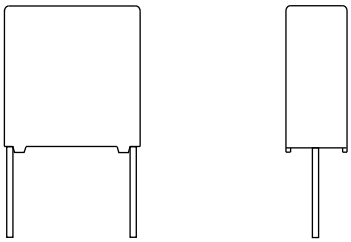
Interference Suppression Film Capacitor - Class Y2
Radial MKP 300 V_{AC} - Line to Ground Application



FEATURES

- AEC-Q200 qualified (rev. C) up to 105 °C
- Compliant with IEC 60384-14: AMD1 grade IIB for pitch ≥ 15 mm
  - THB: 85 °C / 85 % RH, 500 h at U_{RAC}
- Compliant with IEC 60384-14: 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?99912

AUTOMOTIVE GRADE

Pb-free

RoHS COMPLIANT

APPLICATIONS

- Standard line bypass (between line and ground) Y2 applications
- Line bypass application for continuous operation

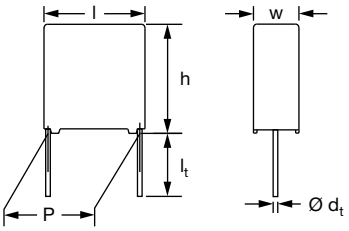
See also application note: www.vishay.com/doc?28153

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 2nd edition; ENEC; CSA E60384-1:14 3rd 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	
338 6 Y2	7.5 mm
	7.5 mm (bent back)
	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)

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

BFC2	338	6X	XX	X
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		**ON REQUEST**
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.		**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)	± 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} Pitch = 7.5 mm Pitch = 10 mm Pitch = 15 mm Pitch = 22.5 mm Pitch = 27.5 mm	 1500 V/µs 1000 V/µs 750 V/µs 600 V/µs 450 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) (4)	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	

ELECTRICAL DATA AND ORDERING INFORMATION - PITCH 7.5 mm

U_{RAC} (V)	CAP. (µF)	DIMENSIONS w x h x l (mm) (4)	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. = ± 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; P_0 = 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

(4) For tolerances see section “Space Requirements for Printed-Circuit Board Applications and Dimension Tolerances”

ELECTRICAL DATA AND ORDERING INFORMATION - PITCH 10 mm

U_{RAC} (V)	CAP. (µF)	DIMENSIONS w x h x l (mm) (4)	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	

ELECTRICAL DATA AND ORDERING INFORMATION - PITCH 10 mm

U_{RAC} (V)	CAP. (µF)	DIMENSIONS w x h x l (mm) (4)	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. = ± 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; P_0 = 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

(4) For tolerances see section “Space Requirements for Printed-Circuit Board Applications and Dimension Tolerances”

ELECTRICAL DATA AND ORDERING INFORMATION - PITCH 15 mm

U_{RAC} (V)	CAP. (µF)	DIMENSIONS w x h x l (mm) (4)	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	5.0 x 11.0 x 17.5	1.0	60682	62682	1000	64682	1000	-	-	68146	1100
	0.0082			60822	62822		64822				68147	
	0.010			60103	62103		64103				68148	
	0.012			60123	62123		64123				68149	
	0.015	6.0 x 12.0 x 17.5	1.4	60153	62153	1000	64153	1000			68151	900
	0.018			60183	62183		64183				68152	
	PITCH = 15.0 mm ± 0.4 mm; d_t = 0.80 mm ± 0.08 mm; C-TOL. = ± 20 % (U_{RDC} = 1000 V)											
	0.022	7.0 x 13.5 x 17.5	1.8	60223	62223	750	64223	500	-	-	68153	800
	0.027			60273	62273		64273				68154	
	0.033	8.5 x 15.0 x 17.5	2.4	60333	62333	750	64333	500			68155	650
	0.039			60393	62393		64393				68156	
	0.047	10.0 x 16.5 x 17.5	3.0	60473	62473	500	64473	450			68157	600
	0.056			60563	62563		64563				68158	

