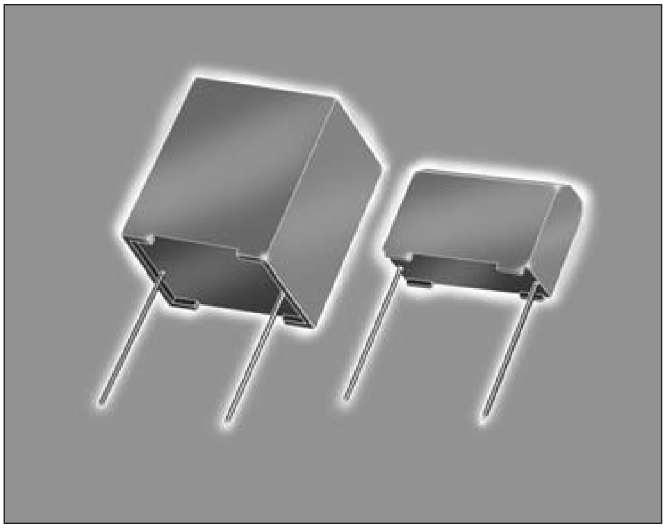
Medium Power Film Capacitors

FFB

DC FILTERING



The FFB series uses a non-impregnated metallized polypropylene or polyester dielectric with the controlled self-healing process, specially treated to have a very high dielectric strength in operating conditions up to 105°C.

The FFB has been designed for printed circuit board mounting. Furthermore, their performances allow to be a very interesting alternative to electrolytic technology because they can withstand much higher levels of surge voltage.

APPLICATIONS

The FFB capacitor is particularly designed for DC filtering, low reactive power.

ELECTRICAL CHARACTERISTICS

Climatic category	55/105/56 (IEC 60068)
Test voltage between terminals @ 25°C 1.5 x $V_n$dc	

STANDARDS

IEC 61071-1, IEC 61071-2:	Power electronic capacitors
IEC 60384-16:	Fixed metallized polypropylene film dielectric DC capacitors
IEC 60384-16-1:	Fixed metallized polypropylene film dielectric DC capacitors Assessment level E
IEC 60384-17:	Fixed metallized polypropylene film dielectric AC and pulse capacitors
IEC 60384-17-1:	Fixed metallized polypropylene film dielectric AC and pulse capacitors Assessment level E
IEC 60384-2:	Fixed metallized polyester capacitors

WORKING TEMPERATURE

(according to the power to be dissipated) -55°C to +105°C

LIFETIME EXPECTANCY

One unique feature of this technology (as opposed to electrolytics) is how the capacitor reacts at the end of its lifetime. Whereas, with an electrolytic, there is a strong risk of explosion of the case. However, with our line of film capacitors, the capacitor will simply experience at the end of life a loss of capacitance of about 2%, with no risk of explosion.

Please note that this is theoretical, however, as the capacitor continues to be functional even after this 2% decrease.

HOT SPOT TEMPERATURE CALCULATION

You can calculate the maximum operating (hot spot) temperature of this capacitor in the following manner:

The loss factor of the capacitor is made up of the sum of two components. The first represents electrical losses in the dielectric and the second component represents Joule effect in the connection and foils (Rs.C.2 π f).

For all applications, the temperature in the hot spot capacitor must be lower than 105°C.

$$\theta_{hot\ spot} = \theta_{ambient} + [tg\delta_0 \cdot Q + R_s \cdot (I_{rms})^2] \cdot R_{th}$$

With:

Q : Reactive power in Var

R_s in Ohm

I_{rms} in Ampere

R_{th} : Rth ambient / hot spot in °C/W

tg $\delta_0 \cdot (10^{-4})$ is the tangent of loss angle (see tan δ_0 page 3)

PACKAGING

Self-extinguishing plastic case (V0 = in accordance with UL 94) filled thermosetting resin.

Self-extinguishing thermosetting resin (V0 = in accordance with UL 94; I3F2 = in accordance with NF F 16-101).

