EFY2S

Metalized polypropylene film EMI suppression capacitors



Applications

- Class Y2 for interference suppression
- EMI filtering in line-to-ground and line bypass applicationsx
- Solar inverter
- UPS
- AC Motor drive
- Air conditioner
- Switch mode power supplies (SMPS)

Product features

- High stability of capacitance
- Self-healing property
- Over voltage stress withstanding
- Flame-retardant plastic case and resin

Environmental compliance and general specifications

- Operating temperature range: -40 °C to +110 °C

Agency information

Approval mark	Standard	File number
c UL us	UL 60384-14 CAN/CSA-E60384-14	E529574
10 DVE	IEC 60384-14:2013 IEC 60384-14:2013/AMD1:2016	40055915
CQC	IEC 60384-14:2013+AMD1:2016 CQC11-471112-2015	CQC22001363200

Powering Business Worldwide

Part number system

EF	Y2	S	30	K	333	B07	2L	H
Capacitor type	**Family**	**Grade**	**Voltage (Vac)**	**Tolerance**	**Capacitance (pF)**	**Size code**	**Terminal code**	**Lead length code**
EF = film capacitors	Y2	S = standard	30 = 300	K = ±10% M = ±20%	First two digits= significant figures, third digit = number of zeros example: 333 = 33000 pF	Refer to size code table	Refer to terminal code table	Refer to lead length code table

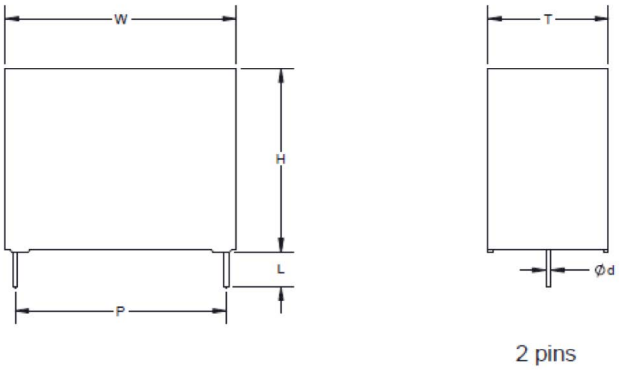
Terminal code table

Digit one (Lead/terminal type)		Digit two (Lead Ipsilateral)	
Straight cut	2	N/A	L
Taping straight	V	-	-

Lead length code table

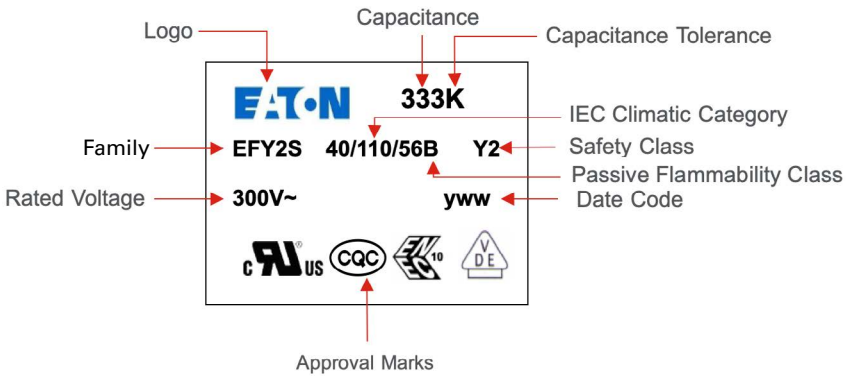
Lead length	
3.0±0.5 mm (Bulk)	D
3.5±0.5 mm (Bulk)	E
4.0±0.5 mm (Bulk)	F
4.5±0.5 mm (Bulk)	G
5.0±0.5 mm (Bulk)	H
25±2 mm (Ammo)	T

