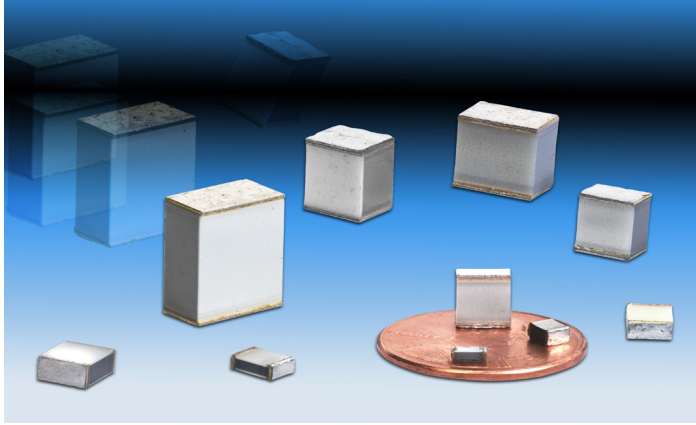


# Type FCN Surface Mount Film Capacitors

## Stable Stacked Metallized Film (PEN) Chips for Reflow Soldering



Type FCN capacitors are designed for applications requiring a general purpose SMT capacitor with stable temperature and frequency characteristics similar to polyester film capacitors. They are ideal for applications such as EMI noise filtering, power supply input/output filters, audio or signal coupling, and IC power bus bypassing or decoupling. FCN SMT capacitors have a non-inductive stacked metallized PEN film construction which results in a low ESR and excellent high frequency performance.

### Highlights

- Designed for reflow soldering
- Withstands 150% of rated voltage for 60 seconds
- Stacked metallized polyethylene naphthalate (PEN) film
- Performs like polyester capacitors
- Nonmagnetic and lead-free

Type FCN SMT capacitors are the general purpose line of CDE's surface mount product offerings. They range in capacitance from .001  $\mu\text{F}$  to 1.0  $\mu\text{F}$ , and they are available in voltage ratings up to 400 Vdc.

### Specifications

Capacitance Range	1000 pF to 1.0 $\mu\text{F}$ (1kHz at $\leq 5$ Vrms)
Capacitance Tolerance	$\pm 5\%$ (J), $\pm 10\%$ (K) (See Ratings)
Rated Voltage	16, 50, 100, 250 & 400 Vdc
Dissipation Factor (Tan $\delta$ )	1.0% Max. (1 kHz at 5 Vrms)
Operating Temperature Range	16, 50, 100Vdc ( $< 0.012 \mu\text{F}$ ); $-55^\circ\text{C}$ to $+105^\circ\text{C}$ 100 Vdc ( $\geq 0.012 \mu\text{F}$ ), 250, 400 Vdc; $-40^\circ\text{C}$ to $+85^\circ\text{C}$
Surface Temperature	16 V & 50 V & 100 V $\leq 0.01 \mu\text{F}$ : 240 $^\circ\text{C}$ max 100 V $\geq 0.012 \mu\text{F}$ , 250 V & 400 V: 230 $^\circ\text{C}$ max
Insulation Resistance	C $> 0.33 \mu\text{F}$ : IR = 1000 $\text{M}\Omega \cdot \mu\text{F}$ Min. C $\leq 0.33 \mu\text{F}$ : IR $\geq 3000 \text{M}\Omega$
Construction	Stacked metallized polyphenylene sulfide (PPS) film. Terminations are lead free with a Sn-Ag-Cu solder finish.
Withstand Voltage	16 V & 50 V, 100 V $\leq 0.01 \mu\text{F}$ : 175% rated voltage, 5 s 100 V $\geq 0.012 \mu\text{F}$ , 250 V and 400 V: 150% rated voltage, 5 s
Life Test	1000 h at rated temp. & 125% rated voltage $\Delta$ Capacitance: +1%, -6% max Dissipation Factor: 1.1% max IR: 1000 $\text{M}\Omega$ min (C $> 0.33 \mu\text{F}$ , 300 $\text{M}\Omega \cdot \mu\text{F}$ min) No significant visual damage
Resistance to Soldering Heat	5 s at max capacitor surface temperature $\Delta$ Capacitance: $\pm 5\%$ max Dissipation Factor: 1.1% max IR: 1000 $\text{M}\Omega$ min (C $> 0.33 \mu\text{F}$ , 300 $\text{M}\Omega \cdot \mu\text{F}$ min) Voltage withstanding: 1.5 times rated voltage, 1 min. No significant visual damage.
Moisture Resistance	500 h at 85 $^\circ\text{C}$ and 85% RH $\Delta$ Capacitance: $\pm 10\%$ max Dissipation Factor: 2% max IR: 10 $\text{M}\Omega$ min (C $> 0.33 \mu\text{F}$ , 3 $\text{M}\Omega \cdot \mu\text{F}$ min) Voltage withstanding: 1.3 times rated voltage, 1 min. No significant damage

