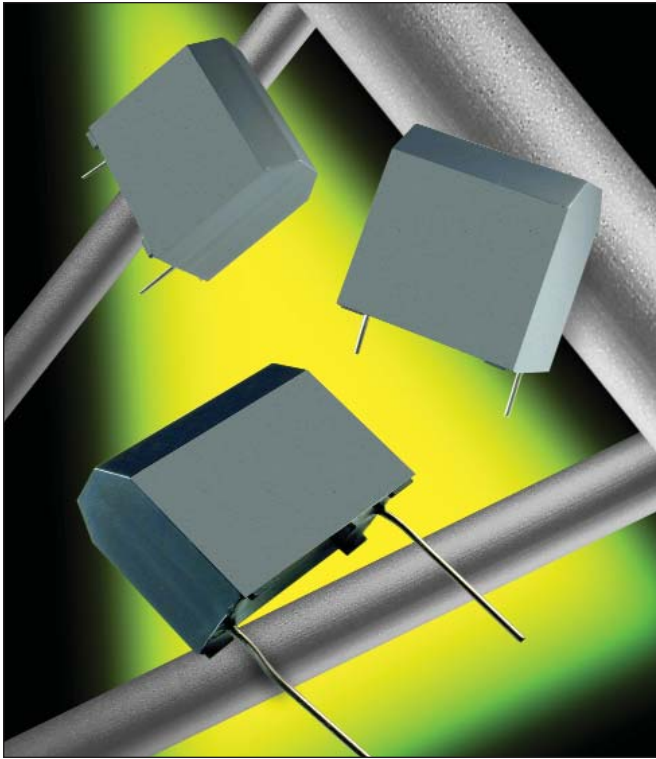


Medium Power Film Capacitors



FFB (RoHS Compliant)

DC FILTERING



PACKAGING MATERIAL

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).

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

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.

HOT SPOT CALCULATION

See *Hot Spot Temperature*, page 3.

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

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

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

$\text{tg}\delta_0$ (tan delta)

For polypropylene, $\text{tg}\delta_0 = 2 \times 10^{-4}$ for frequencies up to 1MHz and is independent of temperatures.

For polyester, $\text{tg}\delta_0$ values are shown in graph 4 on page 3.

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

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

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. Unlike aluminum, electrolytics film capacitors do not have a catastrophic failure mode. Film capacitors simply experience a parametric loss of capacitance of about 2%, with no risk of short circuit.

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

Medium Power Film Capacitors



FFB (RoHS Compliant)

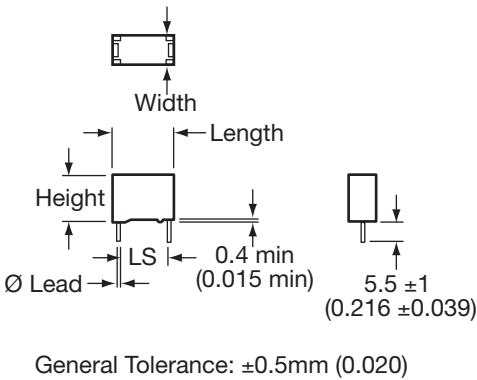
HOW TO ORDER

FFB	1	4	D	0336	K	--
Series	Case Size	Dielectric	Voltage Code	Capacitance Code	Capacitance Tolerances	Lead Styles
	1 2 3 4 5	4 = Polyester 6 = Polypropylene	D = 75Vdc E = 100Vdc H = 300Vdc I = 400Vdc J = 525Vdc A = 720Vdc C = 900Vdc L = 1100Vdc	0 = pF code 0336 = 33μF 0686 = 68μF 0117 = 110μF etc.	K = ±10%	-- = 2 Leaded JC = 4 Leaded Consult Factory for Special Options

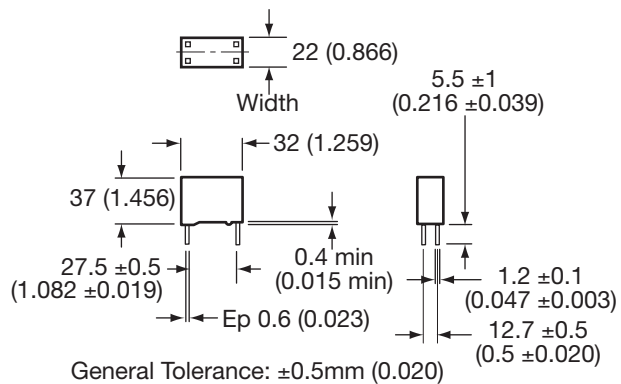
DC FILTERING

GENERAL DESCRIPTION

CASE STYLE: P0; 18; 19; 26; R68 2 LEADED STYLE



CASE STYLE: R68 4 LEADED STYLE



DIMENSIONS: millimeters (inches)

