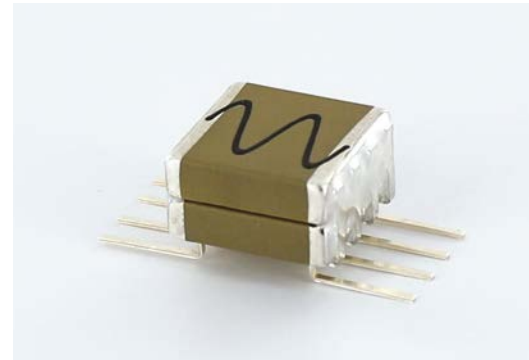
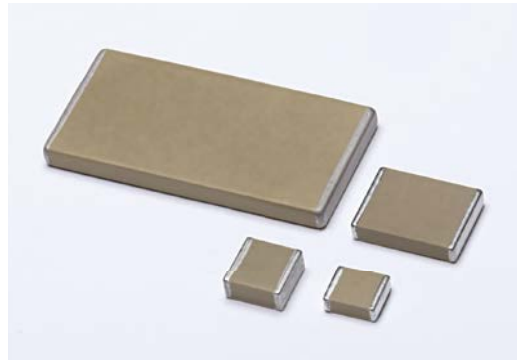
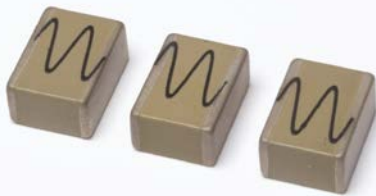


CF/CFS Series Fuze Chips Capacitors

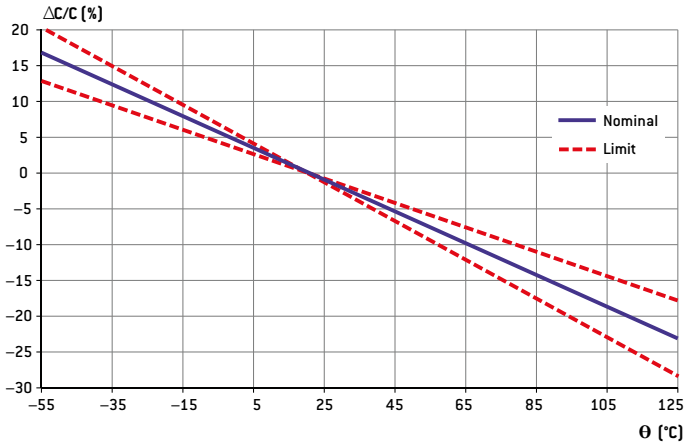


General Information

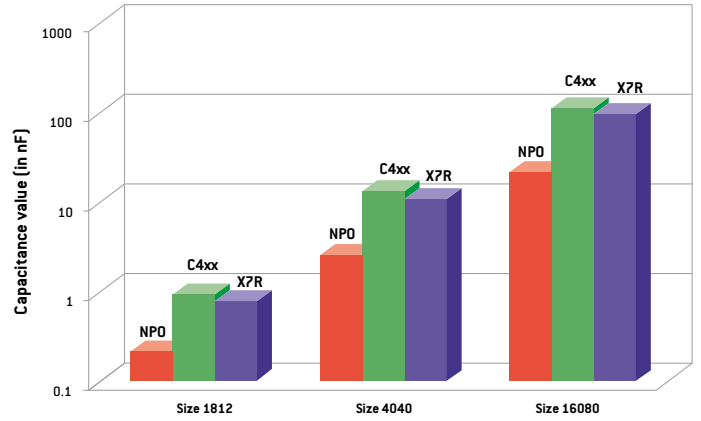
C4xx DIELECTRIC

This ceramic is a negative temperature coefficient dielectric (-2,200 ppm/°C). Its advantage is that it combines the high dielectric constant of an X7R dielectric with the stability of an NPO dielectric. As the C4xx ceramic features low dissipation factor it is recommended for AC line filtering for high power RF and for pulse applications.