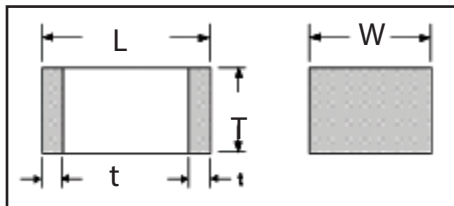
RoHS Compliant

# Type FCN Surface Mount Film Capacitors

## Part Numbering System

FCN	1206	A	102	J	H2	Tape	Tape	Reel
Type	Case Size	Voltage	Capacitance	Tolerance	Packaging Code	Width (mm)	Diameter [in.(mm)]	Quantity
FCN	1206	C = 16 Vdc	102 = 0.001 $\mu$ F	J = $\pm$ 5%	K1	= 8	7 (178)	4000
	1913	H = 50 Vdc	223 = 0.022 $\mu$ F	K = $\pm$ 10%	J1, J2	= 8	7 (178)	3000
	2416	A = 100 Vdc	474 = 0.47 $\mu$ F		H1, H2	= 8	7 (178)	3000
	2420	E = 250 Vdc			H3	= 8	7 (178)	2000
	2820	G = 400 Vdc			G1, G2, G3	= 8	7 (178)	2000
	3022				E1, E2	= 12	13 (330)	3000
	3925				E3, E4	= 12	13 (330)	2000
	3931				D1, D2	= 12	13 (330)	3000
	6031				D3, D4, D5	= 12	13 (330)	2000
	6040				B, Z	= 12	13 (330)	1500
					U, V, X, Y	= 16	13 (330)	1000
					S, T	= 24	13 (330)	750

## Outline Drawing



t = 0.014  $\pm$  0.008 in. (0.35  $\pm$  0.2 mm)  
 For 0.001  $\mu$ F – 0.01  $\mu$ F, 100 V, t = 0.026  $\pm$  0.012 in. (0.62  $\pm$  0.3 mm)

# Type FCN Surface Mount Film Capacitors

## Ratings

Cap ( $\mu$ F)	Catalog Part Number	L in (mm)	W in (mm)	T in (mm)
<b>16 Vdc</b>				
0.120	FCN1913C124J-E1	0.189 (4.8)	0.130 (3.3)	0.055 (1.4)
0.150	FCN1913C154J-E2	0.189 (4.8)	0.130 (3.3)	0.079 (2.0)
0.180	FCN1913C184J-E2	0.189 (4.8)	0.130 (3.3)	0.079 (2.0)
0.220	FCN1913C224J-E4	0.189 (4.8)	0.130 (3.3)	0.094 (2.4)
0.270	FCN2416C274J-D1	0.236 (6.0)	0.161 (4.1)	0.071 (1.8)
0.330	FCN2416C334J-D2	0.236 (6.0)	0.161 (4.1)	0.079 (2.0)
0.390	FCN2416C394J-D3	0.236 (6.0)	0.161 (4.1)	0.094 (2.4)
0.470	FCN2416C474J-D4	0.236 (6.0)	0.161 (4.1)	0.110 (2.8)
<b>50 Vdc</b>				
0.056	FCN1913H563J-E2	0.189 (4.8)	0.130 (3.3)	0.079 (2.0)
0.068	FCN1913H683J-E2	0.189 (4.8)	0.130 (3.3)	0.079 (2.0)
0.082	FCN1913H823J-E4	0.189 (4.8)	0.130 (3.3)	0.094 (2.4)
0.100	FCN1913H104J-E3	0.189 (4.8)	0.130 (3.3)	0.110 (2.8)
0.120	FCN2416H124J-D1	0.236 (6.0)	0.161 (4.1)	0.071 (1.8)
0.150	FCN2416H154J-D2	0.236 (6.0)	0.161 (4.1)	0.079 (2.0)
0.180	FCN2416H184J-D3	0.236 (6.0)	0.161 (4.1)	0.094 (2.4)
0.220	FCN2416H224J-D4	0.236 (6.0)	0.161 (4.1)	0.110 (2.8)
<b>100 Vdc</b>				
0.001	FCN1206A102J-H2	0.126 (3.2)	0.063 (1.6)	0.043 (1.1)
0.001	FCN1206A122J-H2	0.126 (3.2)	0.063 (1.6)	0.043 (1.1)
0.002	FCN1206A152J-H2	0.126 (3.2)	0.063 (1.6)	0.043 (1.1)
0.002	FCN1206A182J-H2	0.126 (3.2)	0.063 (1.6)	0.043 (1.1)
0.002	FCN1206A222J-H2	0.126 (3.2)	0.063 (1.6)	0.043 (1.1)
0.003	FCN1206A272J-H2	0.126 (3.2)	0.063 (1.6)	0.043 (1.1)
0.003	FCN1206A332J-H3	0.126 (3.2)	0.063 (1.6)	0.059 (1.5)
0.004	FCN1206A392J-H3	0.126 (3.2)	0.063 (1.6)	0.059 (1.5)
0.005	FCN1206A472J-H3	0.126 (3.2)	0.063 (1.6)	0.059 (1.5)
0.006	FCN1210A562J-G2	0.126 (3.2)	0.098 (2.5)	0.059 (1.5)
0.007	FCN1210A682J-G2	0.126 (3.2)	0.098 (2.5)	0.059 (1.5)
0.008	FCN1210A822J-G3	0.126 (3.2)	0.098 (2.5)	0.083 (2.1)
0.010	FCN1210A103J-G3	0.126 (3.2)	0.098 (2.5)	0.083 (2.1)
0.012	FCN1913A123K-E1	0.189 (4.8)	0.130 (3.3)	0.055 (1.4)
0.015	FCN1913A153K-E1	0.189 (4.8)	0.130 (3.3)	0.055 (1.4)
0.018	FCN1913A183K-E1	0.189 (4.8)	0.130 (3.3)	0.055 (1.4)
0.022	FCN1913A223K-E1	0.189 (4.8)	0.130 (3.3)	0.055 (1.4)
0.027	FCN1913A273K-E1	0.189 (4.8)	0.130 (3.3)	0.055 (1.4)
0.033	FCN1913A333K-E1	0.189 (4.8)	0.130 (3.3)	0.055 (1.4)
0.039	FCN1913A393K-E1	0.189 (4.8)	0.130 (3.3)	0.055 (1.4)

