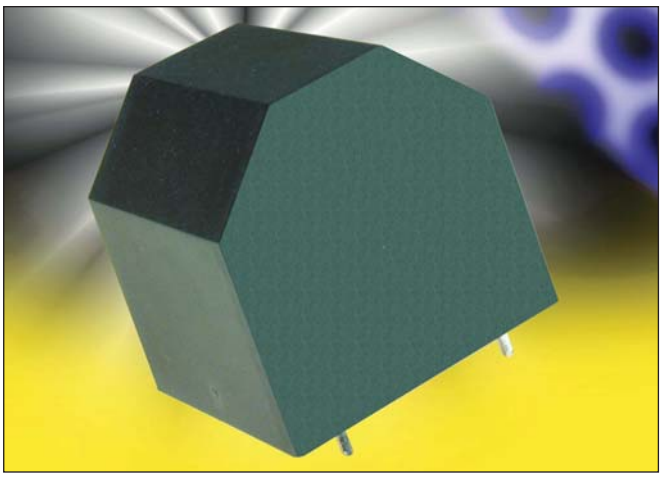
# Medium Power Film Capacitors

## FFV3 (RoHS Compliant)

## DC FILTERING



## APPLICATIONS

The FFV3 capacitors are particularly designed for DC filtering, low reactive power.

## 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

## 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.

## PACKAGING MATERIAL

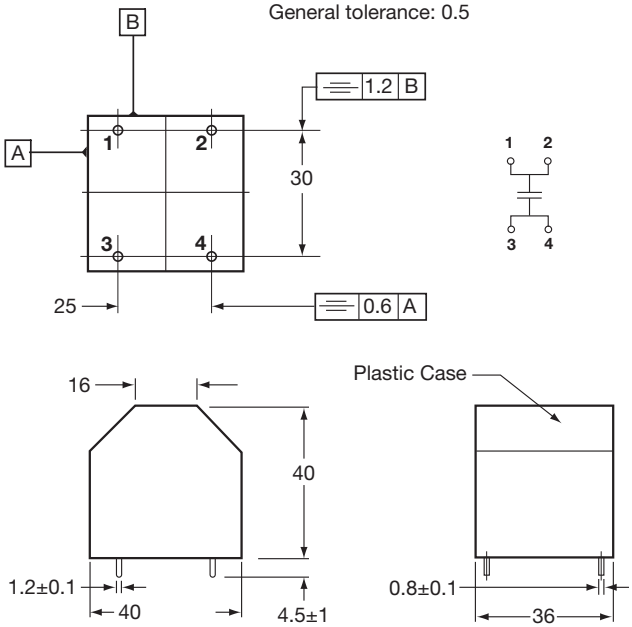
Self-extinguishing plastic case (V0 = in accordance with UL 94) filled thermosetting resin.

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

The series uses a 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.

This is a dry solution for polypropylene and dry or wet for polyester.

The FFV3 has been designed for printed circuit board mounting.




## HOT SPOT CALCULATION

*See Hot Spot Temperature, page 3.*

$\theta_{hot\ spot} = \theta_{ambient} + (P_d + P_t) \times (R_{th} + 7.4)$

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

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

$\Rightarrow [\ ½ \times C_n \times (V_{peak\ to\ peak})^2 \times f\ ] \times tg\delta_0$

$tg\delta_0$ (tan delta)

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

For polyester, $tg\delta_0$ values are shown in graph 4 on 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, $\theta$ in °C
$R_{th}$ in °C/W, $R_{th}$ : $R_{th}$ case/hot spot in °C/W

# Medium Power Film Capacitors

## FFV3 (RoHS Compliant) for Low Voltage Applications



## HOW TO ORDER

| FFV3 | 4 | D | K | – – |
|---|---|---|---|---|
| Series | Dielectric<br>4 = Polyester<br>6 = Polypropylene | Voltage Code<br>D = 75Vdc<br>E = 100Vdc<br>F = 160Vdc<br>H = 300Vdc<br>I = 400Vdc<br>J = 500Vdc<br>A = 700Vdc<br>C = 900Vdc<br>L = 1100Vdc | Capacitance Tolerances<br>K = ±10% | Lead Styles<br>– – = Standard<br>Consult Factory for Special Options |