ELECTRICAL DATA AND ORDERING INFORMATION - PITCH 15 mm

U_{RAC} (V)	CAP. (µF)	DIMENSIONS w x h x l (mm) (4)	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. = ± 10 % (U_{RDC} = 1000 V)											
	0.0068	5.0 x 11.0 x 17.5	1.0	61682	63682	1000	65682	1000	-	-	68202	1100
	0.0082			61822	63822		65822				68203	
	0.010			61103	63103		65103				68204	
	0.012			61123	63123		65123				68205	
	0.015	6.0 x 12.0 x 17.5	1.4	61153	63153		65153				68206	900
	0.018			61183	63183		65183				68207	
	PITCH = 15.0 mm ± 0.4 mm; d_t = 0.80 mm ± 0.08 mm; C-TOL. = ± 10 % (U_{RDC} = 1000 V)											
	0.022	7.0 x 13.5 x 17.5	1.8	61223	63223	750	65223	500	-	-	68208	800
	0.027	8.5 x 15.0 x 17.5	2.4	61273	63273		65273				68209	650
	0.033			61333	63333		65333				68211	
	0.039	10.0 x 16.5 x 17.5	3	61393	63393	500	65393	450			68212	600
	0.047			61473	63473		65473				68213	
	PITCH = 15.0 mm ± 0.4 mm; d_t = 0.60 mm ± 0.06 mm; C-TOL. = ± 5 % (U_{RDC} = 1000 V)											
	0.0068	5.0 x 11.0 x 17.5	1.0	68258	68284	1000	68309	1000	-	-	68381	1100
	0.0082			68259	68285		68311				68382	
	0.010			68261	68286		68312				68383	
	0.012	6.0 x 12.0 x 17.5	1.4	68262	68287		68313				68384	900
	0.015			68263	68288		68314				68385	
	PITCH = 15.0 mm ± 0.4 mm; d_t = 0.80 mm ± 0.08 mm; C-TOL. = ± 5 % (U_{RDC} = 1000 V)											
	0.018	7.0 x 13.5 x 17.5	1.8	68264	68289	750	68315	500	-	-	68386	800
	0.022			68265	68291		68316				68387	
	0.027	8.5 x 15.0 x 17.5	2.4	68266	68292		68317				68388	650
	0.033			68267	68293		68318				68389	
	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; P_0 = 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

(4) For tolerances see section “Space Requirements for Printed-Circuit Board Applications and Dimension Tolerances”

ELECTRICAL DATA AND ORDERING INFORMATION - PITCH 22.5 mm

U_{RAC} (V)	CAP. (µF)	DIMENSIONS w x h x l (mm) (4)	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	7.0 x 16.5 x 26.0	2.9	68123	68125	200	68127	250	-	-	-	-
	0.056			68124	68126		68128					
	0.068	8.5 x 18.0 x 26.0	3.8	60683	62683	200	64683	250				
	0.082			60823	62823		64823					
	0.10	10.0 x 19.5 x 26.0	6.8	60104	62104	200	64104	200				
	0.12	12.0 x 22.0 x 26.0	7.8	60124	62124	150	64124	200				
	0.15			60154	62154		64154					
	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	10.0 x 19.5 x 26.0	6.8	61823	63823		65823	200				
	0.10			61104	63104		65104					
	0.12	12.0 x 22.0 x 26.0	7.8	61124	63124	150	65124	200				
	0.15			61154	63154		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		68324	200				
	0.10	12.0 x 22.0 x 26.0	7.8	68274	68299	150	68325					
	0.12			68275	68301		68326					

Notes

- SPQ = Standard Packing Quantity

(1) H = in-tape height; P_0 = 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
(4) For tolerances see section “Space Requirements for Printed-Circuit Board Applications and Dimension Tolerances”