# Type FCN Surface Mount Film Capacitors

Cap ( $\mu$ F)	Catalog Part Number	L in (mm)		W in (mm)		T in (mm)	
<b>100 Vdc</b>							
0.047	FCN1913A473K-E2	0.189	(4.8)	0.130	(3.3)	0.079	(2.0)
0.056	FCN1913A563K-E2	0.189	(4.8)	0.130	(3.3)	0.079	(2.0)
0.068	FCN1913A683K-E4	0.189	(4.8)	0.130	(3.3)	0.094	(2.4)
0.082	FCN1913A823K-E3	0.189	(4.8)	0.130	(3.3)	0.110	(2.8)
0.100	FCN2416A104K-D1	0.236	(6.0)	0.161	(4.1)	0.071	(1.8)
0.120	FCN2416A124K-D3	0.236	(6.0)	0.161	(4.1)	0.094	(2.4)
0.150	FCN2416A154K-D4	0.236	(6.0)	0.161	(4.1)	0.110	(2.8)
0.180	FCN2820A184K-Z	0.280	(7.1)	0.197	(5.0)	0.079	(2.0)
0.220	FCN2820A224K-Z	0.280	(7.1)	0.197	(5.0)	0.094	(2.4)
0.270	FCN2820A274K-Z	0.280	(7.1)	0.197	(5.0)	0.114	(2.9)
0.330	FCN2820A334K-Z	0.280	(7.1)	0.197	(5.0)	0.138	(3.5)
0.390	FCN3022A394K-X	0.303	(7.7)	0.217	(5.5)	0.134	(3.4)
0.470	FCN3022A474K-X	0.303	(7.7)	0.217	(5.5)	0.157	(4.0)
0.560	FCN3925A564K-V	0.386	(9.8)	0.248	(6.3)	0.118	(3.0)
0.680	FCN3925A684K-V	0.386	(9.8)	0.248	(6.3)	0.142	(3.6)
0.820	FCN3925A824K-V	0.386	(9.8)	0.248	(6.3)	0.169	(4.3)
1.000	FCN3925A105K-V	0.386	(9.8)	0.248	(6.3)	0.201	(5.1)
<b>250 Vdc</b>							
0.001	FCN1913E102K-E1	0.189	(4.8)	0.130	(3.3)	0.055	(1.4)
0.001	FCN1913E122K-E1	0.189	(4.8)	0.130	(3.3)	0.055	(1.4)
0.002	FCN1913E152K-E1	0.189	(4.8)	0.130	(3.3)	0.055	(1.4)
0.002	FCN1913E182K-E1	0.189	(4.8)	0.130	(3.3)	0.055	(1.4)
0.002	FCN1913E222K-E1	0.189	(4.8)	0.130	(3.3)	0.055	(1.4)
0.003	FCN1913E272K-E1	0.189	(4.8)	0.130	(3.3)	0.055	(1.4)
0.003	FCN1913E332K-E1	0.189	(4.8)	0.130	(3.3)	0.055	(1.4)
0.004	FCN1913E392K-E1	0.189	(4.8)	0.130	(3.3)	0.055	(1.4)
0.005	FCN1913E472K-E1	0.189	(4.8)	0.130	(3.3)	0.055	(1.4)
0.006	FCN1913E562K-E1	0.189	(4.8)	0.130	(3.3)	0.055	(1.4)
0.007	FCN1913E682K-E1	0.189	(4.8)	0.130	(3.3)	0.055	(1.4)
0.008	FCN1913E822K-E1	0.189	(4.8)	0.130	(3.3)	0.055	(1.4)
0.010	FCN1913E103K-E1	0.189	(4.8)	0.130	(3.3)	0.055	(1.4)
0.012	FCN1913E123K-E1	0.189	(4.8)	0.130	(3.3)	0.055	(1.4)
0.015	FCN1913E153K-E1	0.189	(4.8)	0.130	(3.3)	0.055	(1.4)
0.018	FCN1913E183K-E2	0.189	(4.8)	0.130	(3.3)	0.079	(2.0)
0.022	FCN1913E223K-E2	0.189	(4.8)	0.130	(3.3)	0.079	(2.0)
0.027	FCN1913E273K-E4	0.189	(4.8)	0.130	(3.3)	0.094	(2.4)
0.033	FCN1913E333K-E3	0.189	(4.8)	0.130	(3.3)	0.110	(2.8)
0.039	FCN2416E393K-D2	0.236	(6.0)	0.161	(4.1)	0.079	(2.0)
0.047	FCN2416E473K-D3	0.236	(6.0)	0.161	(4.1)	0.094	(2.4)
0.056	FCN2416E563K-D4	0.236	(6.0)	0.161	(4.1)	0.110	(2.8)
0.068	FCN2416E683K-D5	0.236	(6.0)	0.161	(4.1)	0.126	(3.2)
0.082	FCN2420E823K-B	0.236	(6.0)	0.197	(5.0)	0.126	(3.2)
0.100	FCN2420E104K-B	0.236	(6.0)	0.197	(5.0)	0.150	(3.8)