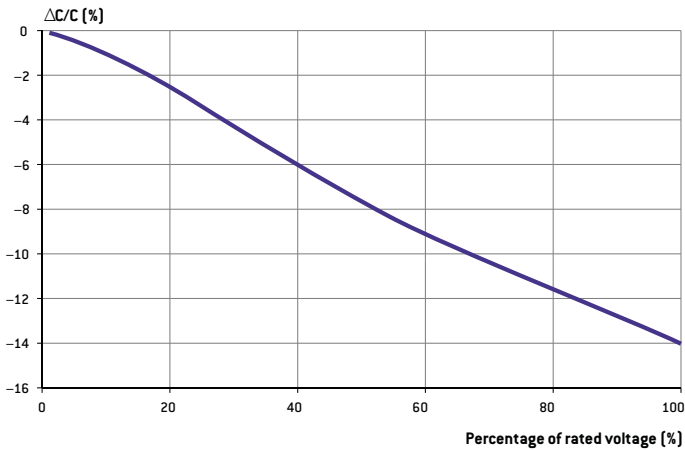
C4xx: TEMPERATURE COEFFICIENT



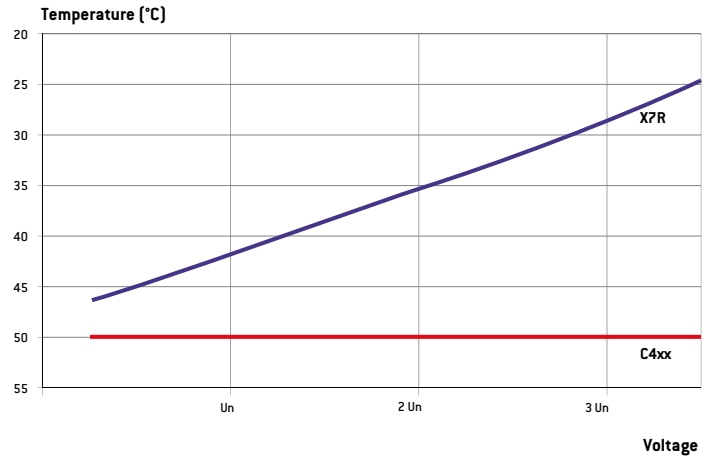
COMPARISON OF CAPACITANCE VALUE UNDER RATED VOLTAGE AT 125°C



C4xx: VOLTAGE COEFFICIENT

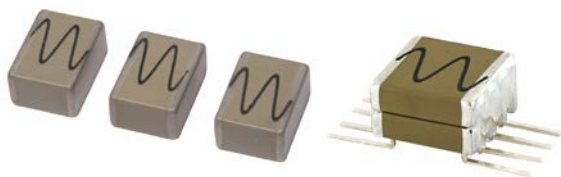


COMPARISON OF SELF-HEATING AT 400 Hz BETWEEN C4xx AND X7R DIELECTRICS



Pulse capacitors with printed resistor option

CF / CFS Series



FEATURES

- Multilayer chip ceramic capacitors
- Size 1812 to 16080
- C4xx dielectric
- Capacitance range: 27pF to 15 μF
- Voltage range: 500 V_{DC} to 10,000 V_{DC}
- Option: Printed resistor

PHYSICAL CHARACTERISTICS

CONSTRUCTION

- C Series: Unleaded chip capacitors for surface mounting with optional tinning.
- P, PL, L, R, RU models: DIL or Ribbon led chip capacitors for surface mounting (R: varnished chips, RU: uncoated chips) recommended to eliminate thermomechanical stresses.
- N, NU models: DIL led chip capacitors for through-hole circuits (N: varnished chips, NU: uncoated chips).

MARKING (On request on unleaded chips)

Series, capacitance value, tolerance, rated voltage clear or coded, date code.