Case Size	Case Style	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)
1	P0	31.1 (1.230)	13.0 (0.510)	22.4 (0.880)	Ø 0.80 (0.031)	27.5 (1.083)
2	18	31.1 (1.230)	14.6 (0.580)	25.7 (1.010)	Ø 0.80 (0.031)	27.5 (1.083)
3	19	31.1 (1.230)	17.3 (0.680)	29.8 (1.170)	Ø 0.80 (0.031)	27.5 (1.083)
4	26	31.1 (1.230)	20.8 (0.820)	31.3 (1.230)	Ø 1.00 (0.039)	27.5 (1.083)
5	R68 2 Leaded Style	32.0 (1.260)	22.0 (0.870)	37.0 (1.460)	Ø 1.00 (0.039)	27.5 (1.083)
	R68 4 Leaded Style	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)



Medium Power Film Capacitors



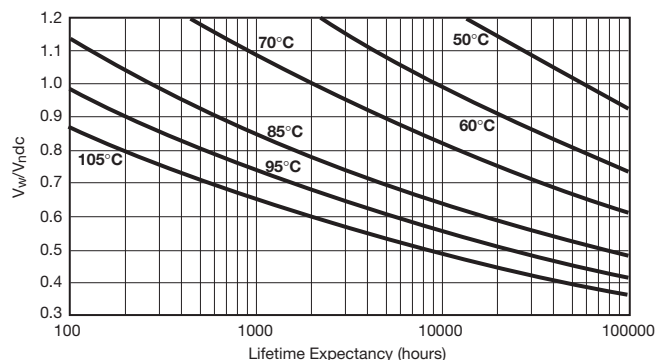
FFB (RoHS Compliant) – Polyester Dielectric

POLYESTER DIELECTRIC FOR LOW VOLTAGE DC FILTERING

ELECTRICAL CHARACTERISTICS – POLYESTER DIELECTRIC

Climatic category	55/105/56 (IEC 60068)
Test voltage between terminals @ 25°C	1.5 x $V_{n\text{dc}}$
Capacitance range C_n	6.2 μF to 110 μF
Tolerance on C_n	$\pm 10\%$
Rated DC voltage $V_{n\text{dc}}$	75 to 400 V
Dielectric	polyester
Max Stray Inductance	20nH

LIFETIME EXPECTANCY vs VOLTAGE AND HOT SPOT TEMPERATURE – POLYESTER DIELECTRIC



V_w = Permanent working or operating DC voltage.

RATINGS AND PART NUMBER REFERENCE – POLYESTER DIELECTRIC

Part Number	Capacitance (μF)	Case Style	I_{rms} max. (A)	R_s (m Ω)	R_{th} ($^{\circ}\text{C}/\text{W}$)	Typical Weight (g)
$V_{n\text{dc}}$ 75V V_{rms} max.: 45 volts Voltage Code: D						
FFB14D0336K--	33	PO	3	3	40.7	15
FFB24D0476K--	47	18	4.3	2	33.3	20
FFB34D0686K--	68	19	6.2	1.7	29.9	25
FFB44D0826K--	82	26	7.4	1.6	26.7	32
FFB54D0117K--	110	R68 (2 terminals)	10	1.4	22.9	40
FFB54D0117KJC	110	R68 (4 terminals)	10	1.4	22.9	40
$V_{n\text{dc}}$ 100V V_{rms} max.: 60 volts Voltage Code: E						
FFB14E0206K--	20	PO	2.6	3	40.5	15
FFB24E0276K--	27	18	3.5	2.5	33.3	20
FFB34E0396K--	39	19	5	2	29.8	25
FFB44E0476K--	47	26	6	1.7	26.6	32
FFB54E0686K--	68	R68 (2 terminals)	9	1.4	22.8	40
FFB54E0686KJC	68	R68 (4 terminals)	9	1.4	22.8	40
$V_{n\text{dc}}$ 300V V_{rms} max.: 90 volts Voltage Code: H						
FFB14H0755K--	7.5	PO	2.4	16	40.7	15
FFB24H0116K--	11	18	3.6	11	33.5	20
FFB34H0166K--	16	19	5.2	8	29.9	25
FFB44H0186K--	18	26	6	7	27.1	32
FFB54H0276K--	27	R68 (2 terminals)	9	5	22.9	40
FFB54H0276KJC	27	R68 (4 terminals)	9	5	22.9	40
$V_{n\text{dc}}$ 400V V_{rms} max.: 105 volts Voltage Code: I						
FFB14I0625K--	6.2	PO	2.5	17	40.5	15
FFB24I0755K--	7.5	18	3.1	14	33.5	20
FFB34I0126K--	12	19	5	9	29.9	25
FFB44I0156K--	15	26	6.2	7	26.4	32
FFB54I0206K--	20	R68 (2 terminals)	8.2	5.5	22.8	40
FFB54I0206KJC	20	R68 (4 terminals)	8.2	5.5	22.8	40

