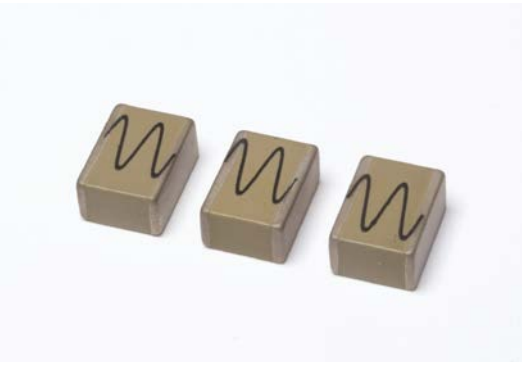
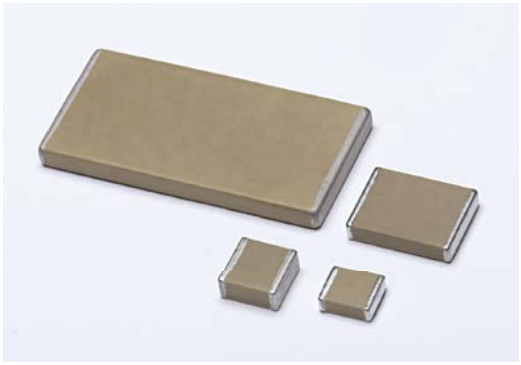
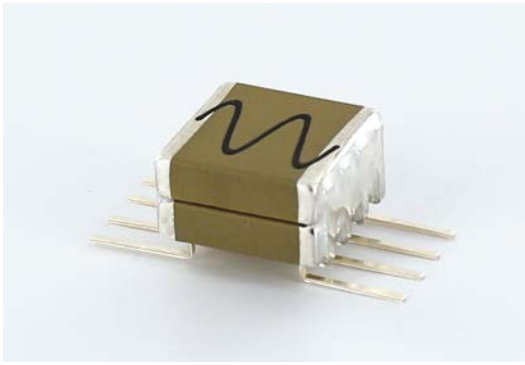
CF/CFS Series

Fuze Chips Capacitors







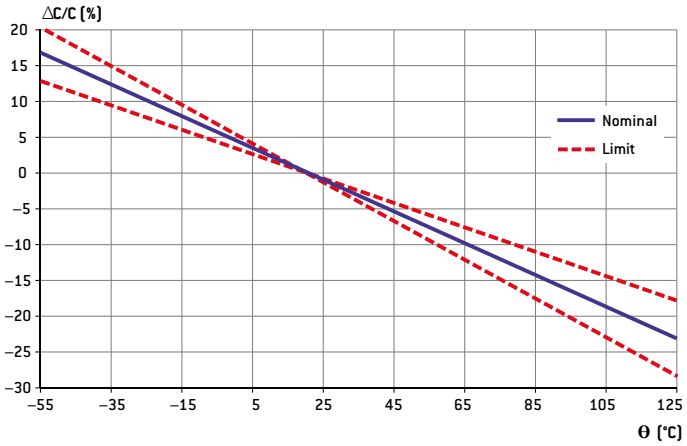
EXXELIA

General Information

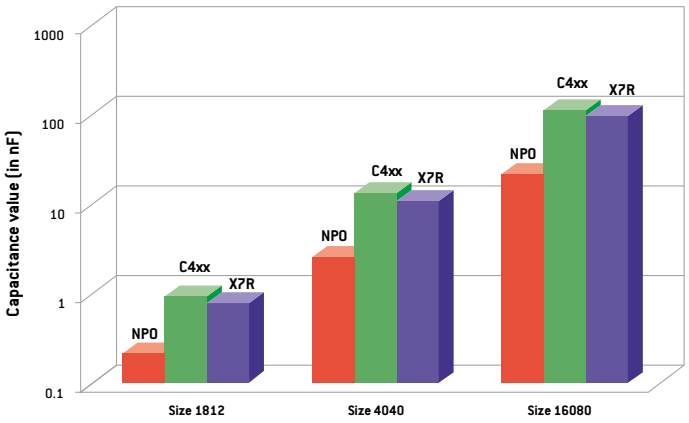
C4xx DIELECTRIC

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 NP0 dielectric. As the C4xx ceramic features low dissipation factor it is recommended for AC line filtering for high power RF and for pulse applications.