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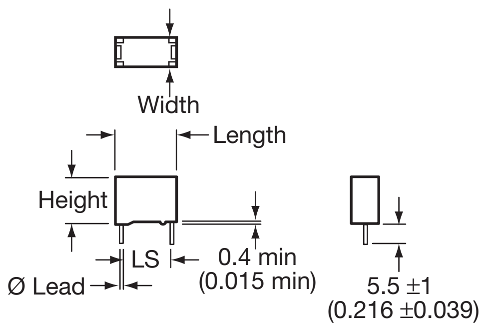
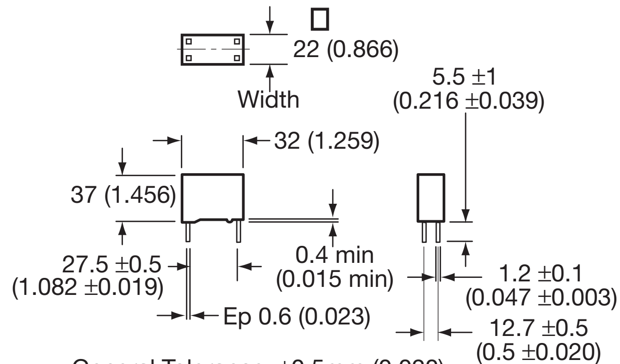
GENERAL DESCRIPTION

BOX KIND: P0; 18; 19; 26; R68
2 TERMINALS SOLUTION



General Tolerance: ±0.5mm (0.020)

BOX KIND: R68
4 TERMINALS SOLUTION



General Tolerance: ±0.5mm (0.020)

DIMENSIONS: millimeters (inches)

Box Kind	Length mm ±0.40 (inches)	Width mm ±0.40 (inches)	Height mm ±0.30 (inches)	Dimensions lead mm +10% -0.05 (inches)	LS mm ±0.40 (inches)
PO	31.1 (1.230)	13.0 (0.051)	22.4 (0.880)	Ø 0.80 (0.031)	27.5 (1.083)
18	31.1 (1.230)	14.6 (0.580)	25.7 (1.010)	Ø 0.80 (0.031)	27.5 (1.083)
19	31.1 (1.230)	17.3 (0.068)	29.8 (1.170)	Ø 0.80 (0.031)	27.5 (1.083)
26	31.1 (1.230)	20.8 (0.820)	31.3 (1.230)	Ø 1.00 (0.039)	27.5 (1.083)
R68 2 Terminals Solution	32.0 (1.260)	22.0 (0.870)	37.0 (1.460)	Ø 1.00 (0.039)	27.5 (1.083)
R68 4 Terminals Solution	32.0 (1.260)	22.0 (0.870)	37.0 (1.460)	1.20 x 0.60 (0.047 x 0.023)	27.5 (1.083)

DC FILTERING FOR LOW VOLTAGE

ELECTRICAL CHARACTERISTICS

Capacitance range C_n	6.2μF to 110μF
Tolerance on C_n	±10%
Rated DC voltage $V_n$dc	75 to 400 V
Dielectric	polyester

HOT SPOT CALCULATION

$$\theta_{hot\ spot} = \theta_{ambient} + (P_d + P_t) \times R_{th}$$

with P_d (Dielectric losses) = $Q \times tg\delta_0$

$Q \times tg\delta_0 \Rightarrow [\ \frac{1}{2} \times C_n \times (V_{peak\ to\ peak})^2 \times f\ ] \times tg\delta_0$

(see $tg\delta_0$ for polyester dielectric page 3)

P_t (Thermal losses) = $R_s \times (I_{rms})^2$

where C_n in Farad, I_{rms} in Ampere, f in Hertz, V in Volt, R_s in Ohm, θ in °C, R_{th} in °C/W