ELECTRICAL DATA AND ORDERING INFORMATION - PITCH 27.5 mm

U_{RAC} (V)	CAP. (µF)	DIMENSIONS w x h x l (mm) (4)	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	13.0 x 23.0 x 31.0	9.2	60184	62184	100	64184	125	-	-	-	-
	0.22			60224	62224		64224					
	0.27	15.0 x 25.0 x 31.0	12.3	60274	62274	100	64274	125				
	0.33	18.0 x 28.0 x 31.0	16.1	60334	62334	100	64334	100				
	0.39			60394	62394		64394					
	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	13.0 x 23.0 x 31.0	9.2	61184	63184	100	65184	125	-	-	-	-
	0.22	15.0 x 25.0 x 31.0	12.3	61224	63224		65224					
	0.27	18.0 x 28.0 x 31.0	16.1	61274	63274		65274	100				
	0.33			61334	63334		65334					
	0.39	21.0 x 31.0 x 31.0	20.3	61394	63394	50	65394	75				
	0.47			61474	63474		65474					
	PITCH = 27.5 mm ± 0.4 mm; d_t = 0.80 mm ± 0.08 mm; C-TOL. = ± 5 % (U_{RDC} = 1000 V)											
	0.15	13.0 x 23.0 x 31.0	9.2	68276	68302	100	68327	125	-	-	-	-
	0.18			68277	68303		68328					
	0.22	15.0 x 25.0 x 31.5	12.3	68278	68304		68329					
	0.27	18.0 x 28.0 x 31.5	16.1	68279	68305		68331	100				
	0.33			68281	68306		68332					
	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; P_0 = 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

(4) For tolerances see section “Space Requirements for Printed-Circuit Board Applications and Dimension Tolerances”

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/A3	www.vishay.com/doc?28212
UL 60384-14 2nd edition	300 V_{AC}	1 nF to 470 nF	E354331	www.vishay.com/doc?28189
CSA E60384-1:14 3rd 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:

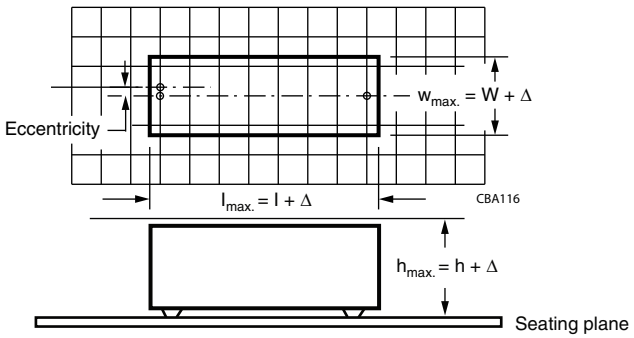
- For pitches ≤ 15 mm capacitors shall be mechanically fixed by the leads
- For larger pitches the capacitors shall be mounted in the same way and the body clamped

SPACE REQUIREMENTS FOR PRINTED-CIRCUIT BOARD APPLICATIONS AND DIMENSION TOLERANCES

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.



For the minimum product dimensions for length ($l_{min.}$), width ($w_{min.}$), and height ($h_{min.}$) following tolerances of the components are valid:

$l_{min.} = l - \Delta l$, $w_{min.} = w - \Delta w$, and $h_{min.} = h - \Delta h$ following

- For products with pitch ≤ 10 mm, $\Delta l = 0.3$ mm and $\Delta w = \Delta h = 0.3$ mm
- For products with pitch = 15 mm, $\Delta l = 0.5$ mm and $\Delta w = \Delta h = 0.5$ mm
- For products with 15 mm < pitch ≤ 27.5 mm, $\Delta l = 1.0$ mm and $\Delta w = \Delta h = 0.5$ mm

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

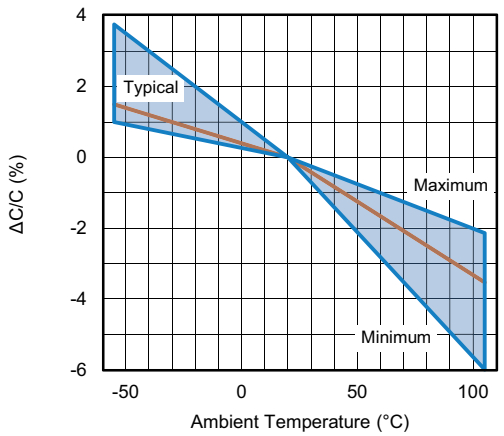
T_{stg} = -25 °C to +35 °C with RH maximum 75 % without condensation