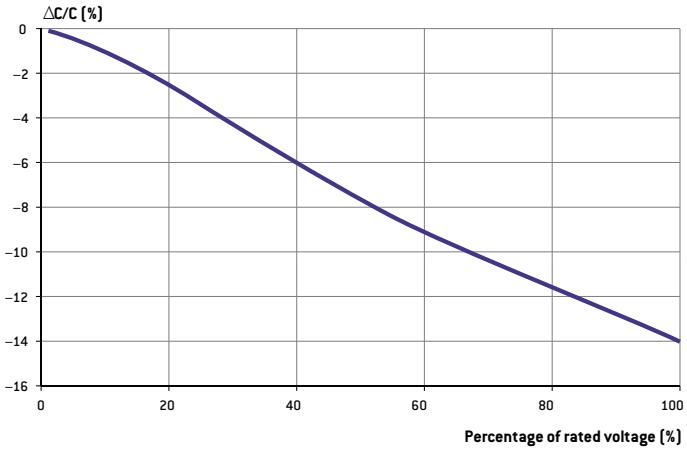
C4xx: TEMPERATURE COEFFICIENT



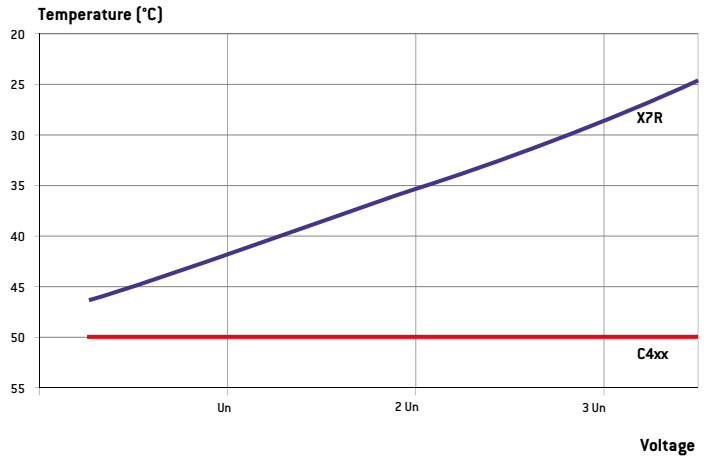
COMPARISON OF CAPACITANCE VALUE UNDER RATED VOLTAGE AT 125°C



C4xx: VOLTAGE COEFFICIENT

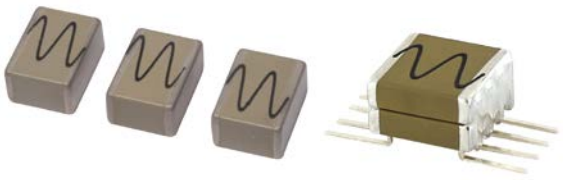


COMPARISON OF SELF-HEATING AT 400 Hz BETWEEN C4xx AND X7R DIELECTRICS



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 leaded chip capacitors for surface mounting (R: varnished chips, RU: uncoated chips) recommended to eliminate thermomechanical stresses.
- N, NU models: DIL leaded 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 **under U_{RC} for $U_{RC} \leq 500V_{DC}$** **under $500V_{DC}$ for $U_{RC} > 500V_{DC}$**	≥ 20,000 MΩ for C ≤ 25nF ≥ 500 MΩ. µF for C > 25nF

PRINTED RESISTOR OPTION

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

Examples:

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

CF	4	80	CW	-	M	F	220nF	10%	500V	S12	Rxxx
CFS	4	80	-	P	M	F	68nF	10%	1000V	-	Rxxx

Series

CF = Pulse chips capacitor

CFS = Pulse stacked capacitor

Dielectric

4 = C4xx

Exxelia size code

79 = 1812
90 = 1825
80 = 2220
91 = 2225
81 = 2825
82 = 3333
83 = 4040
84 = 5440
89 = 5550
85 = 6560
87 = 11283
88 = 16080

Termination (Bare chips only)

