# Feedthru 0805/1206 Capacitors

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Feedthru 0805/1206 Capacitors
W2F/W3F Series

GENERAL DESCRIPTION
Available in both a standard 0805 and 1206 size, AVX's line of feedthru capacitors are ideal choices for EMI suppression, broadband I/O filtering, or Vcc power line conditioning. The unique construction of a feedthru capacitor provides low parallel inductance and offers excellent decoupling capability for all high di/dt environments and provides significant noise reduction in digital circuits to <5 GHz. A large range of capacitor values are available in either NP0 or X7R ceramic dielectrics.

CAPACITOR VALUES

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Size</th>
<th>Voltage</th>
<th>Dielectric</th>
<th>Capacitance</th>
</tr>
</thead>
<tbody>
<tr>
<td>W2F11A 220 8ATxx</td>
<td>0805</td>
<td>100V</td>
<td>NP0</td>
<td>22pF</td>
</tr>
<tr>
<td>W2F11A 470 8ATxx</td>
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<td>0805</td>
<td>100V</td>
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<td>470pF</td>
</tr>
<tr>
<td>W2F15C 102 8ATxx</td>
<td>0805</td>
<td>50V</td>
<td>X7R</td>
<td>1000pF</td>
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<tr>
<td>W2F15C 222 8ATxx</td>
<td>0805</td>
<td>50V</td>
<td>X7R</td>
<td>2200pF</td>
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<tr>
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<td>50V</td>
<td>X7R</td>
<td>4700pF</td>
</tr>
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<td>50V</td>
<td>X7R</td>
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</table>

PERFORMANCE CHARACTERISTICS

<table>
<thead>
<tr>
<th>Capacitance Tolerance</th>
<th>NP0</th>
<th>X7R</th>
</tr>
</thead>
<tbody>
<tr>
<td>+50%, -20%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>+50%, -20%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Voltage Rating
100V
50V

Current Rating
300mA
300mA

Insulation Resistance
1000MΩ
1000MΩ

DC Resistance
<0.6Ω
<0.6Ω

Operating Temperature Range
-55 to +125°C

HOW TO ORDER

*Note: NP0 available in 100V only and X7R available in 50V only.
Feedthru 0805/1206 Capacitors
W2F/W3F Series

**DIMENSIONS**

<table>
<thead>
<tr>
<th></th>
<th>L (in.)</th>
<th>W (in.)</th>
<th>T (in.)</th>
<th>BW (in.)</th>
<th>BL (in.)</th>
<th>EW (in.)</th>
<th>X (in.)</th>
<th>S (in.)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>0805 MM</strong></td>
<td>2.01 ± 0.20 (0.079 ± 0.008)</td>
<td>1.25 ± 0.20 (0.049 ± 0.008)</td>
<td>1.14 Max. (0.045 Max.)</td>
<td>0.46 ± 0.10 (0.018 ±0.004)</td>
<td>0.18 + 0.25 -0.08 (0.007 + 0.010 -0.003)</td>
<td>0.25 ± 0.13 (0.010 ± 0.005)</td>
<td>1.02 ± 0.10 (0.040 ± 0.004)</td>
<td>0.23 ± 0.15 (0.009 ± 0.006)</td>
</tr>
<tr>
<td><strong>1206 MM</strong></td>
<td>3.20 ± 0.20 (0.126 ± 0.008)</td>
<td>1.60 ± 0.20 (0.063 ± 0.008)</td>
<td>1.27 Max. (0.050 Max.)</td>
<td>0.89 ± 0.10 (0.035 ± 0.004)</td>
<td>0.18 + 0.25 -0.08 (0.007 + 0.010 -0.003)</td>
<td>0.38 ± 0.18 (0.015 ± 0.007)</td>
<td>1.60 ± 0.10 (0.063 ± 0.004)</td>
<td>0.46 ± 0.15 (0.018 ± 0.006)</td>
</tr>
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</table>

**RECOMMENDED SOLDER PAD LAYOUT (TYPICAL DIMENSIONS)**

<table>
<thead>
<tr>
<th></th>
<th>T (in.)</th>
<th>P (in.)</th>
<th>S (in.)</th>
<th>W (in.)</th>
<th>L (in.)</th>
<th>C (in.)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>0805 MM</strong></td>
<td>3.46 (0.136)</td>
<td>0.51 (0.020)</td>
<td>0.76 (0.030)</td>
<td>1.27 (0.050)</td>
<td>1.02 (0.040)</td>
<td>0.46 (0.018)</td>
</tr>
<tr>
<td><strong>1206 MM</strong></td>
<td>4.54 (0.179)</td>
<td>0.94 (0.037)</td>
<td>1.02 (0.040)</td>
<td>1.65 (0.065)</td>
<td>1.09 (0.043)</td>
<td>0.71 (0.028)</td>
</tr>
</tbody>
</table>