ELECTRICAL SPECIFICATIONS

Dielectric	C4xx
Dielectric code	4
Temperature coefficient	(-2,200 ± 500) ppm/°C
Aging	None
Operating temperature	-55°C to +125°C
Rated voltage (U _{RC})	500 V _{DC} to 10,000 V _{DC}
Dielectric withstanding voltage	1.1 U _{RC}
Capacitance	At 1kHz
Dissipation factor	≤ 0.10% at 1kHz
Insulation resistance at 25°C	≥ 20,000 MΩ for C ≤ 25nF under U _{RC} for U _{RC} ≤ 500V _{DC} ≥ 500 MΩ.μF for C > 25nF under 500V _{DC} for U _{RC} > 500V _{DC}

PRINTED RESISTOR OPTION

- Resistance range: from 100kΩ/sq to 1GΩ/sq

Examples:

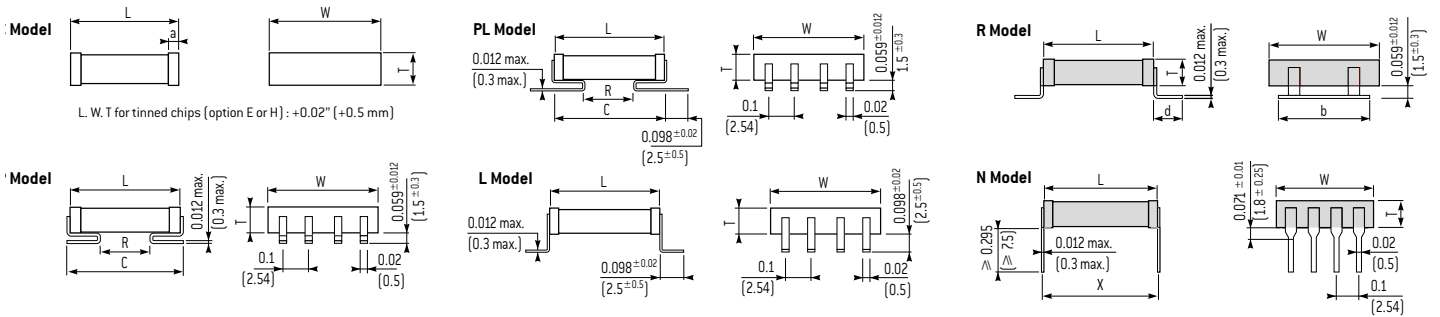
- 500 MΩ, size 4040
- 100 MΩ, size 4040
- 7150 MΩ, size 3040

Series	Dielectric	Exxelia size code	Termination (Bare chips only)	Leads style (Leaded chips/Stacked capacitors)	Marking	Quality level	Capacitance	Tolerance	Rated voltage	Packaging	Printed resistor		
CF	4	80	CW	-	M	F	220nF	10%	500V	S12	Rxxx		
CFS	4	80	-	P	M	F	68nF	10%	1000V	-	Rxxx		
CF = Pulse chips capacitor	4 = C4xx	79 = 1812	W = RoHS compliant		P	For unleaded chips only, with no printed resistor (Leaded chips are always marked).	Capacitance value in clear	±2% ±5% ±10% ±20%	500V 1,000V 1,500V 2,000V 3,000V 4,000V 5,000V 7,500V 10,000V	- = Exxelia packaging (leaded chips : thermoformed packaging) Only available for unleaded chips: Sizes 1812 - 2220: S12 = Super 12 reel BA = Tray package (non oriented chips) BAO = Tray package (oriented chips)	Rxxx = Printed resistor option (xxx = resistor value in MΩ)		
CFS = Pulse stacked capacitor		90 = 1825	For all sizes		PW - RoHS								
		80 = 2220	-	Ag/Pd/Pt	W							Ag/Pd/Pt	PL
		91 = 2225	Q	wAg	QW							Ag	PLW - RoHS
		81 = 2825	From 1812 to 3333 sizes		L							LW - RoHS	
		82 = 3333	-	Ag/Pd/Pt	W							Ag/Pd/Pt	R
		83 = 4040	H	Ag/Pd/Pt + dipped Sn/Pb 60/40	HW							Ag/Pd/Pt + dipped Sn	RW - RoHS
		84 = 5440	E	Ni + dipped Sn/Pb 60/40	EW							Ni + dipped Sn	RU
		89 = 5550	C	+ electrolytic Sn/Pb 95/5	CW							+ electrolytic Sn	RUW - RoHS
		85 = 6560	D	Ag + Ni + electrolytic Sn/Pb 60/40	-							-	N
		87 = 11283	G	Ni + electrolytic Gold	-							-	NW - RoHS
		88 = 16080	From 1812 to 4040 sizes		NUW - RoHS							NU	NU
		YC	Ag + Polymer + Ni + Sn/Pb 95/5	YCW	Ag + Polymer + Ni + Sn	N							
		YD	Ag + Polymer + Ni + Sn/Pb 60/40	-	-	NW - RoHS							
		YG	Ag + Polymer + Ni + Au	YGW	Ag + Polymer + Ni + Au	NU							