W = RoHS compliant

For all sizes

-	Ag/Pd/Pt	W	Ag/Pd/Pt
Q	wAg	QW	Ag

From 1812 to 3333 sizes

-	Ag/Pd/Pt	W	Ag/Pd/Pt
H	Ag/Pd/Pt + dipped Sn/Pb 60/40	HW	Ag/Pd/Pt + dipped Sn
E	Ni + dipped Sn/Pb 60/40	EW	Ni + dipped Sn
C	Ni + electrolytic Sn/Pb 95/5	CW	Ni + electrolytic Sn
D	Ag + Ni + electrolytic Sn/Pb 60/40	-	
G	Ni + electrolytic Gold	-	

From 1812 to 4040 sizes

YC	Ag + Polymer + Ni + Sn/Pb 95/5	YCW	Ag + Polymer + Ni + Sn
YD	Ag + Polymer + Ni + Sn/Pb 60/40	-	
YG	Ag + Polymer + Ni + Au	YGW	Ag + Polymer + Ni + Au

Leads style (Leaded chips/ Stacked capacitors)

P
PW - RoHS
PL
PLW - RoHS
L
LW - RoHS
R
RW - RoHS
RU
RUW - RoHS
N
NW - RoHS
NU
NUW - RoHS

Marking

For unleaded chips only with no printed resistor (Leaded chips are always marked).

- = no marking

M = Marking:

For sizes 1812 - 1825: Cap. value. For other sizes: EFD, Series, cap. value, tolerance,rated voltage, date code.

Quality level

- = standard quality level

F = Hi-Rel quality: screening in accordance with Exxelia specification

Capacitance

Capacitance value in clear

Tolerance

±2%
±5%
±10%
±20%

Rated voltage

500V
1,000V
1,500V
2,000V
3,000V
4,000V
5,000V
7,500V
10,000V

Packaging

- = 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)

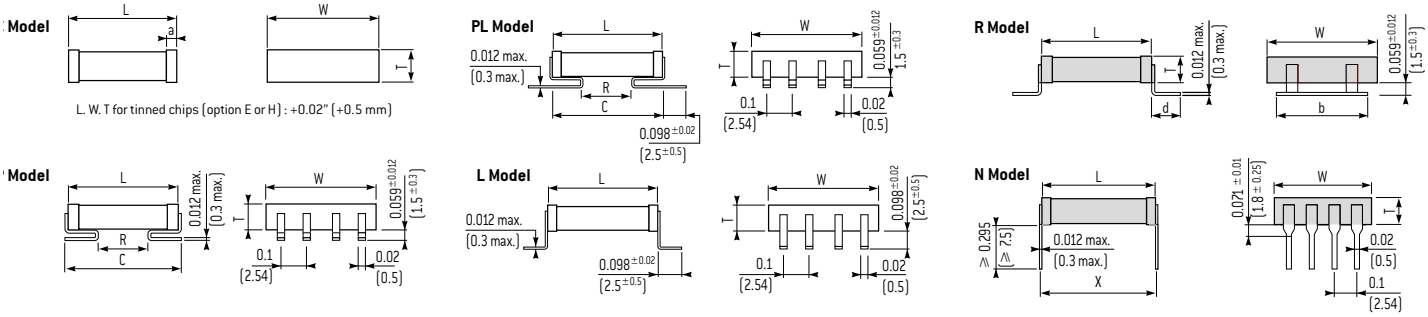
Printed resistor

Rxxx = Printed resistor option (xxx = resistor value in MΩ)

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)
Min. Capacitance value		27pF	33pF	33pF	47pF	56pF	82pF
Rated voltage (U_{RC})	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