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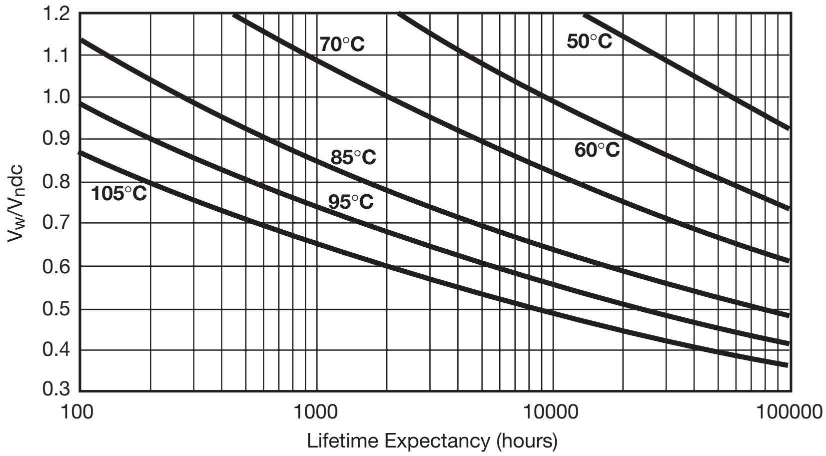
DC FILTERING FOR LOW VOLTAGE

POLYESTER DIELECTRIC

TABLE OF VALUES

Capacitance (μF)	Box Kind	I_{rms} max. (A)	R_s (mΩ)	R_{th} (°C/W)	Part Number
$V_n$dc 75V	**Vrms max.: 45 volts**				
33	PO	3	3	40.7	FFB14D0336K--
47	18	4.3	2	33.3	FFB24D0476K--
68	19	6.2	1.7	29.9	FFB34D0686K--
82	26	7.4	1.6	26.7	FFB44D0826K--
110	R68 (2 terminals)	10	1.4	22.9	FFB54D0117K--
110	R68 (4 terminals)	10	1.4	22.9	FFB54D0117KJC
$V_n$dc 100V	**Vrms max.: 60 volts**				
20	PO	2.6	3	40.5	FFB14E0206K--
27	18	3.5	2.5	33.3	FFB24E0276K--
39	19	5	2	29.8	FFB34E0396K--
47	26	6	1.7	26.6	FFB44E0476K--
68	R68 (2 terminals)	9	1.4	22.8	FFB54E0686K--
68	R68 (4 terminals)	9	1.4	22.8	FFB54E0686KJC
$V_n$dc 300V	**Vrms max.: 90 volts**				
7.5	PO	2.4	16	40.7	FFB14H0755K--
11	18	3.6	11	33.5	FFB24H0116K--
16	19	5.2	8	29.9	FFB34H0166K--
18	26	6	7	27.1	FFB44H0186K--
27	R68 (2 terminals)	9	5	22.9	FFB54H0276K--
27	R68 (4 terminals)	9	5	22.9	FFB54H0276KJC
$V_n$dc 400V	**Vrms max.: 105 volts**				
6.2	PO	2.5	17	40.5	FFB14I0625K--
7.5	18	3.1	14	33.5	FFB24I0755K--
12	19	5	9	29.9	FFB34I0126K--
15	26	6.2	7	26.4	FFB44I0156K--
20	R68 (2 terminals)	8.2	5.5	22.8	FFB54I0206K--
20	R68 (4 terminals)	8.2	5.5	22.8	FFB54I0206KJC

LIFETIME EXPECTANCY vs VOLTAGE AND HOT SPOT TEMPERATURE



Vw = Permanent working or operating DC voltage.

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DC FILTERING FOR INDUSTRIAL APPLICATION

These capacitors have been designed principally for high and medium power DC filtering applications.

ELECTRICAL CHARACTERISTICS

Capacitance range C_n	1.5µF to 13µF
Tolerance on C_n	±10%
Rated DC voltage $V_n$dc	525 to 1100 V
Dielectric	polypropylene

TANGENT OF LOSS ANGLE (TANδ_0) FOR POLYPROPYLENE DIELECTRIC

Polypropylene has a constant dielectric loss factor of 2×10^{-4} irrespective of temperature and frequency (up to 1 MHz).

HOT SPOT TEMPERATURE CALCULATION

You can calculate the maximum operating (hot spot) temperature of this capacitor in the following manner:

The loss factor of the capacitor is made up of the sum of two components. The first represents electrical losses ($tg\ \delta_0 = 2 \times 10^{-4}$) and the second component represents Joule effect in the connection and foils, (Rs.C.2 π f).