CF Series

Pulse capacitors with printed resistor option

DIMENSIONS in inches (mm)



STANDARD RATINGS

	Size	1812	1825	2220	2225	2825	3333
	Exxelia size code	79	90	80	91	81	82
Dimensions inches (mm)	L*	0.177 ± 0.020 (4.5 ± 0.5)	0.177 ± 0.020 (4.5 ± 0.5)	0.224 ± 0.020 (5.7 ± 0.5)	0.224 ± 0.020 (5.7 ± 0.5)	0.276 ± 0.020 (7 ± 0.5)	0.331 ± 0.020 (8.4 ± 0.5)
	W*	0.126 ± 0.020 (3.2 ± 0.5)	0.250 ± 0.020 (6.35 ± 0.5)	0.197 ± 0.020 (5.0 ± 0.5)	0.250 ± 0.020 (6.35 ± 0.5)	0.250 ± 0.020 (6.35 ± 0.5)	0.331 ± 0.020 (8.4 ± 0.5)
	a	0.024 ± 0.020 (0.6 ± 0.5)	0.024 ± 0.020 (0.6 ± 0.5)	0.028 ± 0.020 (0.7 ± 0.5)	0.028 ± 0.020 (0.7 ± 0.5)	0.039 ± 0.020 (1 ± 0.5)	0.039 ± 0.020 (1 ± 0.5)
	d	-	0.087 ± 0.008 (2.2 ± 0.2)	0.087 ± 0.008 (2.2 ± 0.2)	0.087 ± 0.008 (2.2 ± 0.2)	0.087 ± 0.008 (2.2 ± 0.2)	0.138 ± 0.008 (3.5 ± 0.2)
	b	-	0.197 ± 0.020 (5 ± 0.5)	0.197 ± 0.020 (5 ± 0.5)	0.197 ± 0.020 (5 ± 0.5)	0.197 ± 0.020 (5 ± 0.5)	0.315 ± 0.020 (8 ± 0.5)
	R min.	-	0.066 (1.7)	0.098 (2.5)	0.098 (2.5)	0.137 (3.5)	0.177 (4.5)
	C max.	-	0.229 (5.8)	0.276 (7)	0.276 (7)	0.315 (8)	0.355 (9)
	X	-	0.2 ± 0.020 (5.08 ± 0.5)	0.248 ± 0.020 (6.3 ± 0.5)	0.248 ± 0.020 (6.3 ± 0.5)	0.300 ± 0.020 (7.62 ± 0.5)	0.350 ± 0.020 (8.9 ± 0.5)
	Leads per side		2	2	2	2	3
	T max.*	0.138 (3.5)	0.138 (3.5)	0.2kV up to 3kV: 0.119 [3] 4kV-5kV: 0.150 [3.8]	0.177 (4.5)	0.177 (4.5)	0.177 (4.5)
Rated voltage [U _{RIC}]	Min. Capacitance value	27pF	33pF	33pF	47pF	56pF	82pF
	0.5kV	120nF	330nF	220nF	470nF	470nF	820nF
	1kV	33nF	82nF	56nF	120nF	120nF	220nF
	1.5kV	15nF	33nF	27nF	47nF	47nF	82nF
	2kV	6.8nF	5.6nF	10nF	18nF	22nF	39nF
	3kV	2.7nF	2.7nF	4.7nF	8.2nF	10nF	18nF
	4kV	1.2nF	1.5nF	3.3nF	4.7nF	5.6nF	10nF
5kV	-	-	2.2nF	2.7nF	3.3nF	5.6nF	