Dimensions-mm



2 pins

Part marking



Size code table

Size	Dimension						Pitch		Lead wire		Lead length
Code	W	Tolerance (±)	H	Tolerance (±)	T	Tolerance (±)	P	Tolerance (±)	Ød	Tolerance (±)	L
A01	13	0.5	9	0.5	4	0.5	10	0.5	0.6	0.05	Refer to Lead Length Code Table, Pitch 27.5 and 37.5 without Ammo package
A02	13	0.5	11	0.5	5	0.5	10	0.5	0.6	0.05	
A03	13	0.5	12	0.5	6	0.5	10	0.5	0.6	0.05	
B01	18	0.5	11	0.5	5	0.5	15	0.5	0.6	0.05	
B02	18	0.5	12	0.5	6	0.5	15	0.5	0.6	0.05	
B07	18	0.5	13.5	0.5	7.5	0.5	15	0.5	0.8	0.05	
B09	18	0.5	14.5	0.5	8.5	0.5	15	0.5	0.8	0.05	
B16	18	0.5	19	0.5	11	0.5	15	0.5	0.8	0.05	
C01	26	0.5	15.5	0.5	6	0.5	22.5	0.5	0.6	0.05	
C02	26	0.5	16.5	0.5	7	0.5	22.5	0.5	0.8	0.05	
C03	26	0.5	17	0.5	8.5	0.5	22.5	0.5	0.8	0.05	
C04	26	0.5	19	0.5	10	0.5	22.5	0.5	0.8	0.05	
C06	26	0.5	22	0.5	12	0.5	22.5	0.5	0.8	0.05	
C09	26	0.5	25	0.5	15	0.5	22.5	0.5	0.8	0.05	
D02	32	0.8	18	0.8	9	0.8	27.5	0.5	0.8	0.05	
D03	32	0.8	20	0.8	11	0.8	27.5	0.5	0.8	0.05	
D04	32	0.8	22	0.8	13	0.8	27.5	0.5	0.8	0.05	
D08	32	0.8	28	0.8	14	0.8	27.5	0.5	0.8	0.05	
D09	32	0.8	28	0.8	18	0.8	27.5	0.5	0.8	0.05	
D12	32	0.8	33	0.8	18	0.8	27.5	0.5	0.8	0.05	
D13	32	0.8	37	0.8	22	0.8	27.5	0.5	0.8	0.05	
E02	42	1	24	1	13	1	37.5	0.5	1	0.05	
E04	42	1	28	1	17	1	37.5	0.5	1	0.05	
E10	42	1	32	1	19	1	37.5	0.5	1	0.05	
E13	42	1	40	1	20	1	37.5	0.5	1	0.05	

P=10/15/22.5 case color is gray, P=27.5/37.5 case color is black.

Rating and part number

Rated voltage 300 Vac/1500 Vdc

	Dimensions								
Capacitance value (µF)	W (mm)	H (mm)	T (mm)	P (mm)	Peak current (A)	Surge current (A)	dv/dt (V/µs)	Lead wire diameter (mm)	Part number[1]
0.001	13	9	4	10	0.8	2.4	800	0.6	EFY2S30K102A012LH
0.0015	13	9	4	10	1.2	3.6	800	0.6	EFY2S30K152A012LH
0.0022	13	9	4	10	1.76	5.28	800	0.6	EFY2S30K222A012LH
0.0033	13	11	5	10	2.64	7.92	800	0.6	EFY2S30K332A022LH
0.0047	13	11	5	10	3.76	11.28	800	0.6	EFY2S30K472A022LH
0.0047	13	12	6	10	3.76	11.28	800	0.6	EFY2S30K472A032LH
0.0068	13	12	6	10	5.44	16.32	800	0.6	EFY2S30K682A032LH
0.01	13	12	6	10	8	24	800	0.6	EFY2S30K103A032LH
0.015	13	12	6	10	12	36	800	0.6	EFY2S30K153A032LH
0.0047	18	11	5	15	2.82	8.46	600	0.6	EFY2S30K472B012LH
0.0056	18	11	5	15	3.36	10.08	600	0.6	EFY2S30K562B012LH
0.0068	18	11	5	15	4.08	12.24	600	0.6	EFY2S30K682B012LH
0.0082	18	11	5	15	4.92	14.76	600	0.6	EFY2S30K822B012LH
0.01	18	11	5	15	6	18	600	0.6	EFY2S30K103B012LH
0.015	18	11	5	15	9	27	600	0.6	EFY2S30K153B012LH
0.018	18	12	6	15	10.8	32.4	600	0.6	EFY2S30K183B022LH
0.022	18	12	6	15	13.2	39.6	600	0.6	EFY2S30K223B022LH
0.033	18	13.5	7.5	15	19.8	59.4	600	0.8	EFY2S30K333B072LH
0.039	18	13.5	7.5	15	23.4	70.2	600	0.8	EFY2S30K393B072LH
0.047	18	14.5	8.5	15	28.2	84.6	600	0.8	EFY2S30K473B092LH
0.068	18	19	11	15	40.8	122.4	600	0.8	EFY2S30K683B162LH
0.082	18	19	11	15	49.2	147.6	600	0.8	EFY2S30K823B162LH
0.047	26	15.5	6	22.5	23.5	70.5	500	0.6	EFY2S30K473C012LH
0.056	26	15.5	6	22.5	28	84	500	0.6	EFY2S30K563C012LH
0.068	26	16.5	7	22.5	34	102	500	0.8	EFY2S30K683C022LH
0.082	26	16.5	7	22.5	41	123	500	0.8	EFY2S30K823C022LH
0.1	26	17	8.5	22.5	50	150	500	0.8	EFY2S30K104C032LH
0.15	26	19	10	22.5	75	225	500	0.8	EFY2S30K154C042LH
0.22	26	22	12	22.5	110	330	500	0.8	EFY2S30K224C062LH
0.33	26	25	15	22.5	165	495	500	0.8	EFY2S30K334C092LH
0.1	32	18	9	27.5	40	120	400	0.8	EFY2S30K104D022LH
0.15	32	18	9	27.5	60	180	400	0.8	EFY2S30K154D022LH
0.18	32	20	11	27.5	72	216	400	0.8	EFY2S30K184D032LH