# Type FCN Surface Mount Film Capacitors

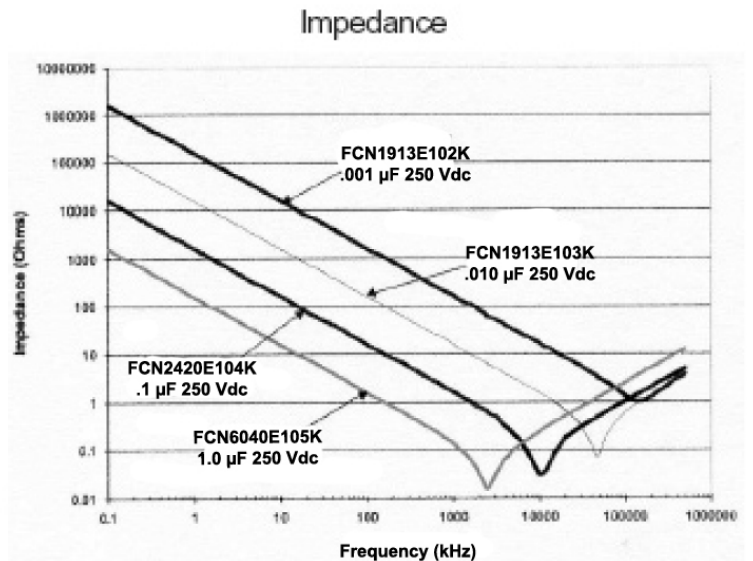
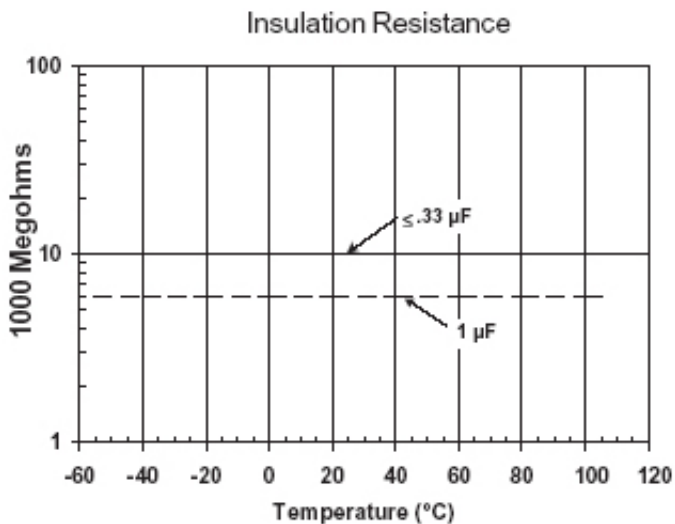
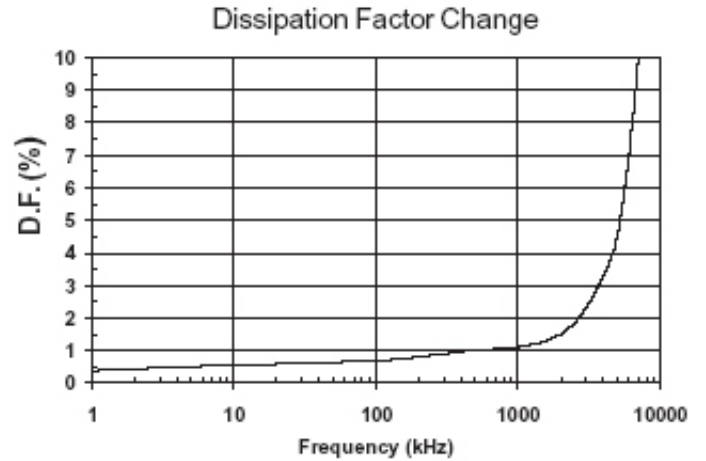
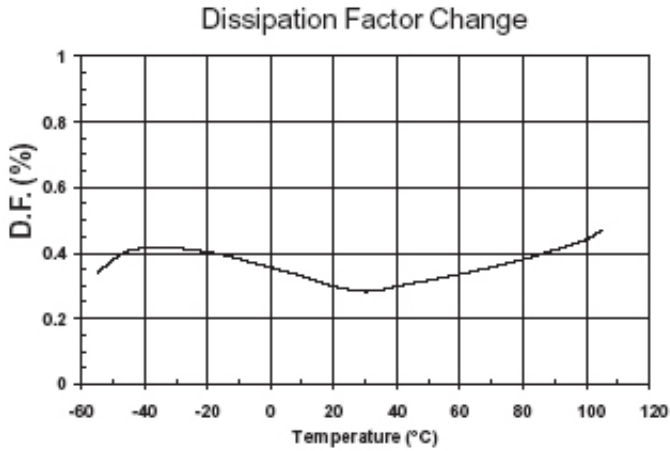
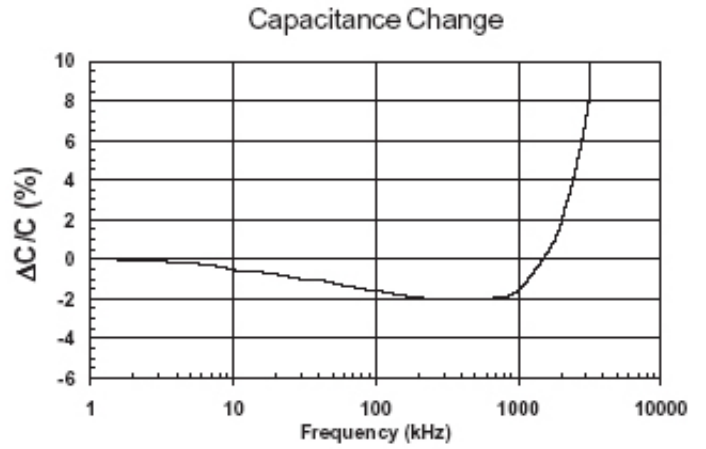
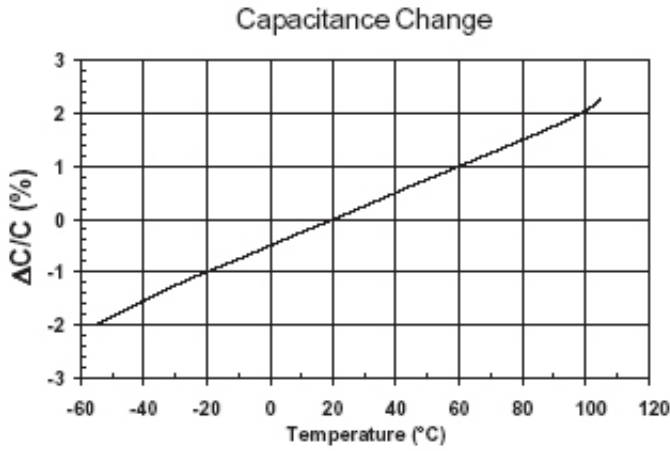
Cap ( $\mu$ F)	Catalog Part Number	L in (mm)		W in (mm)		T in (mm)	
<b>250 Vdc</b>							
0.120	FCN2420E124K-B*	0.236	(6.0)	0.197	(5.0)	0.177	(4.5)
0.150	FCN2825E154K-Y	0.280	(7.1)	0.248	(6.3)	0.138	(3.5)
0.180	FCN2825E184K-Y	0.280	(7.1)	0.248	(6.3)	0.161	(4.1)
0.220	FCN2825E224K-Y	0.280	(7.1)	0.248	(6.3)	0.201	(5.1)
0.270	FCN3925E274K-V	0.386	(9.8)	0.248	(6.3)	0.154	(3.9)
0.330	FCN3925E334K-V	0.386	(9.8)	0.248	(6.3)	0.189	(4.8)
0.390	FCN3931E394K-U	0.386	(9.8)	0.315	(8.0)	0.173	(4.4)
0.470	FCN3931E474K-U	0.386	(9.8)	0.315	(8.0)	0.209	(5.3)
0.56	FCN6031E564K-T	0.598	(15.2)	0.315	(8.0)	0.146	(3.7)
0.68	FCN6031E684K-T	0.598	(15.2)	0.315	(8.0)	0.173	(4.4)
0.82	FCN6040E824K-S	0.598	(15.2)	0.394	(10.0)	0.165	(4.2)
1.0	FCN6040E105K-S	0.598	(15.2)	0.394	(10.0)	0.201	(5.1)
<b>400 Vdc</b>							
0.001	FCN1913G102J-E1	0.189	(4.8)	0.130	(3.3)	0.055	(1.4)
0.001	FCN1913G122J-E1	0.189	(4.8)	0.130	(3.3)	0.055	(1.4)
0.002	FCN1913G152J-E1	0.189	(4.8)	0.130	(3.3)	0.055	(1.4)
0.002	FCN1913G182J-E1	0.189	(4.8)	0.130	(3.3)	0.055	(1.4)