Ratings and Characteristics Reference Conditions

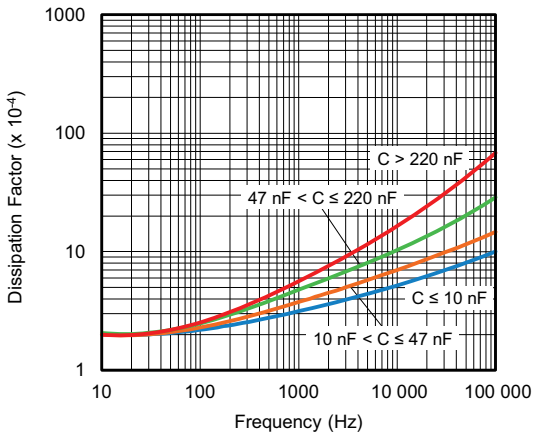
Unless otherwise specified, all electrical values apply to an ambient temperature of 23 °C ± 1 °C, an atmospheric pressure of 86 kPa to 106 kPa and a relative humidity of 50 % ± 2 %.

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 %.

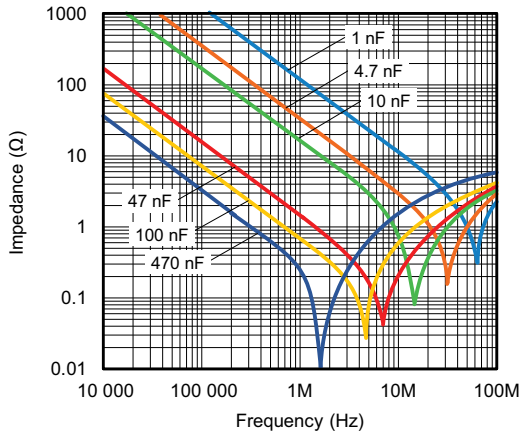
CHARACTERISTICS



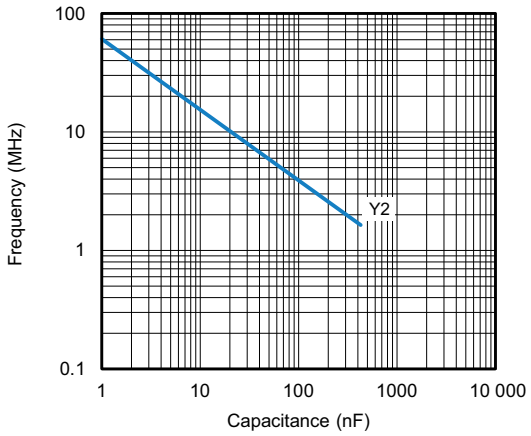
Capacitance as a function of ambient temperature (typical curve)



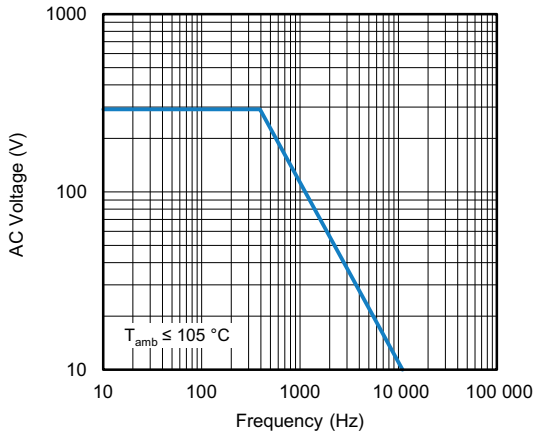
Tangent of loss angle as a function of frequency (typical curve)



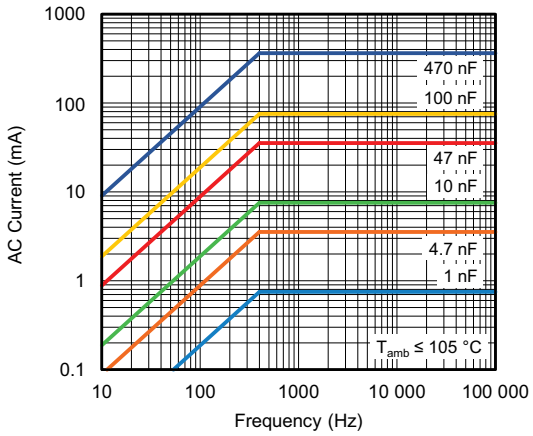
Impedance as a function of frequency (typical curve)