1. Standard part numbers listed---addition confirgurations available for tolerance, terminal and lead length. See part number system for available tolerances and terminal and lead length tables for available options.

Rating and part number

Rated voltage 300 Vac/1500 Vdc

	Dimensions								
Capacitance value (µF)	W (mm)	H (mm)	T (mm)	P (mm)	Peak current (A)	Surge current (A)	dv/dt (V/µs)	Lead wire diameter (mm)	Part number[1]
0.22	32	20	11	27.5	88	264	400	0.8	EFY2S30K224D032LH
0.27	32	22	13	27.5	108	324	400	0.8	EFY2S30K274D042LH
0.33	32	28	14	27.5	132	396	400	0.8	EFY2S30K334D082LH
0.33	32	22	13	27.5	132	396	400	0.8	EFY2S30M334D042LH*
0.47	32	28	18	27.5	188	564	400	0.8	EFY2S30K474D092LH
0.56	32	33	18	27.5	224	672	400	0.8	EFY2S30K564D122LH
0.68	32	33	18	27.5	272	816	400	0.8	EFY2S30K684D122LH
0.82	32	37	22	27.5	328	984	400	0.8	EFY2S30K824D132LH
1	32	37	22	27.5	400	1200	400	0.8	EFY2S30K105D132LH
0.47	42	24	13	37.5	141	423	300	1	EFY2S30K474E022LH
0.68	42	28	17	37.5	204	612	300	1	EFY2S30K684E042LH
0.82	42	32	19	37.5	246	738	300	1	EFY2S30K824E102LH
1	42	40	20	37.5	300	900	300	1	EFY2S30K105E132LH

1. Standard part numbers listed---addition confirgurations available for tolerance, terminal and lead length. See part number system for available tolerances and terminal and lead length tables for available options.
* Only available in M = 20% tolerance, otherwise both K =10% and M = 20% available

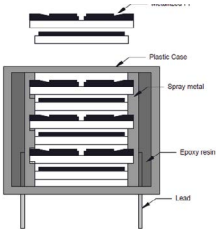
General information

Application	Line-to-ground / Line-by-pass (Class Y2)
Dielectric	Metallized Polypropylene Film
Reference standard	IEC 60384-14; UL 60384-14; GB/T 6346.14-2015
Climatic category	40/110/56 IEC60068-1
Passive flammability class	B
Operating temperature range	-40 °C to +110 °C
Protection	Solvent resistant plastic case UL94 V-0, Thermosetting resin sealing UL 94V-0 compliant
Installation	Any position
Packaging	Packed in cardboard boxes with protection for the terminals
Storage conditions	Storage time: ≤24 months from the date marked on the package label, Average relative humidity per year ≤70%, RH≤85% for 30 days randomly distributed throughout the year, Dew is absent, Temperature: -40 °C to +85 °C
RoHS compliant	Compliant with the restricted substance requirements of Directive 2011/65/EU
Flame retardant grade	Flame retardant performance accords with horizontal combustion grade HB and vertical combustion grade V-0

Construction

Metallized film	OPP & Al/Zn
Metal sprayed	Sn/Zn Alloy
Connection electrode	(0.6 mm to 0.8 mm) Tinned copper clad steel wire (1.0 mm to 1.2 mm) Tinned copper wires
Plastic case	Plastic case (UL94V-0)
Filling	Epoxy resin (UL94V-0)