Pulse capacitors with printed resistor option

CF Series

STANDARD RATINGS

Size	4040	5440	5550	6560	11283	16080	
Exxelia size code	83	84	89	85	87	88	
Dimensions (mm)	L*	0.400 ± 0.039 (10.16 ± 1)	0.539 ± 0.039 (13.7 ± 1)	0.551 ± 0.039 (14 ± 1)	0.650 ± 0.039 (16.5 ± 1)	1.122 ± 0.039 (28.5 ± 1)	1.555 ± 0.039 (39.5 ± 1)
	W*	0.400 ± 0.039 (10.16 ± 1)	0.400 ± 0.039 (10.16 ± 1)	0.500 ± 0.039 (12.7 ± 1)	0.598 ± 0.039 (15.2 ± 1)	0.827 ± 0.039 (21 ± 1)	0.756 ± 0.039 (19.2 ± 1)
	a	0.059 ± 0.020 (1.5 ± 0.5)	0.059 ± 0.020 (1.5 ± 0.5)	0.059 ± 0.020 (1.5 ± 0.5)	0.059 ± 0.020 (1.5 ± 0.5)	0.059 ± 0.020 (1.5 ± 0.5)	0.059 ± 0.020 (1.5 ± 0.5)
	d	0.138 ± 0.008 (3.5 ± 0.2)	0.138 ± 0.008 (3.5 ± 0.2)	0.138 ± 0.008 (3.5 ± 0.2)	0.138 ± 0.008 (3.5 ± 0.2)	0.138 ± 0.008 (3.5 ± 0.2)	0.138 ± 0.008 (3.5 ± 0.2)
	b	0.315 ± 0.020 (8 ± 0.5)	0.315 ± 0.020 (8 ± 0.5)	0.315 ± 0.020 (8 ± 0.5)	0.591 ± 0.020 (15 ± 0.5)	0.591 ± 0.020 (15 ± 0.5)	0.591 ± 0.020 (15 ± 0.5)
	R min.	0.275 (7)	0.393 (10)	0.393 (10)	0.511 (13)	0.984 (25)	1.377 (35)
	C max.	0.473 (12)	0.611 (15.5)	0.63 (16)	0.729 (18.5)	1.26 (32)	1.654 (42)
	X	0.45 ± 0.020 (11.43 ± 0.5)	0.551 ± 0.020 (14 ± 0.5)	0.563 ± 0.020 (14.3 ± 0.5)	0.7 ± 0.020 (17.78 ± 0.5)	1.15 ± 0.020 (29.21 ± 0.5)	1.6 ± 0.020 (40.64 ± 0.5)
	Leads per side	4	4	5	6	6	6
	T max.*	0.177 (4.5)	0.177 (4.5)	0.177 (4.5)	0.177 (4.5)	0.177 (4.5)	0.177 (4.5)
Min. Capacitance value	180pF	270pF	390pF	470pF	1nF	1.8nF	
Rated voltage (U _{RC})	0.5kV	1.5 μF	2.2 μF	2.7 μF	3.9 μF	10 μF	12 μF
	1kV	330nF	470nF	680nF	1 μF	2.2 μF	2.7 μF
	1.5kV	150nF	220nF	270nF	390nF	1 μF	1.2 μF
	2kV	82nF	120nF	150nF	220nF	560nF	680nF
	3kV	39nF	56nF	68nF	100nF	220nF	330nF
	4kV	22nF	33nF	39nF	56nF	120nF	180nF
	5kV	12nF	18nF	27nF	39nF	82nF	100nF
	7.5kV	5.6nF	5.6nF	6.8nF	12nF	33nF	47nF
10kV	2.7nF	3.3nF	3.9nF	6.8nF	18nF	22nF	