**TYPICAL FEEDTHRU CHIP CAP CONNECTION**

- **Feedthru Chip Component Model**
  - Vcc or Signal In - Ground
  - Vcc or Signal Out

- **Physical Layout - A**
  - Signal In - Ground
  - Signal Out

- **Physical Layout - B**
  - Vcc - Ground

The terminals are connected internally side to side. Left side and right side are connected and front and back are connected internally. For Decoupling, the chip is usually surrounded by four vias, two for Vcc and two for GND. For Signal Filtering, the in and out lines need to be separated on the circuit board.
PERFORMANCE CHARACTERISTICS

0805 - dB vs. Frequency
NP0

X7R

1206 - dB vs. Frequency
NP0

X7R
PERFORMANCE CHARACTERISTICS

0805 NP0
Current vs. Temperature

0805 X7R
Current vs. Temperature

1206 NP0
Current vs. Temperature

1206 X7R
Current vs. Temperature
High Current Feedthru Capacitors
W2H/W3H Series

GENERAL DESCRIPTION
High current feedthru capacitors are designed as a broadband EMI filter that is specially designed to have high current handling capability. These SMT feedthru filters offer an optimized frequency response with high attenuation across a wide RF spectrum due to optimized parallel and series inductances. These W2H/W3H feedthru filters can actually replace discrete L/C filter networks.

FEATURES
• Low parallel inductance provides significant noise reduction in circuits with operating frequencies up to 5GHz
• Broad frequency response with high attenuation
• High rated current – up to 2A for 0805 and up to 5A for 0612
• Small size – 0805 and 0612 case size
• Reeling in accordance with EIA-481

HOW TO ORDER

<table>
<thead>
<tr>
<th>W2H1</th>
<th>Size &amp; Style</th>
<th>Voltage</th>
<th>Dielectric</th>
<th>Capacitance Code</th>
<th>Capacitance Tolerance</th>
<th>Failure Rate</th>
<th>Terminations</th>
<th>Packaging</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>W2H1=0805</td>
<td>3=25v</td>
<td>A=NP0</td>
<td>Code</td>
<td>8=+50/-20%</td>
<td>A=Not Applicable</td>
<td>T=Plated Ni And Sn</td>
<td>1A=7&quot; Reel 4000 pcs</td>
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<tr>
<td></td>
<td>W3H1=0612</td>
<td>5=50v</td>
<td>C=X7R</td>
<td></td>
<td>M=±20%</td>
<td></td>
<td></td>
<td>3A=13&quot; Reel 4000 pcs</td>
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<tr>
<td></td>
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<td>1=100v</td>
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</table>

TYPICAL APPLICATIONS
• High current power (Vcc) lines
• PA decoupling
• DC-DC converters
• Regulators
• Power supervisory circuits

MECHANICAL CHARACTERISTICS
• Available in EIA 0805 and 0612 cases
• Plated Tin over Nickel Barrier
• Packaged in Tape & Reel

PINOUT CONFIGURATION

W2H1 – 0805 Style

W3H1 – 0612 Style
# High Current Feedthru Capacitors

## W2H/W3H Series

### ELECTRICAL PARAMETERS

<table>
<thead>
<tr>
<th>Insulation Resistance</th>
<th>1000 mOhms Minimum</th>
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<tbody>
<tr>
<td>DC Resistance</td>
<td>&lt;150 mOhms</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>-55°C to +125°C</td>
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</table>