Film construction

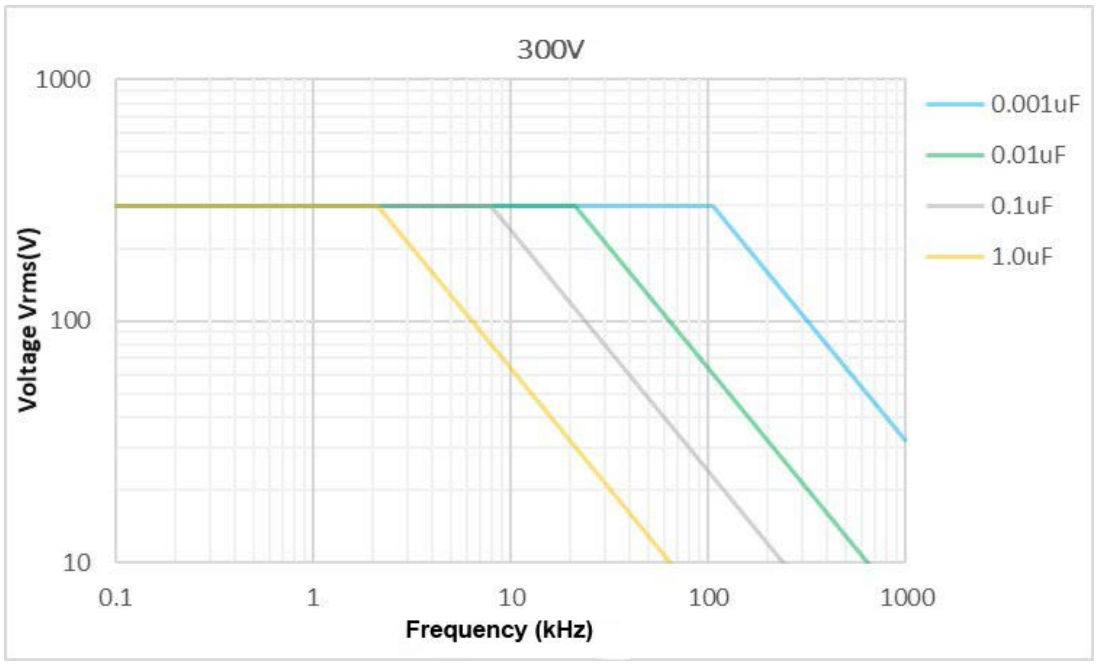


Electrical and general characteristics

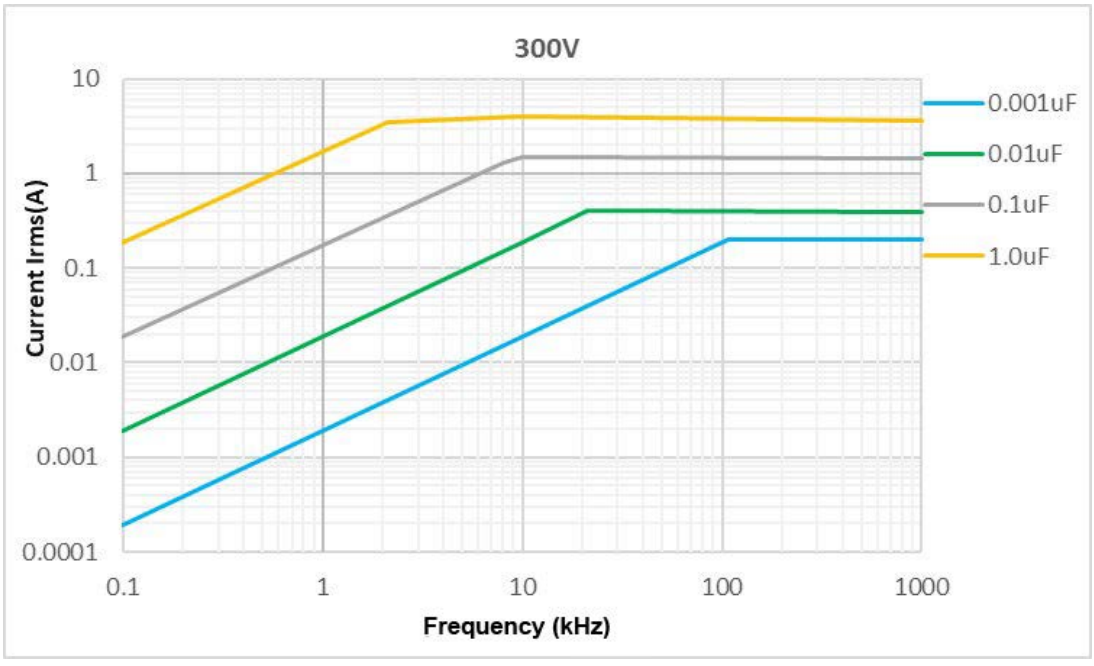
Voltage range (U_R)	300 Vac, 50/60 Hz
Recommended DC voltage	1500 Vdc
Capacitance range	0.001 µF to 1.0 µF
Capacitance tolerance	±10% or ±20% at +20 °C
Capacitance	Measuring frequency at 1 kHz, +20 °C Measuring voltage: 1 ±0.2 V
Standard atmospheric conditions for static test	Ambient temperature +15 °C to +35 °C Relative humidity 45% to 75% Air pressure 86 kPa to 106 kPa.
Withstanding DC voltage between terminals U_{TT}	DC Voltage: 4000 Vdc for 2 seconds, charge current must be 1 A maximum. Withstanding (DC) voltage (cut off current 10 mA), rise time 100V/s. (at+20+/-2 °C)
Withstanding AC voltage between terminal and case U_{TC}	$2U_R$ + 1500 Vac, 60 s (at +20+/-2 °C)
Dissipation factor	≤20 * 10^{-4} at 10 kHz. (C ≤ 1 µF) at +20 °C
Insulation resistance	R between leads, for C ≤ 0.33 µF at 100 V, +20 °C; 1 minute > 15 000 MΩ RC between leads, for C > 0.33 µF at 100 V, +20 °C; 1 minute > 5000 MΩ * µF
Life expectancy	100,000 hours (U_R hotspot = +85 °C) (△C/C≤10%)
Failure rate	100 FIT
Maximum altitude	2000 m