* For E, EW, H and HW: add +0.020 inch (+0.5 mm) to L, W and T dimensions.

The high voltage parts may require varnish or encapsulation to prevent surface arcing.

Available capacitance values:

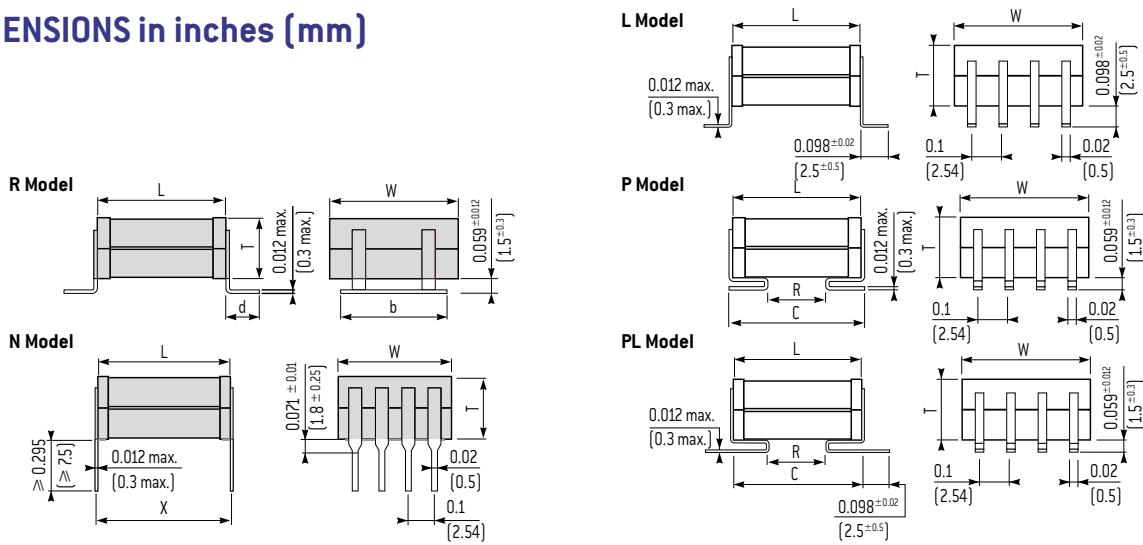
C4xx dielectrics: E6, E12, E24. Specific values upon request.

The above table defines the standard products, other components may be built upon request.

CFS Series

Pulse capacitors with printed resistor option

DIMENSIONS in inches (mm)