0.002	FCN1913G222J-E1	0.189	(4.8)	0.130	(3.3)	0.055	(1.4)
0.003	FCN1913G272J-E1	0.189	(4.8)	0.130	(3.3)	0.055	(1.4)
0.003	FCN1913G332J-E1	0.189	(4.8)	0.130	(3.3)	0.055	(1.4)
0.004	FCN1913G392J-E1	0.189	(4.8)	0.130	(3.3)	0.055	(1.4)
0.005	FCN1913G472J-E1	0.189	(4.8)	0.130	(3.3)	0.055	(1.4)
0.006	FCN1913G562J-E2	0.189	(4.8)	0.130	(3.3)	0.079	(2.0)
0.007	FCN1913G682J-E2	0.189	(4.8)	0.130	(3.3)	0.079	(2.0)
0.008	FCN1913G822J-E4	0.189	(4.8)	0.130	(3.3)	0.094	(2.4)
0.010	FCN1913G103J-E3	0.189	(4.8)	0.130	(3.3)	0.110	(2.8)
0.012	FCN2416G123J-D2	0.236	(6.0)	0.161	(4.1)	0.079	(2.0)
0.015	FCN2416G153J-D3	0.236	(6.0)	0.161	(4.1)	0.094	(2.4)
0.018	FCN2416G183J-D4	0.236	(6.0)	0.161	(4.1)	0.110	(2.8)
0.022	FCN2416G223J-D5	0.236	(6.0)	0.161	(4.1)	0.126	(3.2)
0.027	FCN2420G273J-B	0.236	(6.0)	0.197	(5.0)	0.118	(3.0)
0.033	FCN2420G333J-B	0.236	(6.0)	0.197	(5.0)	0.142	(3.6)
0.039	FCN2820G393J-Z	0.280	(7.1)	0.197	(5.0)	0.126	(3.2)
0.047	FCN2820G473J-Z	0.280	(7.1)	0.197	(5.0)	0.150	(3.8)
0.056	FCN2825G563J-Y	0.280	(7.1)	0.248	(6.3)	0.142	(3.6)
0.068	FCN2825G683J-Y	0.280	(7.1)	0.248	(6.3)	0.173	(4.4)
0.082	FCN3925G823J-V	0.386	(9.8)	0.248	(6.3)	0.134	(3.4)
0.100	FCN3925G104J-V	0.386	(9.8)	0.248	(6.3)	0.157	(4.0)
0.120	FCN3931G124J-U	0.386	(9.8)	0.315	(8.0)	0.150	(3.8)
0.150	FCN3931G154J-U	0.386	(9.8)	0.315	(8.0)	0.181	(4.6)