Charcteristics curves

Maximum voltage (V_{rms}) vs frequency

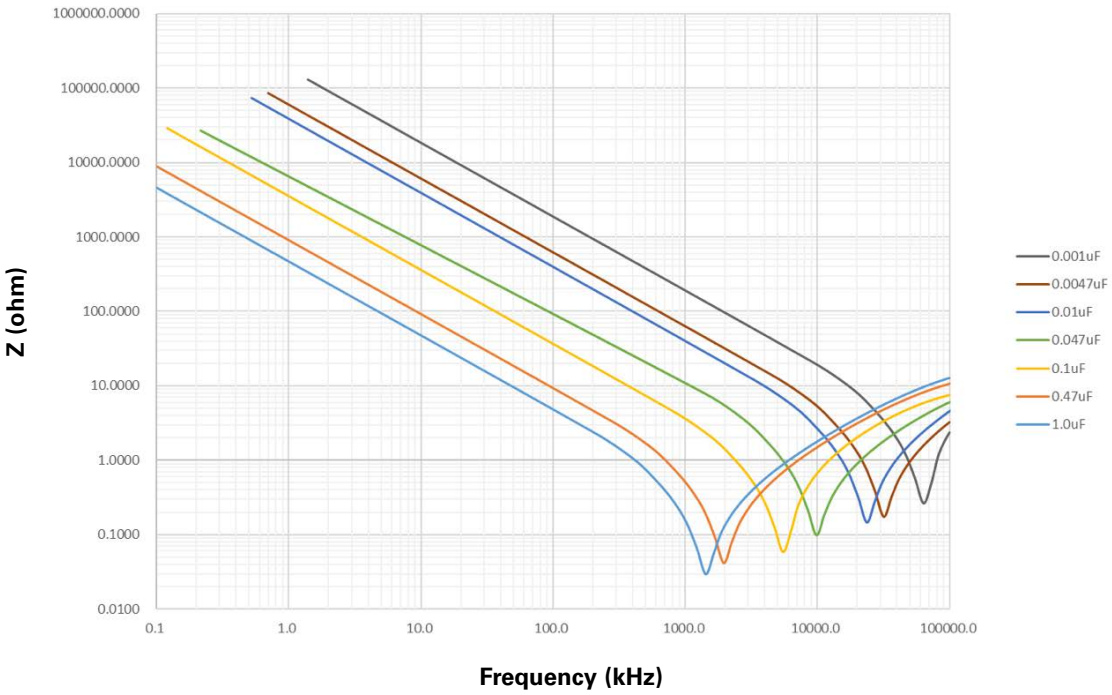


Maximum current (I_{rms}) vs frequency



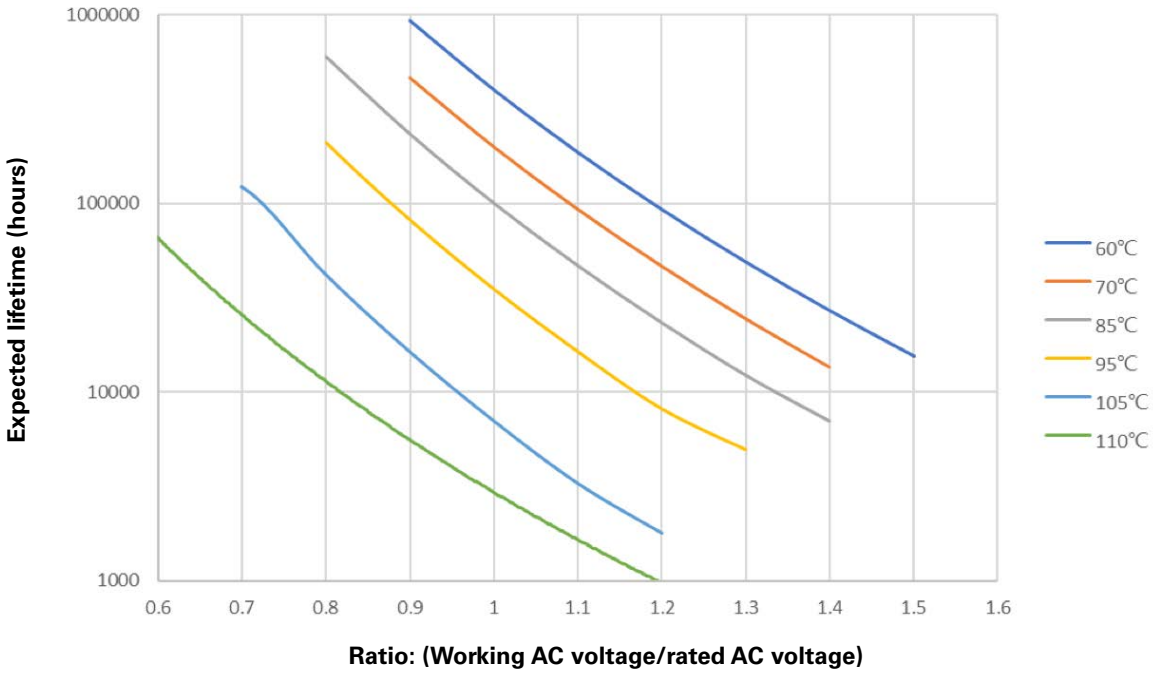
Charcteristics curves

Impedance vs frequency



Charcteristics curves

Expected life curve



Environmental test

Test	Test condition	Performance
Damp heat loading	Test temperature: +40 ±2 °C Test humidity: 90% to 95% R.H. Test Duration: 1000 +24/-0 hours Loading voltage: Rated voltage	Capacitance change rate (△C/C) : ≤±10% DF change (△tgδ): : ≤80*10^{-4} at 10 kHz. (C ≤ 1 µF) Insulation resistance: ≥50% of initial limit (T-T) test voltage: 4000 Vdc/2 s (T-C) test voltage: 2 U_R + 1500 V (ac)/60 s
Rapid temperature change	Testing method per IEC 60068-2-14 Na Test temperature cycle: Total 5 cycles High temperature: +110 ±5 °C for 30 minutes Low temperature: -40 ±5 °C for 30 minutes	Capacitance change rate (△C/C) : ≤±5% DF change (△tgδ): : ≤80*10^{-4} at 10 kHz. (C ≤ 1 µF) Insulation resistance: ≥50% of initial limit (T-T) test voltage: 4000 Vdc/2 s (T-C) test voltage: 2 U_R + 1500 V (ac)/60 s
High temperature loading	Testing method per IEC 60384-14 Test Temperature: +110 ±2 °C. Apply 125% of rated voltage for 1,000 +24/-0 hours; Each of these voltages shall be applied to each capacitor individually through a resistor of 47 Ω ±5%. Once every hour the voltage is increased to 1.5UR or 1000 V rms, whichever is higher, for 0.1 seconds.	Capacitance change rate (△C/C) : ≤±10% DF change (△tgδ): : ≤80*10^{-4} at 10 kHz. (C ≤ 1 µF) Insulation resistance: ≥50% of initial limit (T-T) test voltage: 4000 Vdc/2 s (T-C) test voltage: 2 U_R + 1500 V (ac)/60 s