STANDARD RATINGS

	Size	2220	2825	3333	4040		
	Exxelia size code	80	81	82	83	T max. inches (mm)	Nb. of chips
Dimensions inches (mm)	L	0.224 ± 0.020 (5.7 ± 0.5)	0.276 ± 0.020 (7 ± 0.5)	0.331 ± 0.020 (8.4 ± 0.5)	0.400 ± 0.039 (10.16 ± 1)		
	W	0.197 ± 0.020 (5.0 ± 0.5)	0.250 ± 0.020 (6.35 ± 0.5)	0.331 ± 0.020 (8.4 ± 0.5)	0.400 ± 0.039 (10.16 ± 1)		
	d	0.087 ± 0.008 (2.2 ± 0.2)	0.087 ± 0.008 (2.2 ± 0.2)	0.138 ± 0.008 (3.5 ± 0.2)	0.138 ± 0.008 (3.5 ± 0.2)		
	b	0.197 ± 0.020 (5 ± 0.5)	0.197 ± 0.020 (5 ± 0.5)	0.315 ± 0.020 (8 ± 0.5)	0.315 ± 0.020 (8 ± 0.5)		
	R min.	0.098 (2.5)	0.137 (3.5)	0.177 (4.5)	0.275 (7)		
	C max.	0.276 (7)	0.315 (8)	0.355 (9)	0.473 (12)		
	X	0.248 ± 0.020 (6.3 ± 0.5)	0.300 ± 0.020 (7.62 ± 0.5)	0.350 ± 0.020 (8.9 ± 0.5)	0.45 ± 0.020 (11.43 ± 0.5)		
Leads per side	2	2	3	4			
Rated voltage (U _{RC})	Min. Capacitance value	820pF	1.5nF	2.7nF	6.8nF		
	1kV	68nF	180nF	470nF	680nF	0.394 (10)	2
		100nF	270nF	680nF	1µF	0.591 (15)	3
		150nF	330nF	820nF	1.5µF	0.788 (20)	4
		180nF	390nF	1µF	1.8µF	0.985 (25)	5
	1.5kV	33nF	68nF	180nF	330nF	0.394 (10)	2
		47nF	100nF	270nF	470nF	0.591 (15)	3
		68nF	150nF	390nF	560nF	0.788 (20)	4
	2kV	82nF	180nF	470nF	820nF	0.985 (25)	5
		18nF	47nF	82nF	150nF	0.394 (10)	2
		27nF	68nF	120nF	220nF	0.591 (15)	3
	3kV	39nF	82nF	150nF	270nF	0.788 (20)	4
		47nF	120nF	180nF	390nF	0.985 (25)	5
		22nF	33nF	33nF	68nF	0.394 (10)	2
	4kV	33nF	56nF	56nF	100nF	0.591 (15)	3
		39nF	68nF	68nF	120nF	0.788 (20)	4
		47nF	82nF	82nF	150nF	0.985 (25)	5
	5kV	39nF	39nF	39nF	39nF	0.394 (10)	2
		68nF	68nF	68nF	68nF	0.591 (15)	3
		82nF	82nF	82nF	82nF	0.788 (20)	4
7.5kV	100nF	100nF	100nF	100nF	0.985 (25)	5	
	39nF	39nF	39nF	39nF	0.394 (10)	2	
	68nF	68nF	68nF	68nF	0.591 (15)	3	
10kV	82nF	82nF	82nF	82nF	0.788 (20)	4	
	100nF	100nF	100nF	100nF	0.985 (25)	5	