### CAPACITOR VALUES

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Size</th>
<th>Dielectric</th>
<th>Capacitance</th>
<th>Tolerance</th>
<th>Voltage</th>
<th>Current</th>
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<tbody>
<tr>
<td>W2H13C 104 8AT</td>
<td>0805</td>
<td>X7R</td>
<td>100,000pF</td>
<td>+50%, -20%</td>
<td>25V</td>
<td>2A</td>
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<td>W2H15C 473 8AT</td>
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<td>X7R</td>
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<td>+50%, -20%</td>
<td>50V</td>
<td>2A</td>
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<tr>
<td>W2H15C 223 8AT</td>
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<td>X7R</td>
<td>22,000pF</td>
<td>+50%, -20%</td>
<td>50V</td>
<td>1A</td>
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<td>X7R</td>
<td>10,000pF</td>
<td>+50%, -20%</td>
<td>50V</td>
<td>1A</td>
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<td>W2H15C 102 8AT</td>
<td>0805</td>
<td>X7R</td>
<td>1,000pF</td>
<td>+50%, -20%</td>
<td>50V</td>
<td>1A</td>
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<tr>
<td>W2H11A 471 8AT</td>
<td>0805</td>
<td>NP0</td>
<td>470pF</td>
<td>+50%, -20%</td>
<td>100V</td>
<td>0.5A</td>
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<tr>
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<td>0805</td>
<td>NP0</td>
<td>220pF</td>
<td>+50%, -20%</td>
<td>100V</td>
<td>0.5A</td>
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<tr>
<td>W2H11A 101 8AT</td>
<td>0805</td>
<td>NP0</td>
<td>100pF</td>
<td>+50%, -20%</td>
<td>100V</td>
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<td>W2H11A 470 8AT</td>
<td>0805</td>
<td>NP0</td>
<td>47pF</td>
<td>+50%, -20%</td>
<td>100V</td>
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</tr>
<tr>
<td>W2H11A 220 8AT</td>
<td>0805</td>
<td>NP0</td>
<td>22pF</td>
<td>+50%, -20%</td>
<td>100V</td>
<td>0.5A</td>
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<tr>
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<td>X7R</td>
<td>47,000pF</td>
<td>+50%, -20%</td>
<td>50V</td>
<td>up to 5A</td>
</tr>
<tr>
<td>W3H15C 223 8AT</td>
<td>0612</td>
<td>X7R</td>
<td>22,000pF</td>
<td>+50%, -20%</td>
<td>50V</td>
<td>up to 4A</td>
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<td>+50%, -20%</td>
<td>50V</td>
<td>up to 3A</td>
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<tr>
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<td>NP0</td>
<td>470pF</td>
<td>+50%, -20%</td>
<td>100V</td>
<td>up to 4A</td>
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<td>+50%, -20%</td>
<td>100V</td>
<td>up to 3A</td>
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</tbody>
</table>
High Current Feedthru Capacitors
W2H/W3H Series

PHYSICAL DIMENSIONS AND PAD LAYOUT

W2H1 – 0805 Style

W3H1 – 0612 Style

PHYSICAL DIMENSIONS

<table>
<thead>
<tr>
<th></th>
<th>L</th>
<th>W</th>
<th>T</th>
<th>BW</th>
<th>BL</th>
<th>ES</th>
<th>EW</th>
<th>X</th>
<th>S</th>
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<tr>
<td>W2H1– 0805 MM</td>
<td>2.01 ± 0.20</td>
<td>1.25 ± 0.20</td>
<td>1.14 Max.</td>
<td>0.46 ± 0.10</td>
<td>0.18 + 0.25 -0.08</td>
<td>NA</td>
<td>0.25 ± 0.13</td>
<td>1.02 ± 0.10</td>
<td>0.23 ± 0.05</td>
</tr>
<tr>
<td></td>
<td>(0.079 ± 0.008)</td>
<td>(0.049 ± 0.008)</td>
<td>(0.048 Max.)</td>
<td>(0.018 ±0.004)</td>
<td>(0.007 + 0.010 -0.003)</td>
<td></td>
<td>(0.010 ± 0.005)</td>
<td>(0.040 ± 0.004)</td>
<td>(0.009 ± 0.002)</td>
</tr>
<tr>
<td>W3H1– 0612 MM</td>
<td>1.80 ± 0.20</td>
<td>3.20 ± 0.20</td>
<td>1.22 Max.</td>
<td>2.80 ± .127</td>
<td>0.16 + 0.25 -0.08</td>
<td>0.41 ± 0.10</td>
<td>0.41 ± 0.10</td>
<td>1.60 ± 0.10</td>
<td>1.40 ± 0.07</td>
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<tr>
<td></td>
<td>(0.063 ± 0.008)</td>
<td>(0.126 ± 0.008)</td>
<td>(0.110 ± 0.005)</td>
<td>(0.110 ± 0.005)</td>
<td>(0.007 + 0.010 -0.003)</td>
<td>(0.016 ± 0.004)</td>
<td>(0.016 ± 0.004)</td>
<td>(0.063 ± 0.004)</td>
<td>(0.055 ± 0.003)</td>
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PAD DIMENSIONS