High temperature features	Test Temperature: +110 ±2 °C Test Duration: 16 +1/-0 hours	Capacitance change rate (△C/C) : -0 to -5% DF change (△tgδ): : ≤80*10^{-4} at 10 kHz. (C ≤ 1 µF) Insulation resistance: ≥50% of initial limit (T-T) test voltage: 4000 Vdc/2 s (T-C) test voltage: 2 U_R + 1500 V (ac)/60 s
Low temperature features	Test Temperature: -40 ±2 °C Test Duration: 2 +1/-0 hrs.	Capacitance change rate (△C/C) : +0 to +5% DF change (△tgδ): : ≤80*10^{-4} at 10 kHz. (C ≤ 1 µF) Insulation resistance: ≥50% of initial limit (T-T) test voltage: 4000 Vdc/2 s (T-C) test voltage: 2 U_R + 1500 V (ac)/60 s
Solderability	Testing method per IEC 60068-2-20 Ta Soldering temperature: +245 ±5 °C Immersion duration: 2 +/-0.5 seconds	More than 95% of circumferential surface of lead wire shall be covered with new solder. Insulation Resistance: ≥50% of initial limit (T-T) test voltage: 4000 Vdc/2 s (T-C) test voltage: 2 UR + 1500 V (ac) /60 s
Soldering heat resistance	Flow soldering: Preheat temperature +100 °C to +120 °C Preheat Duration: 100 seconds maximum Soldering Temperature: +260 ±5 °C Immersion Duration: ≤10 seconds Immersion Depth: 1.5 +/- 0.5 mm from roots.	Capacitance change rate (△C/C) : ≤±2% DF change (△tgδ): : ≤80*10^{-4} at 10 KHz. (C ≤ 1 µF) Insulation resistance: ≥50% of initial limit (T-T) test voltage: 4000 Vdc/2 s (T-C) test voltage: 2 U_R + 1500 V (ac)/60 s