\* also available in 5% (J) tolerance

# Type FCN Surface Mount Film Capacitors

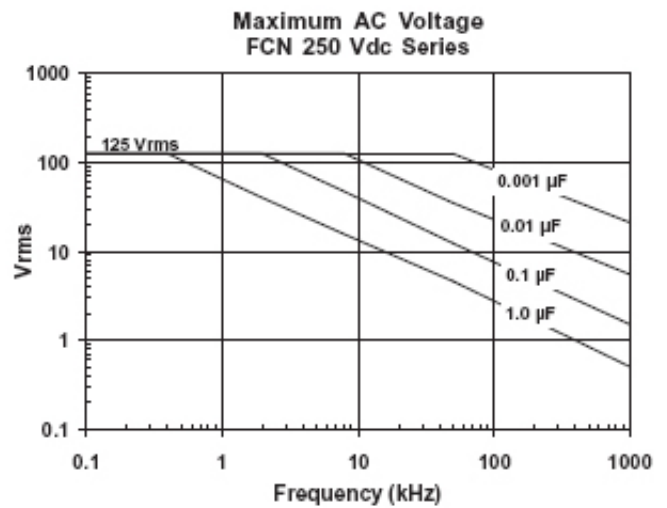
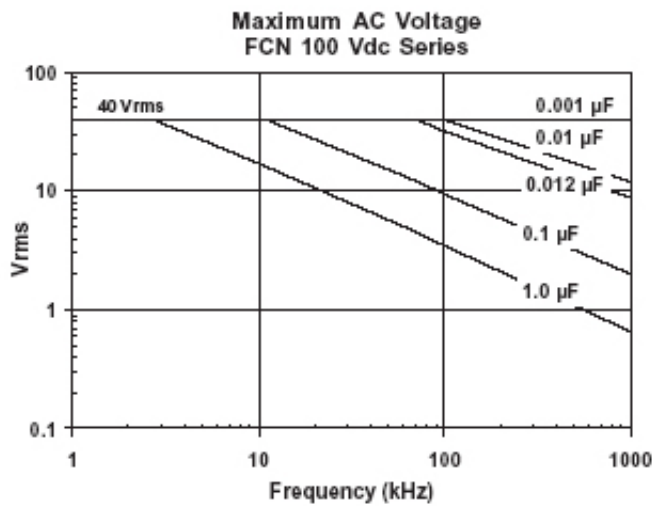
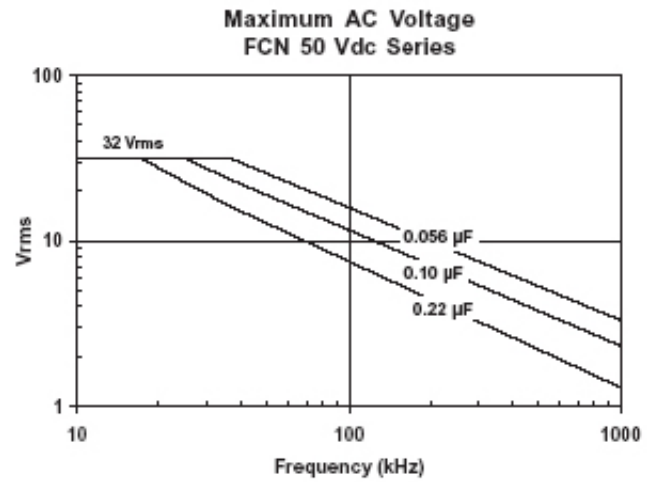
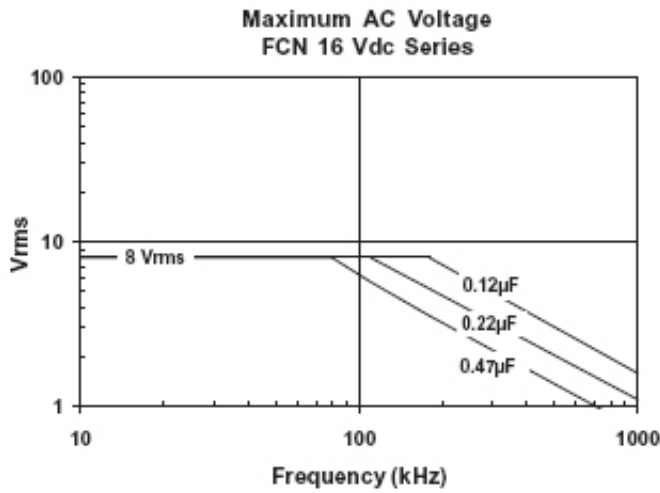
## Typical Temperature Characteristics