RoHS COMPLIANT

## ELECTRICAL CHARACTERISTICS – POLYESTER DIELECTRIC

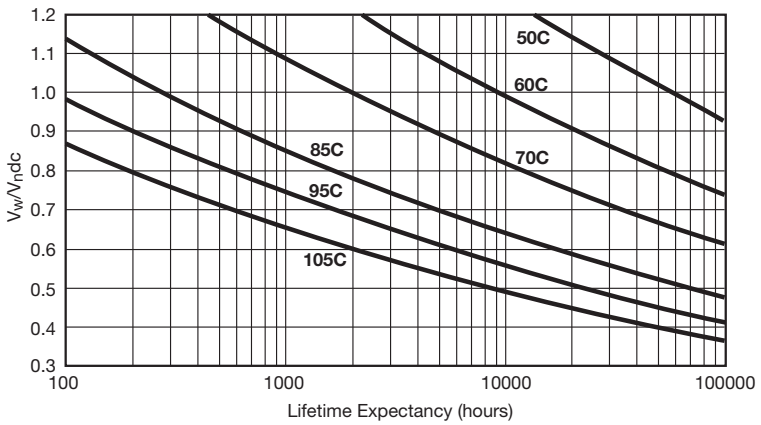
| | |
|---|---|
| Climatic category | 40/105/56 (IEC 60068) |
| Test voltage between terminals @ 25°C | 1.5 x $V_n$dc during 10s |
| Test voltage between terminals and case @ 25°C “ | @ 4 kVrms @ 50 Hz during 1 min. |
| Capacitance range $C_n$ | 30µF to 160µF |
| Tolerance on $C_n$ | ±10% |
| Rated DC voltage $V_n$dc | 75 to 400 V |
| Dielectric | polyester |
| Max Stray Inductance | 15nH |

## RATINGS AND PART NUMBER REFERENCE – POLYESTER DIELECTRIC

| Part Number | Capacitance (µF) | $I_{rms\ max.}$ (A) | $I^2t_{10\ shots}$ ($A^2s$) | $I^2t_{1000\ shots}$ ($A^2s$) | $R_s$ (mΩ) | $R_{th}$ (°C/W) | Typical Weight (g) |
|---|---|---|---|---|---|---|---|
| **$V_n$dc = 75 V Vrms = 45 v max Voltage Code: D** | | | | | | | |
| FFV34D0137K-- | 130 | 23 | 370 | 37 | 0.56 | 5.6 | 90 |
| FFV34D0167K-- | 160 | 28 | 560 | 56 | 0.47 | 5 | 90 |
| **$V_n$dc = 100 V Vrms = 60 v max Voltage Code: E** | | | | | | | |
| FFV34E0806K-- | 80 | 19 | 250 | 25 | 0.67 | 6.2 | 90 |
| FFV34E0107K-- | 100 | 24 | 390 | 39 | 0.55 | 5.4 | 90 |
| **$V_n$dc = 160 V Vrms = 75 v max Voltage Code: F** | | | | | | | |
| FFV34F0556K-- | 55 | 17 | 180 | 18 | 0.77 | 6.6 | 90 |
| FFV34F0656K-- | 65 | 20 | 260 | 26 | 0.66 | 6 | 90 |
| **$V_n$dc = 300 V Vrms = 90 v max Voltage Code: H** | | | | | | | |
| FFV34H0406K-- | 40 | 20 | 150 | 15 | 2.80 | 9.6 | 90 |
| FFV34H0506K-- | 50 | 26 | 230 | 23 | 2.25 | 8.5 | 90 |
| **$V_n$dc = 400 V Vrms = 105 v max Voltage Code: I** | | | | | | | |
| FFV34I0306K--* | 30 | 17 | 110 | 11 | 2.93 | 9.9 | 90 |
| FFV34I0406K--* | 40 | 23 | 200 | 20 | 2.21 | 8.4 | 90 |

(*) Polyester dielectric film wet silicone

## LIFETIME EXPECTANCY vs $V_W/V_n$ AND HOT SPOT TEMPERATURE POLYESTER DIELECTRIC




Vw = Permanent working or operating DC voltage.