Medium Power Film Capacitors



FFB (RoHS Compliant) – Polypropylene Dielectric

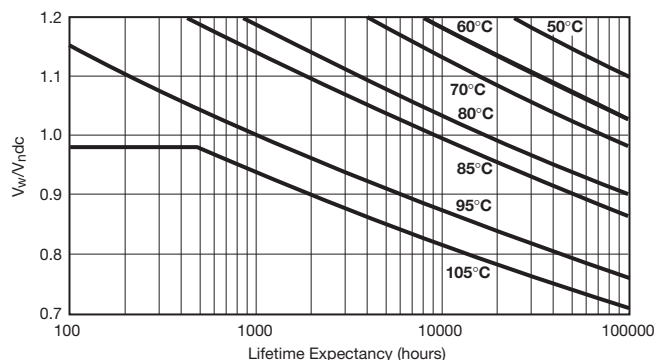
POLYPROPYLENE DIELECTRIC FOR INDUSTRIAL DC FILTERING

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

ELECTRICAL CHARACTERISTICS – POLYPROPYLENE DIELECTRIC

Climatic category	55/105/56 (IEC 60068)
Test voltage between terminals @ 25°C	1.5 x V_{ndc}
Capacitance range C_n	1.5 μ F to 13 μ F
Tolerance on C_n	$\pm 10\%$
Rated DC voltage V_{ndc}	525 to 1100 V
Dielectric	polypropylene

LIFETIME EXPECTANCY vs VOLTAGE AND HOT SPOT TEMPERATURE – POLYPROPYLENE DIELECTRIC



V_w = Working DC Voltage • V_n = Rated DC Voltage

RATINGS AND PART NUMBER REFERENCE – POLYPROPYLENE DIELECTRIC

Part Number	Capacitance (μ F)	Case Style	I_{rms} max. (A)	R_s (m Ω)	R_{th} ($^{\circ}$ C/W)	Typical Weight (g)
V_{ndc} 525V V_{rms} max.: 105 volts Voltage Code: J						
FFB16J0395K--	3.9	PO	5.1	30	45.7	15
FFB26J0565K--	5.6	18	7.4	21	36.4	20
FFB36J0825K--	8.2	19	10.9	15	32.6	25
FFB46J0106K--	10	26	12	12	29.8	32
FFB56J0136K--	13	R68 (2 terminals)	12	9	24.3	40
FFB56J0136KJJC	13	R68 (4 terminals)	16.7	9	24.3	40
V_{ndc} 720V V_{rms} max.: 120 volts Voltage Code: A						
FFB16A0335K--	3.3	PO	5.0	31	45.0	15
FFB26A0435K--	4.3	18	6.5	24	36.2	20
FFB36A0625K--	6.2	19	9.4	17	32.7	25
FFB46A0755K--	7.5	26	11.4	14	29.9	32
FFB56A0106K--	10	R68 (2 terminals)	12	11	24.2	40
FFB56A0106KJJC	10	R68 (4 terminals)	15.2	11	24.2	40
V_{ndc} 900V V_{rms} max.: 150 volts Voltage Code: C						
FFB16C0205K--	2	PO	3.6	41	45.7	15
FFB26C0275K--	2.7	18	4.9	30	36.6	20
FFB36C0395K--	3.9	19	7.2	21	32.9	25
FFB46C0515K--	5.1	26	9.3	16	29.7	32
FFB56C0685K--	6.8	R68 (2 terminals)	12	12	24.1	40
FFB56C0685KJJC	6.8	R68 (4 terminals)	12.5	12	24.1	40
V_{ndc} 1100V V_{rms} max.: 180 volts Voltage Code: L						
FFB16L0155K--	1.5	PO	3.3	45	45.2	15
FFB26L0185K--	1.8	18	3.9	40	36.5	20
FFB36L0245K--	2.4	19	5.3	28	33.4	25
FFB46L0305K--	3	26	6.6	23	30.2	32
FFB56L0475K--	4.7	R68 (2 terminals)	10.3	15	24.1	40
FFB56L0475KJJC	4.7	R68 (4 terminals)	10.3	15	24.1	40