Temperature cycle	Test Temperature Cycle: Total 5 cycles Each cycle includes: 1. +20 ±2 °C for 3 minutes 2. -40 +0/-3 °C for 30 minutes 3. +20 ±2 °C for 3 minutes 4. +110 +3/-0 °C for 30 minutes 5. +20 ±2 °C for 3 minutes	Capacitance change rate (△C/C) ≤±5% DF change (△tgδ): : ≤80*10^{-4} at 10 kHz. (C ≤ 1 µF) Insulation resistance: ≥50% of initial limit (T-T) test voltage: 4000 Vdc/2 s (T-C) test voltage: 2 U_R + 1500 V (ac)/60 s
Humidity resistance	Testing method per IEC 60068-2-3 Ca Test Temperature: +40 +/-2°C Test Humidity: 90% to 95% R.H. Test Duration: 1344 +24/-0 hours	Capacitance change rate (△C/C) : -0 to -5% DF change (△tgδ): : ≤80*10^{-4} at 10 kHz. (C ≤ 1 µF) Insulation resistance: ≥50% of initial limit (T-T) test voltage: 4000 Vdc/2 s (T-C) test voltage: 2 U_R + 1500 V (ac)/60 s

Electrical test

Test	Test condition	Performance
Charge and discharge	10000 cycles Charge to √2 x UR(DC) Charge resistance: $R = \frac{220 \times 10^{-6}}{C_N}\ \Omega$ Discharge resistance: $R = \frac{\sqrt{2} \times U_R\,(DC)}{1.25 \times C(dv/dt)}\ \Omega$	Capacitance change rate (△C/C) : ≤±5% DF change (△tgδ): : ≤80*10^{-4} at 10 kHz. (C ≤ 1 µF) Insulation resistance: ≥50% of initial limit (T-T) test voltage: 4000 Vdc/2 s (T-C) test voltage: 2 U_R + 1500 V (ac)/60 s
Impulse voltage	3 successive impulses, full wave, peak voltage: Y2: 5 kV for C ≤ 1 µF 24 pulses maximum	No self-healing breakdowns or flashover

