Medium Power Film Capacitors

FFV3 (RoHS Compliant)

DC FILTERING

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.

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).

HOT SPOT CALCULATION

See Hot Spot Temperature, page 3.

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

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

with

\[
P_d (\text{Dielectric losses}) = Q \times \tan \delta_0
\]

\[
\Rightarrow \frac{1}{2} \times C_n \times (V_{\text{peak to peak}})^2 \times f \times \tan \delta_0
\]

\[
\tan \delta_0 (\tan \Delta)
\]

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

For polyester, \(\tan \delta_0\) values are shown in graph 4 on page 3.

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

where

\[C_n\text{ in Farad} \quad I_{\text{rms}}\text{ in Ampere} \quad f\text{ in Hertz} \]

\[V\text{ in Volt} \quad R_s\text{ in Ohm} \quad \theta\text{ in °C} \]

\[R_{\text{th}}\text{ in °C/W} \quad R_{\text{th}}: R_{\text{th}} \text{ case/hot spot in °C/W} \]
Medium Power Film Capacitors

FFV3 (RoHS Compliant) for Low Voltage Applications

**HOW TO ORDER**

<table>
<thead>
<tr>
<th>FFV3</th>
<th>4</th>
<th>Voltage Code</th>
<th>Capacitance Tolerances</th>
</tr>
</thead>
<tbody>
<tr>
<td>Series</td>
<td>Dielectric</td>
<td>D = 75Vdc</td>
<td>K = ±10%</td>
</tr>
<tr>
<td>4 = Polyester</td>
<td>E = 100Vdc</td>
<td>J = 500Vdc</td>
<td></td>
</tr>
<tr>
<td>6 = Polypropylene</td>
<td>F = 160Vdc</td>
<td>A = 700Vdc</td>
<td></td>
</tr>
<tr>
<td></td>
<td>G = 900Vdc</td>
<td>C = 900Vdc</td>
<td></td>
</tr>
<tr>
<td></td>
<td>H = 300Vdc</td>
<td>L = 1100Vdc</td>
<td></td>
</tr>
<tr>
<td>I = 400Vdc</td>
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</table>

**ELECTRICAL CHARACTERISTICS – POLYESTER DIELECTRIC**

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

**RATINGS AND PART NUMBER REFERENCE – POLYESTER DIELECTRIC**

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Capacitance (μF)</th>
<th>Irms max. (A)</th>
<th>I10 shots (A²s)</th>
<th>I1000 shots (A²s)</th>
<th>Rth (m²K)</th>
<th>Rr (°C/W)</th>
<th>Typical Weight (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FFV34D0137K--</td>
<td>130</td>
<td>23</td>
<td>370</td>
<td>37</td>
<td>0.56</td>
<td>5.6</td>
<td>90</td>
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<tr>
<td>FFV34D0167K--</td>
<td>160</td>
<td>28</td>
<td>560</td>
<td>56</td>
<td>0.47</td>
<td>5</td>
<td>90</td>
</tr>
<tr>
<td>FFV34E0806K--</td>
<td>80</td>
<td>19</td>
<td>250</td>
<td>25</td>
<td>0.67</td>
<td>6.2</td>
<td>90</td>
</tr>
<tr>
<td>FFV34E0107K--</td>
<td>100</td>
<td>24</td>
<td>390</td>
<td>39</td>
<td>0.55</td>
<td>5.4</td>
<td>90</td>
</tr>
<tr>
<td>FFV34F0556K--</td>
<td>55</td>
<td>17</td>
<td>190</td>
<td>18</td>
<td>0.77</td>
<td>6.6</td>
<td>90</td>
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<tr>
<td>FFV34F0656K--</td>
<td>65</td>
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<td>260</td>
<td>26</td>
<td>0.66</td>
<td>6</td>
<td>90</td>
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<tr>
<td>FFV34H0406K--*</td>
<td>40</td>
<td>20</td>
<td>150</td>
<td>15</td>
<td>2.80</td>
<td>9.6</td>
<td>90</td>
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<tr>
<td>FFV34H0506K--*</td>
<td>50</td>
<td>26</td>
<td>230</td>
<td>23</td>
<td>2.25</td>
<td>8.5</td>
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<tr>
<td>FFV34I0306K--*</td>
<td>30</td>
<td>17</td>
<td>110</td>
<td>11</td>
<td>2.93</td>
<td>9.9</td>
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<tr>
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<td>23</td>
<td>200</td>
<td>20</td>
<td>2.21</td>
<td>8.4</td>
<td>90</td>
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</tbody>
</table>

(*) Polyester dielectric film wet silicone

**LIFETIME EXPECTANCY vs Vw/Vn 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 \( V_{ndc} \) 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 \( V_{ndc} \) 500 to 1100 V
Dielectric polypropylene
Max Stray Inductance 15nH

RATINGS AND PART NUMBER REFERENCE – POLYPROPYLENE DIELECTRIC

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Capacitance (μF)</th>
<th>( I_{rms \ max.} ) (A)</th>
<th>( I_{10 \ shots} ) (A²s)</th>
<th>( I_{1000 \ shots} ) (A²s)</th>
<th>( R_s ) (mΩ)</th>
<th>( R_{th} ) (°C/W)</th>
<th>Typical Weight (g)</th>
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</thead>
<tbody>
<tr>
<td>FFV36J0206K--</td>
<td>20</td>
<td>27</td>
<td>3200</td>
<td>320</td>
<td>5.88</td>
<td>3.5</td>
<td>90</td>
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<tr>
<td>FFV36J0256K--</td>
<td>25</td>
<td>33</td>
<td>5000</td>
<td>500</td>
<td>4.72</td>
<td>3.1</td>
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<tr>
<td>FFV36A0146K--</td>
<td>14</td>
<td>21</td>
<td>2000</td>
<td>200</td>
<td>7.34</td>
<td>3.7</td>
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<td>20</td>
<td>30</td>
<td>4200</td>
<td>420</td>
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<td>19</td>
<td>1600</td>
<td>160</td>
<td>8.21</td>
<td>3.4</td>
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<td>280</td>
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<tr>
<td>FFV36L0605K--</td>
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<td>800</td>
<td>80</td>
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<tr>
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<td>20</td>
<td>1900</td>
<td>190</td>
<td>7.61</td>
<td>2.9</td>
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</tbody>
</table>

LIFETIME EXPECTANCY vs \( V_w/V_n \) AND HOT SPOT TEMPERATURE POLYPROPYLENE DIELECTRIC

\( V_w = \) Permanent working or operating DC voltage.

Vw = Permanent working or operating DC voltage.