# Medium Power Film Capacitors

## FFV3 (RoHS Compliant) DC for Medium and High Voltage Applications

## DC FILTERING

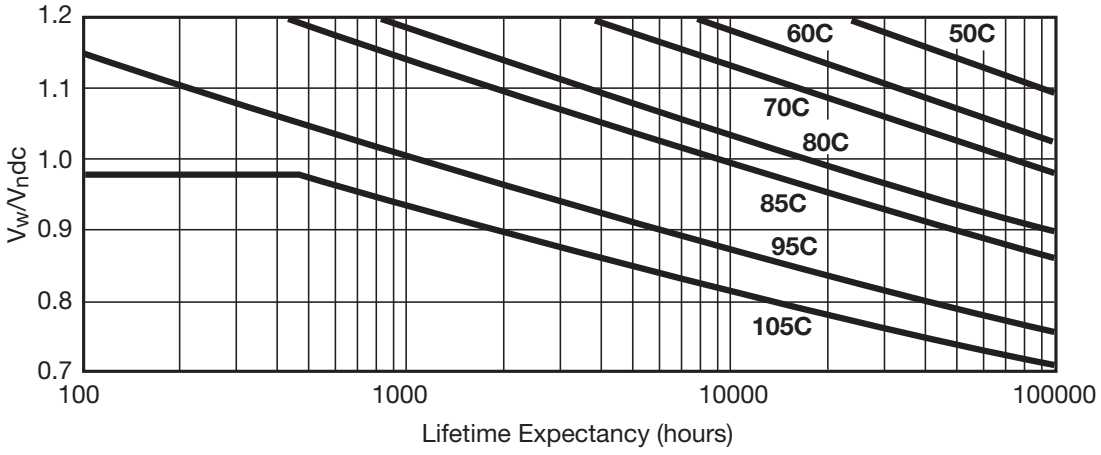
### ELECTRICAL CHARACTERISTICS – POLYPROPYLENE DIELECTRIC

| | |
|---|---|
| Climatic category | 40/105/56 (IEC 60068) |
| Test voltage between terminals @ 25°C | 1.5 x $V_n$dc during 10s |
| Test voltage between terminals and case @ 25°C “ | @ 4 kVrms @ 50 Hz during 1 min. |
| Capacitance range $C_n$ | 6µF to 25µF |
| Tolerance on $C_n$ | ±10% |
| Rated DC voltage $V_n$dc | 500 to 1100 V |
| Dielectric | polypropylene |
| Max Stray Inductance | 15nH |

### RATINGS AND PART NUMBER REFERENCE – POLYPROPYLENE DIELECTRIC

| Part Number | Capacitance (µF) | $I_{rms\ max.}$ (A) | $I^2t_{10\ shots}$ ($A^2s$) | $I^2t_{1000\ shots}$ ($A^2s$) | $R_s$ (mΩ) | $R_{th}$ (°C/W) | Typical Weight (g) |
|---|---|---|---|---|---|---|---|
| **$V_n$dc = 500 V Vrms = 105 v max Voltage Code: J** | | | | | | | |
| FFV36J0206K-- | 20 | 27 | 3200 | 320 | 5.88 | 3.5 | 90 |
| FFV36J0256K-- | 25 | 33 | 5000 | 500 | 4.72 | 3.1 | 90 |
| **$V_n$dc = 700 V Vrms = 120 v max Voltage Code: A** | | | | | | | |
| FFV36A0146K-- | 14 | 21 | 2000 | 200 | 7.34 | 3.7 | 90 |
| FFV36A0206K-- | 20 | 30 | 4200 | 420 | 5.15 | 3.1 | 90 |
| **$V_n$dc = 900 V Vrms = 150 v max Voltage Code: C** | | | | | | | |
| FFV36C0106K-- | 10 | 19 | 1600 | 160 | 8.21 | 3.4 | 90 |
| FFV36C0136K-- | 13 | 25 | 2800 | 280 | 6.33 | 2.9 | 90 |
| **$V_n$dc = 1100 V Vrms = 180 v max Voltage Code: L** | | | | | | | |
| FFV36L0605K-- | 6 | 13 | 800 | 80 | 11.4 | 3.7 | 90 |
| FFV36L0905K-- | 9 | 20 | 1900 | 190 | 7.61 | 2.9 | 90 |

### LIFETIME EXPECTANCY vs $V_W/V_n$ AND HOT SPOT TEMPERATURE POLYPROPYLENE DIELECTRIC




Vw = Permanent working or operating DC voltage.