Mechanical test

Test	Test condition	Performance
Resistance to solvent	IEC 60068-2-45 test XA method 1 Solvent: propanol (isopropyl-alcohol) Temperature: +23 ±5°C Immersion time: 5 ±0.5 minutes Drying time: 5 minutes Mechanical treatment: 10 rubbing (with cotton-wool)	Capacitance change rate (△C/C) : ≤±1% DF change (△tgδ): : ≤80*10^{-4} at 10 kHz. (C ≤ 1 µF) Insulation resistance: ≥50% of initial limit (T-T) test voltage: 4000 Vdc/2 s (T-C) test voltage: 2 U_R + 1500 V (ac)/60 s
Terminal strength	Tension: 0.50 < D ≤0.80, 10N 0.80 < D ≤1.25, 20N Bending test : Bending force: 0.50 < D ≤0.80, 5N 0.80 < D ≤1.25, 10N Make two successive bends in each direction	No visible damage to appearance
Vibration resistance	Testing method per IEC 60068-2-6 Fc. Frequency Change: 10—55—10 Hz. Vibration Distance : 1.5 mm Test Direction : X, Y, Z Test Duration: 2 +1/- 0 hours each direction	Capacitance change rate (△C/C) : ≤±3% DF change (△tgδ): : ≤80*10^{-4} at 10 kHz. (C ≤ 1 µF) Insulation resistance: ≥50% of initial limit (T-T) test voltage: 4000 Vdc/2 s (T-C) test voltage: 2 U_R + 1500 V (ac)/60 s
Bump	1000 times, Acceleration: 400 m/s^2 Pulse duration: 6 ms	Capacitance change rate (△C/C) : ≤±3% DF change (△tgδ): : ≤80*10^{-4} at 10 kHz. (C ≤ 1 µF) Insulation resistance: ≥50% of initial limit (T-T) test voltage: 4000 Vdc/2 s (T-C) test voltage: 2 U_R + 1500 V (ac)/60 s

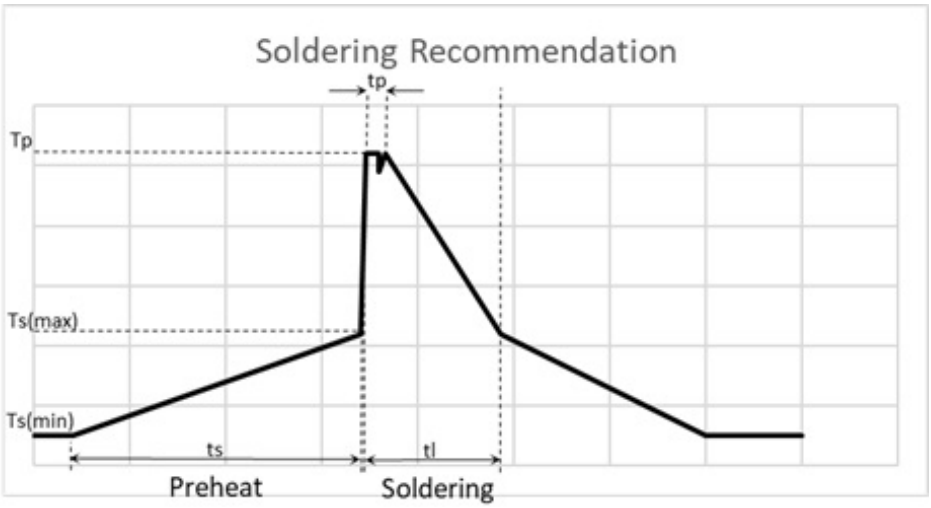
Flammability test

Test	Test condition	Performance
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.
Active flammability	20 cycles of 5 kV discharges on the test capacitor connected to U_R	The cheese cloth around the capacitors shall not burn with a flame. No electrical measurements are required.

Packaging information

Pitch	SIze	Dimension			Package quantity	
mm	Code	W	H	T	Bulk pack/box	Ammo pack/box
10	A01	13	9	4	1,848	840
	A02	13	11	5	1,488	680
	A03	13	12	6	1,224	560
15	B01	18	11	5	1,054	680
	B02	18	12	6	867	560
	B07	18	13.5	7.5	697	450
	B09	18	14.5	8.5	612	390
	B16	18	19	11	476	300
22.5	C01	26	15.5	6	612	350
	C02	26	16.5	7	528	300
	C03	26	17	8.5	432	250
	C04	26	19	10	372	210
	C06	26	22	12	300	170
	C09	26	25	15	240	140
27.5	D02	32	18	9	340	NA
	D03	32	20	11	280	NA
	D04	32	22	13	230	NA
	D08	32	28	14	220	NA
	D09	32	28	18	170	NA
	D12	32	33	18	170	NA
	D13	32	37	22	140	NA
37.5	E02	42	24	13	161	NA
	E04	42	28	17	126	NA
	E10	42	32	19	112	NA
	E13	42	40	20	105	NA

Wave solder profile



Profile feature		
Preheat	• Ts maximimum	110 °C
	• Ts minimum	NA
	• ts	< 150 seconds
Soldering	• Tp	260 °C ±5 °C
	• tp	< 10 seconds
	• tl	≤60 seconds

Capacitor body maximum temperature at wave soldering ≤120 °C

Manual solder

+400 °C, 3 seconds maximum by soldering iron, generally manual, hand soldering is not recommended

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