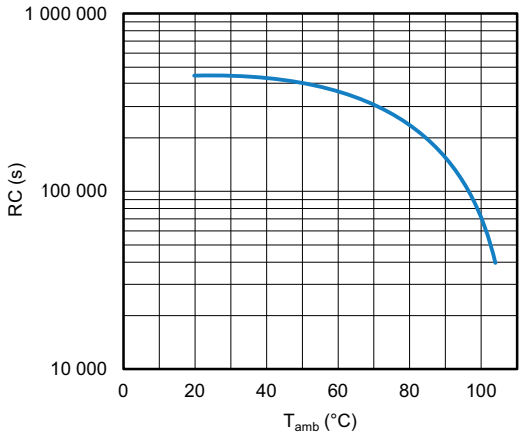
Resonant frequency as a function of capacitance (typical curve)



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

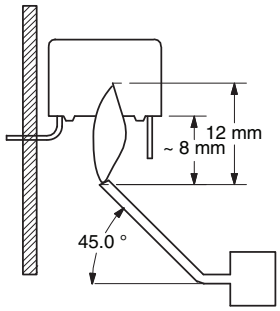
Sub-clause numbers of tests and performance requirements refer to the “Sectional Specification, Publication IEC 60384-14 ed-4 (2013) and Specific Reference Data.”

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	No visible damage Legible marking
	Capacitance	$\|\Delta C/C\| \leq 5$ % of the value measured initially
	Tangent of loss angle	Increase of tan $\delta \leq 0.008$ 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: 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	θA = -55 °C θB = +105 °C 5 cycles Duration t = 30 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	No visible damage
	Capacitance	$\|\Delta C/C\| \leq 5$ % of the value measured initially
	Tangent of loss angle	Increase of tan $\delta \leq 0.008$ Compared to values measured initially
	Insulation resistance	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	No visible damage Legible marking
	Capacitance	$\lvert\Delta C/C\rvert \leq 5$ % of the value measured in 4.11.1.
	Tangent of loss angle	Increase of tan $\delta \leq 0.008$ Compared to values measured in 4.11.1
	Voltage proof 2250 V_{DC}; 1 min between terminations	No permanent breakdown or flash-over
	Insulation resistance	≥ 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	No visible damage Legible marking
	Capacitance	$\lvert\Delta C/C\rvert \leq 5$ % of the value measured in 4.12.1.
	Tangent of loss angle	Increase of tan $\delta \leq 0.007$ Compared to values measured in 4.12.1.
	Voltage proof 2250 V_{DC}; 1 min between terminations	No permanent breakdown or flash-over
	Insulation resistance	≥ 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	$\lvert\Delta C/C\rvert \leq 10$ % 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	≥ 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	$\lvert\Delta C/C\rvert \leq 10$ % 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	≥ 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 mm^3: 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	No visible damage Legible marking
	Capacitance	$\|\Delta C/C\| \leq 10$ % of the value with initial measurement
	Tangent of loss angle	Increase of tan $\delta \leq 0.024$ Compared to values with initial measurement
	Insulation resistance	≥ 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	No visible damage Legible marking
	Capacitance	$\|\Delta C/C\| \leq 10$ % of the value with initial measurement
	Tangent of loss angle	Increase of tan $\delta \leq 0.024$ Compared to values with initial measurement
	Insulation resistance	≥ 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 δ 0.008 for C ≤ 1 µF at 10 kHz IR ≥ 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 δ = 0.008 at 10 kHz IR ≥ 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 δ 0.008 for C ≤ 1 µF at 10 kHz IR ≥ 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 δ 0.008 for C ≤ 1 µF at 10 kHz IR ≥ 50 % of initial requirement
6	Operational life	MIL-STD 202 method 108	T_{amb} = 105 °C; 1000 h; U_{test} = 1 x U_{RAC}	$\|\Delta C/C\| \leq \pm 10$ % Increase of tan δ 0.008 for C ≤ 1 µF at 10 kHz IR ≥ 50 % of initial requirement
7	Terminal strength (leaded)	MIL-STD 202 method 211	Leaded device lead integrity only.	$\|\Delta C/C\| \leq \pm 5$ % Increase of tan δ 0.008 for C ≤ 1 µF at 10 kHz IR = 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 δ 0.008 for C ≤ 1 µF at 10 kHz IR = 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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