For all applications, the temperature in the hot spot capacitor must be lower than 105°C. Heating calculation of hot spot capacitor:

$$\theta_{hot\ spot} = \theta_{ambient} + [tg\delta_0 \cdot Q + R_S \cdot (I_{rms})^2] \cdot R_{th}$$

With:

Q : Reactive power in Var
R_s in Ohm
I_{rms} in Ampere
R_{th} : Rth ambient / hot spot in °C/W
tg δ_0·(10^{-4}) is the tangent of loss angle for polypropylene dielectric. Polypropylene has a constant dielectric losses factor of 2×10^{-4} irrespective of temperature and frequency (up to 1 MHz).

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DC FILTERING

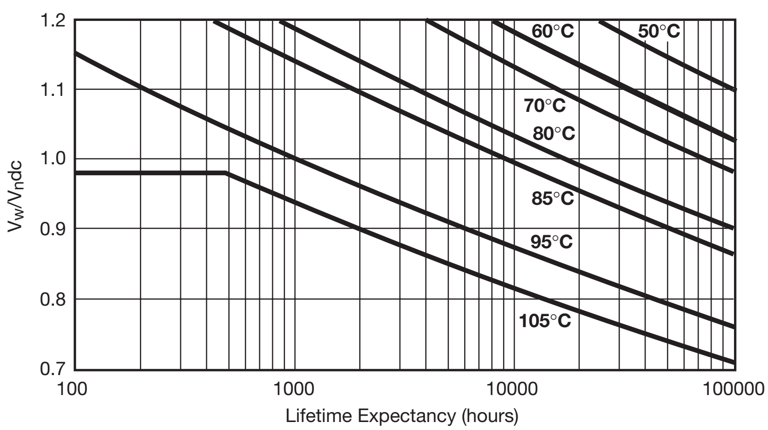
DC FILTERING FOR INDUSTRIAL APPLICATION

POLYPROPYLENE DIELECTRIC

TABLE OF VALUES

Capacitance (µF)	Box Kind	I_{rms} max. (A)	R_S (mΩ)	R_{th} (°C/W)	Part Number
$V_n$dc 525V	**Vrms max.: 105 volts**				
3.9	PO	5.1	30	45.7	FFB16J0395K--
5.6	18	7.4	21	36.4	FFB26J0565K--
8.2	19	10.9	15	32.6	FFB36J0825K--
10	26	12	12	29.8	FFB46J0106K--
13	R68 (2 terminals)	12	9	24.3	FFB56J0136K--
13	R68 (4 terminals)	16.7	9	24.3	FFB56J0136KJC
$V_n$dc 720V	**Vrms max.: 120 volts**				
3.3	PO	5.0	31	45.0	FFB16A0335K--
4.3	18	6.5	24	36.2	FFB26A0435K--
6.2	19	9.4	17	32.7	FFB36A0625K--
7.5	26	11.4	14	29.9	FFB46A0755K--
10	R68 (2 terminals)	12	11	24.2	FFB56A0106K--
10	R68 (4 terminals)	15.2	11	24.2	FFB56A0106KJC
$V_n$dc 900V	**Vrms max.: 150 volts**				
2	PO	3.6	41	45.7	FFB16C0205K--
2.7	18	4.9	30	36.6	FFB26C0275K--
3.9	19	7.2	21	32.9	FFB36C0395K--
5.1	26	9.3	16	29.7	FFB46C0515K--
6.8	R68 (2 terminals)	12	12	24.1	FFB56C0685K--
6.8	R68 (4 terminals)	12.5	12	24.1	FFB56C0685KJC
$V_n$dc 1100V	**Vrms max.: 180 volts**				
1.5	PO	3.3	45	45.2	FFB16L0155K--
1.8	18	3.9	40	36.5	FFB26L0185K--
2.4	19	5.3	28	33.4	FFB36L0245K--
3	26	6.6	23	30.2	FFB46L0305K--
4.7	R68 (2 terminals)	10.3	15	24.1	FFB56L0475K--
4.7	R68 (4 terminals)	10.3	15	24.1	FFB56L0475KJC

LIFETIME EXPECTANCY vs VOLTAGE AND HOT SPOT TEMPERATURE



Vw = Working DC Voltage

Vn = Rated DC Voltage