## Typical Frequency Characteristics

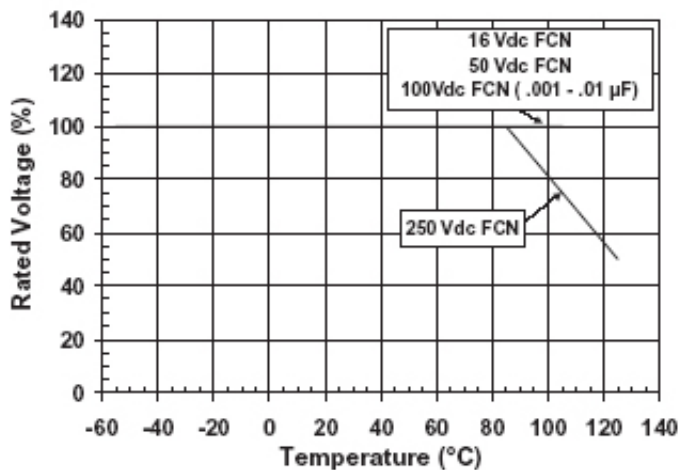


# Type FCN Surface Mount Film Capacitors

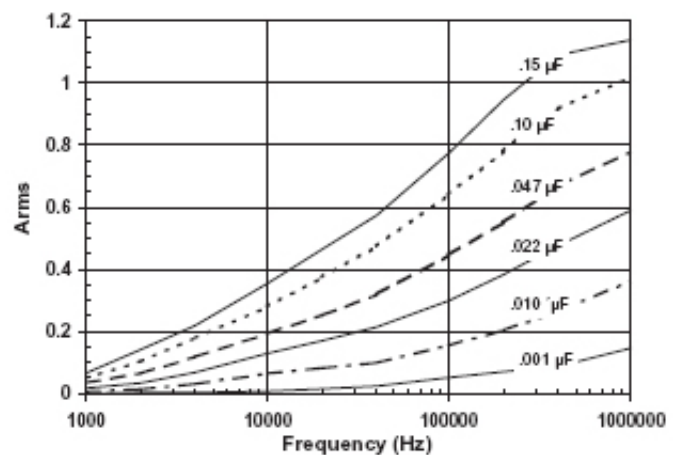
## Vrms vs. Frequency Characteristics



### Voltage Derating vs Temperature



### Maximum RMS Current vs Frequency 400 Vdc FCN





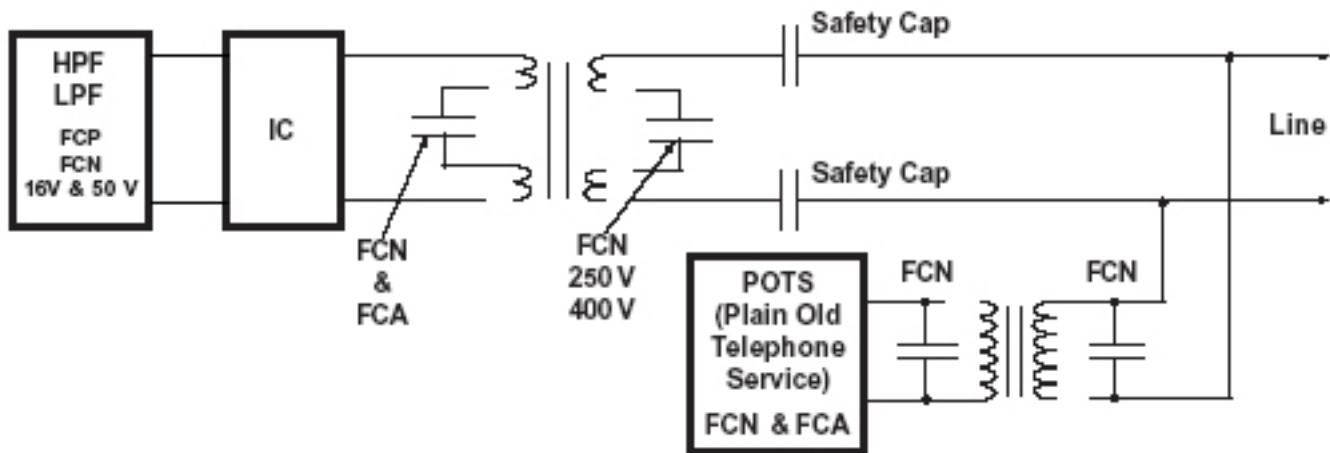
# Type FCN Surface Mount Film Capacitors

## Pulse Handling Capability

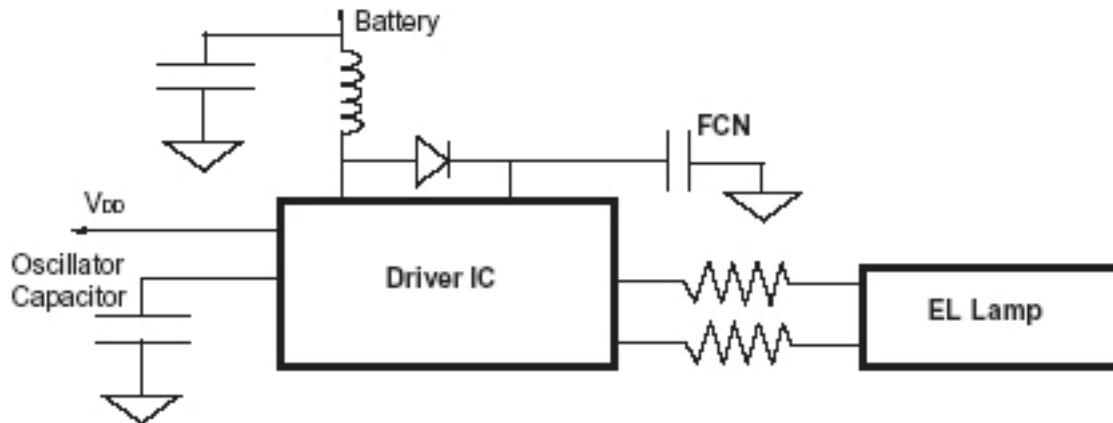
Capacitance ( $\mu\text{F}$ )	Voltage (Vdc)	dV/dt (volts/ $\mu\text{sec}$ )	Capacitance ( $\mu\text{F}$ )	Voltage (Vdc)	dV/dt (volts/ $\mu\text{sec}$ )	Capacitance ( $\mu\text{F}$ )	Voltage (Vdc)	dV/dt (volts/ $\mu\text{sec}$ )
.12 - .22	16	60	.0039	100	530	.001 - .0039	250	615
.27 - .47	16	40	.0047	100	480	.0047 - .033	250	360
.056 - .10	50	190	.0056	100	450	.039 - .12	250	240
.12 - .22	50	130	.0068	100	410	.15 - .22	250	190
.001	100	1000	.0082	100	370	.27 - .47	250	115
.0012	100	920	.01	100	340	.56 - 1.0	250	65
.0015	100	830	.012 - .082	100	320	.001 - .0039	400	615
.0018	100	760	.10 - .15	100	210	.0047 - .01	400	360
.0022	100	690	.18 - .33	100	120	.012 - .033	400	240
.0027	100	630	.39 - .47	100	100	.039 - .068	400	190
.0033	100	570	.056 - 1.0	100	70	.082 - .15	400	115

## Typical Applications

### DC Blocking for xDSL



### Integration for Electroluminescent (EL) Driver



With no piezoelectric effects to deal with, the SMT film capacitor will not create electrical noise in signal circuits or buzzing in power circuits.



## Type FCN Surface Mount Film Capacitors

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