POLYMER CAPACITORS
Speed up your Design – The next Stage of Low ESR

- High Miniaturization Potential
- No DC Bias Effect & No Voltage Derating
- No Capacitance Drift
- Long Lifetime & High Reliability

OS-CON
High Ripple Current Rating

Hybrid
High Voltage

POS-CAP
Small Case Sizes

SP-Cap
Super Low ESR (3 mΩ)

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**LOW ESR SAVES SPACE AND COST, REDUCES DESIGN COMPLEXITY**

Polymer Capacitors have excellent frequency characteristics. Thanks to their ultra-low ESR values, polymer capacitors exhibit low impedance near their resonance point which reduces AC ripple in power circuits. Polymer capacitors are also very stable, showing no capacitance drift over temperature and no DC bias - this stability simplifies the design process. Polymer Capacitors are very efficient, so they are available in very small case sizes, which significantly contributes to a compact design and cost saving.

**FEATURES**

<table>
<thead>
<tr>
<th>POLYMER</th>
<th>MLCC</th>
<th>MnO2 Tantal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ripple Current</td>
<td>medium</td>
<td>high</td>
</tr>
<tr>
<td>ESR</td>
<td>medium</td>
<td>low</td>
</tr>
<tr>
<td>Voltage Derating</td>
<td>no</td>
<td>low</td>
</tr>
<tr>
<td>Capacitance (against DC Bias)</td>
<td>stable</td>
<td>stable</td>
</tr>
<tr>
<td>Capacitance (against Temperature)</td>
<td>decrease</td>
<td>stable</td>
</tr>
<tr>
<td>Estimated Lifetime</td>
<td>limited</td>
<td>long</td>
</tr>
<tr>
<td>Typical Lifetime (at 85°C)</td>
<td>5-7 years</td>
<td>10 years</td>
</tr>
<tr>
<td>Lifetime Calculation Formulator</td>
<td>10°C reduction → 2x lifetime</td>
<td>10°C reduction → 2x lifetime</td>
</tr>
<tr>
<td>Initial Leakage Current</td>
<td>low</td>
<td>low</td>
</tr>
<tr>
<td>ex.: Input, 28V line, 100kHz capacitor requirements: 35V, 22uF, 2Arms ripple</td>
<td>2pcs Ø10x10.2mm</td>
<td>1pc Ø6x3.7mm</td>
</tr>
</tbody>
</table>

* SP-Cap, POSCAP, OS-CON

**POLYMER CAPACITORS FOR DEMANDING APPLICATIONS**

**POLYMER**

- **High Ripple Current - High Capacitance**
  - Voltage Range: 2 to 100 VDC
  - Capacitance Range: 4.4 to 2700 μF
  - Temperature Range: -55°C/+125°C
  - Endurance: 2000h@125°C
  - ESR: Down to 5 mΩ
  - Ripple Current: up to 7.2 Arms
  - Size: Ø 4 mm to 10 mm
  - Height: 4.4 mm to 13 mm

- **High Temperature - Low Leakage Current**
  - Voltage Range: 25 to 80 VDC
  - Capacitance Range: 10 to 470 μF
  - Temperature Range: -55°C/+145°C
  - Endurance: 2000h@145°C
  - ESR: Down to 20 mΩ
  - Ripple Current: up to 2.8 Arms
  - Size: Ø 5 mm to Ø 10 mm
  - Height: 5.8 mm to 10.2 mm

**SP-Cap**

- **Super Low ESR - Low Profile - No Voltage Derating - No Ignition**
  - Voltage Range: 2 to 35 VDC
  - Capacitance Range: 2.2 to 560 μF
  - Temperature Range: -40°C/+125°C
  - Endurance: 1000h@125°C
  - ESR: Down to 3 mΩ
  - Ripple Current: up to 10.2 Arms
  - Size (L x W): 7.3 x 4.3 mm
  - Height: 0.9 mm to 2.4 mm

**POSIGN**

- **Small Case Sizes - High Capacitance - No Voltage Derating - No Ignition**
  - Voltage Range: 2 to 35 VDC
  - Capacitance Range: 2.7 to 1500 μF
  - Temperature Range: -55°C/+125°C
  - Endurance: 1000h@125°C
  - ESR: Down to 5 mΩ
  - Ripple Current: up to 6.2 Arms
  - Size (L x W): 2.0 x 1.25 mm to 7.3 x 4.3 mm
  - Height: 0.9 mm to 3.8 mm

* Automotive grade product available, please contact Panasonic.
**ENDURANCE**

LONG LIFETIME & HIGH RELIABILITY

<table>
<thead>
<tr>
<th>Hybrid</th>
<th>125°C / 4000 h</th>
<th>115°C →</th>
<th>8,000 h</th>
<th>0.9 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>125°C →</td>
<td>4,000 h</td>
<td>0.5 years</td>
<td></td>
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</tr>
<tr>
<td>105°C →</td>
<td>16,000 h</td>
<td>1.8 years</td>
<td></td>
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<tr>
<td>95°C →</td>
<td>32,000 h</td>
<td>3.7 years</td>
<td></td>
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<tr>
<td>85°C →</td>
<td>64,000 h</td>
<td>7.3 years</td>
<td></td>
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<tr>
<td>75°C →</td>
<td>128,000 h</td>
<td>14.6 years</td>
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<tr>
<th>OS-CON, SP-Cap, POSCAP</th>
<th>125°C / 1000 h</th>
<th>125°C →</th>
<th>1,000 h</th>
<th>0.1 years</th>
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</thead>
<tbody>
<tr>
<td>105°C →</td>
<td>10,000 h</td>
<td>1.1 years</td>
<td></td>
<td></td>
</tr>
<tr>
<td>85°C →</td>
<td>100,000 h</td>
<td>11.4 years</td>
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Arrhenius formula
10°C temperature reduction, lifetime is 2x longer

\[ L_x = L_o \times 2^{\frac{T_o - T_x}{10}} \]

20°C temperature reduction, lifetime is 10x longer

\[ L_x = L_o \times 10^{\frac{T_o - T_x}{20}} \]

The above are reference examples. For detailed lifetime calculation, please contact Panasonic.

ANTIS-VIBRATION SMD HYBRID & LYDIC CAPACITORS

ANTIS-VIBRATION FEATURES

> Excellent Anti-Vibration Performance
  withstands 30G

> Drop-shock resistant
  No significant change when dropped from a height of 1.2 m

> Available for all SMD Hybrid & Lytic Capacitor
  series with ≥ Ø 6mm

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Panasonic

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