Pulse capacitors with printed resistor option

CFS Series

STANDARD RATINGS

Size	5440	5550	6560	11283	16080				
Exxelia size code	84	89	85	87	88				
Dimensions inches (mm)	L	0.539 ± 0.039 (13.7 ± 1)	0.551 ± 0.039 (14 ± 1)	0.650 ± 0.039 (16.5 ± 1)	1.122 ± 0.039 (28.5 ± 1)	1.555 ± 0.039 (39.5 ± 1)			
	W	0.400 ± 0.039 (10.16 ± 1)	0.500 ± 0.039 (12.7 ± 1)	0.598 ± 0.039 (15.2 ± 1)	0.827 ± 0.039 (21 ± 1)	0.756 ± 0.039 (19.2 ± 1)			
	d	0.138 ± 0.008 (3.5 ± 0.2)	0.138 ± 0.008 (3.5 ± 0.2)	0.138 ± 0.008 (3.5 ± 0.2)	0.138 ± 0.008 (3.5 ± 0.2)	0.138 ± 0.008 (3.5 ± 0.2)			
	b	0.315 ± 0.020 (8 ± 0.5)	0.315 ± 0.020 (8 ± 0.5)	0.591 ± 0.020 (15 ± 0.5)	0.591 ± 0.020 (15 ± 0.5)	0.591 ± 0.020 (15 ± 0.5)			
	R min.	0.393 (10)	0.393 (10)	0.511 (13)	0.984 (25)	1.377 (35)			
	C max.	0.611 (15.5)	0.63 (16)	0.729 (18.5)	1.26 (32)	1.654 (42)			
	X	0.552 ± 0.020 (14 ± 0.5)	0.563 ± 0.020 (14.3 ± 0.5)	0.7 ± 0.020 (17.78 ± 0.5)	1.15 ± 0.020 (29.21 ± 0.5)	1.6 ± 0.020 (40.64 ± 0.5)			
Leads per side	4	5	6	6	6	T max.	Nb. of		
Min Capacitance value	6.8nF	12nF	18nF	39nF	47nF	inches (mm)	chips		
Rated voltage (U _{RC})	1kV	1µF	1.2µF	2.2µF	4.7µF	5.6µF	0.394	(10)	2
		1.5µF	1.8µF	3.3µF	6.8µF	8.2µF	0.591	(15)	3
		1.8µF	2.2µF	3.9µF	8.2µF	12µF	0.788	(20)	4
		2.2µF	2.7µF	4.7µF	12µF	15µF	0.985	(25)	5
	1.5kV	390nF	560nF	820nF	2.2µF	2.7µF	0.394	(10)	2
		560nF	820nF	1.2µF	3.3µF	3.9µF	0.591	(15)	3
		820nF	1µF	1.8µF	3.9µF	5.6µF	0.788	(20)	4
		1µF	1.2µF	2.2µF	4.7µF	6.8µF	0.985	(25)	5
	2kV	220nF	270nF	470nF	1µF	1.5µF	0.394	(10)	2
		330nF	470nF	680nF	1.5µF	2.2µF	0.591	(15)	3
		470nF	560nF	1µF	2.2µF	2.7µF	0.788	(20)	4
		560nF	680nF	1.2µF	2.7µF	3.9µF	0.985	(25)	5
	3kV	100nF	120nF	220nF	470nF	680nF	0.394	(10)	2
		150nF	180nF	330nF	680nF	1µF	0.591	(15)	3
		220nF	270nF	390nF	1µF	1.2µF	0.788	(20)	4
		270nF	330nF	560nF	1.2µF	1.5µF	0.985	(25)	5
	4kV	56nF	68nF	120nF	220nF	330nF	0.394	(10)	2
		100nF	120nF	180nF	330nF	470nF	0.591	(15)	3
		120nF	150nF	220nF	470nF	680nF	0.788	(20)	4
	5kV	150nF	180nF	270nF	560nF	820nF	0.985	(25)	5
		39nF	47nF	82nF	150nF	220nF	0.394	(10)	2
		56nF	68nF	120nF	220nF	330nF	0.591	(15)	3
		82nF	100nF	150nF	270nF	390nF	0.788	(20)	4
	7.5kV	100nF	120nF	180nF	390nF	560nF	0.985	(25)	5
		12nF	12nF	22nF	68nF	82nF	0.394	(10)	2
		18nF	18nF	39nF	100nF	120nF	0.591	(15)	3
		22nF	27nF	47nF	120nF	180nF	0.788	(20)	4
	10kV	27nF	33nF	56nF	150nF	220nF	0.985	(25)	5
		6.8nF	6.8nF	12nF	33nF	47nF	0.394	(10)	2
		10nF	12nF	18nF	47nF	68nF	0.591	(15)	3
12nF		15nF	27nF	68nF	100nF	0.788	(20)	4	
	15nF	18nF	33nF	82nF	120nF	0.985	(25)	5	

The high voltage parts may require varnish or encapsulation to prevent surface arcing.

Available capacitance values:

C4xx dielectrics: E6, E12, E24. Specific values upon request.

The above table defines the standard products, other components may be built upon request.



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