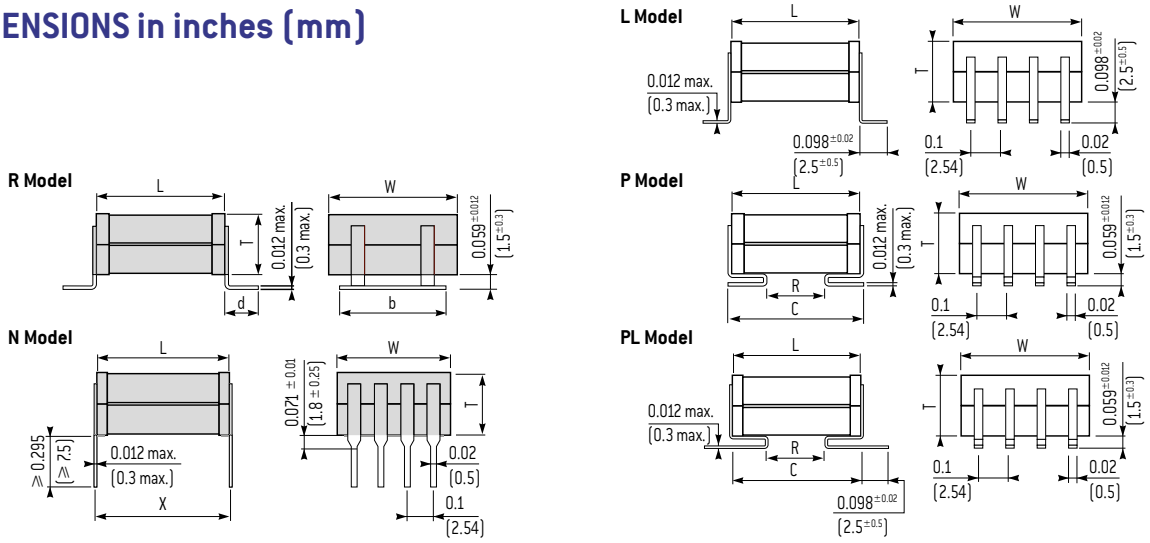
	Size	4040	5440	5550	6560	11283	16080
	Exxelia size code	83	84	89	85	87	88
Dimensions inches (mm)	L*	0.400 ± 0.039 (10.16 ± 1)	0.539 ± 0.039 (13.7 ± 1)	0.551 ± 0.039 (14 ± 1)	0.650 ± 0.039 (16.5 ± 1)	1.122 ± 0.039 (28.5 ± 1)	1.555 ± 0.039 (39.5 ± 1)
	W*	0.400 ± 0.039 (10.16 ± 1)	0.400 ± 0.039 (10.16 ± 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	1.5µF	2.2µF	2.7µF	3.9µF	10µF	12µF
	1kV	330nF	470nF	680nF	1µF	2.2µF	2.7µF
	1.5kV	150nF	220nF	270nF	390nF	1µF	1.2µF
	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		
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		
Min. Capacitance value		820pF	1.5nF	2.7nF	6.8nF	T max. inches (mm)	Nb. of chips
Rated voltage (U_{RC})	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
		82nF	180nF	470nF	820nF	0.985 (25)	5
	2kV	18nF	47nF	82nF	150nF	0.394 (10)	2
		27nF	68nF	120nF	220nF	0.591 (15)	3
		39nF	82nF	150nF	270nF	0.788 (20)	4
		47nF	120nF	180nF	390nF	0.985 (25)	5
	3kV	Consult us	22nF	33nF	68nF	0.394 (10)	2
			33nF	56nF	100nF	0.591 (15)	3
			39nF	68nF	120nF	0.788 (20)	4
			47nF	82nF	150nF	0.985 (25)	5
	4kV		Consult us	Consult us	39nF	0.394 (10)	2
					68nF	0.591 (15)	3
					82nF	0.788 (20)	4
					100nF	0.985 (25)	5
	5kV				Consult us	0.394 (10)	2
						0.591 (15)	3
						0.788 (20)	4
						0.985 (25)	5
	7.5kV 10kV	-	-	-		0.394 (10)	2
		-	-	-		0.591 (15)	3
		-	-	-		0.788 (20)	4
		-	-	-		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		
Min Capacitance value		6.8nF	12nF	18nF	39nF	47nF	T max. inches (mm)	Nb. of 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
		150nF	180nF	270nF	560nF	820nF	0.985 (25)	5
	5kV	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
		100nF	120nF	180nF	390nF	560nF	0.985 (25)	5
	7.5kV	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
		27nF	33nF	56nF	150nF	220nF	0.985 (25)	5
	10kV	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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