ULTEM™ UTF120 FILM
FOR HIGH TEMPERATURE CAPACITORS

ULTEM™ UTF120 PEI dielectric film enables the design of lightweight, compact, high-energy-density capacitors that can store large amounts of electrical energy for long periods without significant current leakage or loss of charge at high temperatures. This technology can offer advantages for capacitor applications, beginning with excellent dielectric and insulative properties. It also maintains low heat loss at target frequencies.

The film portfolio, offering different thicknesses to help meet customers’ specific voltage requirements, exhibits stable properties through a range of temperatures (-40 °C to +150 °C) and frequency, including stable capacitance, good insulation resistance, high dielectric constant (Dk) and low dissipation factor (Df). The wide operating temperature capability of ULTEM UTF120 film based capacitors can increase reliability and can reduce or even eliminate the need for active cooling for converter applications.

ULTEM UTF120 film also provides excellent handling through metallization, capacitor winding and flattening (squashing). It can be processed on existing equipment, and has been validated with both film-foil and metalized electrodes, including flat, tapered and patterned metalized electrode designs.

KEY FEATURES & BENEFITS
- Stable high dielectric constant and dissipation factor up to 200 °C
- High breakdown strength up to 200 °C
- High temperature dimensional and mechanical stability
- Capable of passing 260 °C reflow soldering process
- Excellent metal adhesion (Al, Zn, Cu)
- Inherent flame resistance
- Available at 5, 7 and 10 µm gauges (+/- 5%), other gauges upon request
- Design and package flexibility

INDUSTRIES & APPLICATIONS
- Automotive
- Mass transportation
- Consumer electronics
- Aerospace
- DC-DC converters
- Electrical compressors
- HID lighting
- LED lighting
- LCD backlight
**COMPARATIVE DATA OF DIELECTRIC FILMS**

<table>
<thead>
<tr>
<th>Units</th>
<th>BOPP</th>
<th>PET</th>
<th>PEN</th>
<th>PPS</th>
<th>PC</th>
<th>ULTEM™ UTF120</th>
</tr>
</thead>
<tbody>
<tr>
<td>BDS 23 °C (ASTM D149)</td>
<td>V/μm</td>
<td>690</td>
<td>800</td>
<td>660</td>
<td>530</td>
<td>660</td>
</tr>
<tr>
<td>BDS 150 °C (ASTM D149)</td>
<td>V/μm</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>465</td>
<td>N/A</td>
</tr>
<tr>
<td>Dk at 1 kHz</td>
<td>2.2</td>
<td>3.3</td>
<td>3.2</td>
<td>3.0</td>
<td>2.7</td>
<td>3.1</td>
</tr>
<tr>
<td>Df at 1 kHz</td>
<td>%</td>
<td>0.0007</td>
<td>0.0040*</td>
<td>0.0040**</td>
<td>0.0005</td>
<td>0.0022</td>
</tr>
<tr>
<td>Temperature Range</td>
<td>°C</td>
<td>-55C to +105</td>
<td>-55C to +125</td>
<td>-55C to +140</td>
<td>-55C to +150</td>
<td>-55C to +125</td>
</tr>
<tr>
<td>Self-Healing 23 °C</td>
<td></td>
<td>Excellent</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Poor</td>
<td>Good</td>
</tr>
<tr>
<td>Self-Healing 150 °C</td>
<td></td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Poor</td>
<td>No</td>
</tr>
<tr>
<td>Metallization</td>
<td>Requires plasma</td>
<td>Good</td>
<td>Good</td>
<td>Moderate</td>
<td>Good</td>
<td>Good</td>
</tr>
<tr>
<td>Solder Reflow Capable 260 °C</td>
<td>Y/N</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Available Thickness</td>
<td>μm</td>
<td>~2.1</td>
<td>~0.5</td>
<td>~1.2</td>
<td>~1.2</td>
<td>~2.0</td>
</tr>
<tr>
<td>Cost</td>
<td>Low</td>
<td>Medium</td>
<td>High</td>
<td>Very High</td>
<td>Very High</td>
<td>High</td>
</tr>
<tr>
<td>Certainty of Supply</td>
<td>Excellent</td>
<td>Excellent</td>
<td>Moderate</td>
<td>Limited</td>
<td>Very Limited</td>
<td>Excellent/Moderate</td>
</tr>
</tbody>
</table>

**Comments:**
- **Excellent low temperature performance. Limited temperature capability.**
- **Df climbs exponentially beyond Tg (92 °C).**
- **Df climbs exponentially beyond Tg (120 °C), similar to PET.**
- **Poor self-healing. Often requires monomer coating to enhance self-healing. Limited availability.**
- **Limited quantity of film available. Max. continuous use temperature 125 °C.**
- **Good balance of properties. Other gauge films under development.**

**Overall Performance at 150 °C**
- None
- None
- Poor
- Moderate
- None
- Good

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