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<th>P</th>
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<th>W</th>
<th>L</th>
<th>C</th>
<th>X</th>
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<td>W2H1– 0805 MM</td>
<td>3.45</td>
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<td>0.76</td>
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<td>1.02</td>
<td>0.46</td>
<td>NA</td>
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<tr>
<td></td>
<td>(0.136)</td>
<td>(0.020)</td>
<td>(0.030)</td>
<td>(0.050)</td>
<td>(0.040)</td>
<td>(0.018)</td>
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<td>W3H1– 0612 MM</td>
<td>2.54</td>
<td>3.05</td>
<td>1.12</td>
<td>0.60</td>
<td>0.10</td>
<td>0.33</td>
<td>0.710</td>
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<tr>
<td></td>
<td>(0.100)</td>
<td>(0.120)</td>
<td>(0.044)</td>
<td>(0.018)</td>
<td>(0.024)</td>
<td>(0.013)</td>
<td>(0.028)</td>
</tr>
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</table>
TYPICAL S21 PERFORMANCE

0805 NP0

0805 X7R

0612 NP0

0612 X7R
Feedthru 0805/1206 Capacitors
W3F4 Series - 4 Element 1206 Feedthru Array

GENERAL DESCRIPTION
The Feedthru Capacitor Array contains four elements with a common ground connection. This makes them an ideal choice for Multi-line designs needing EMI suppression, broadband I/O filtering or Vcc power line conditioning. Additional benefits are reduced component count and PCB space savings. The unique construction provides low parallel inductance and offers excellent decoupling capability for all high di/dt environments. It provides significant noise reduction in digital circuits to <5 GHz. A number of capacitor values are available in NP0 and X7R ceramic dielectrics.

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<th>Size</th>
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<th>Capacitance</th>
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<tbody>
<tr>
<td>W3F41A 220 8ATxx</td>
<td>1206</td>
<td>100V</td>
<td>NP0</td>
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<td>W3F41A 470 8ATxx</td>
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<td>X7R</td>
<td>470pF</td>
</tr>
</tbody>
</table>

PERFORMANCE CHARACTERISTICS

<table>
<thead>
<tr>
<th>Capacitor Values</th>
<th>NP0</th>
<th>X7R</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacitance Tolerance</td>
<td>+50%, -20%</td>
<td>+50%, -20%</td>
</tr>
<tr>
<td>Voltage Rating</td>
<td>100V</td>
<td>50V</td>
</tr>
<tr>
<td>Current Rating</td>
<td>300mA</td>
<td>300mA</td>
</tr>
<tr>
<td>Insulation Resistance</td>
<td>1000MΩ</td>
<td>1000MΩ</td>
</tr>
<tr>
<td>DC Resistance</td>
<td>&lt;0.6Ω</td>
<td>&lt;0.6Ω</td>
</tr>
<tr>
<td>Operating Temperature Range</td>
<td>-55 to +125°C</td>
<td></td>
</tr>
</tbody>
</table>

HOW TO ORDER

<table>
<thead>
<tr>
<th>W</th>
<th>3</th>
<th>F</th>
<th>4</th>
<th>5</th>
<th>C</th>
<th>223</th>
<th>8</th>
<th>A</th>
<th>T</th>
<th>3</th>
<th>A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Style</td>
<td>Size</td>
<td>Feedthru</td>
<td>Number of Elements</td>
<td>Voltage*</td>
<td>Dielectric</td>
<td>Capacitance Code</td>
<td>Capacitance Tolerance</td>
<td>Failure Rate</td>
<td>Terminations</td>
<td>Packaging Code (Reel Size)</td>
<td>Quantity Code</td>
</tr>
<tr>
<td>2=0805</td>
<td>3=1206</td>
<td>1=100v</td>
<td>5=50v</td>
<td>A=NP0, C=X7R</td>
<td>8=+50/-20%</td>
<td>A=Not Applicable</td>
<td>T=Plated</td>
<td>1=7&quot; Reel</td>
<td>Embossed Tape</td>
<td>3=13&quot; Reel</td>
<td>Embossed Tape</td>
</tr>
</tbody>
</table>

*Note: NP0 available in 100V only and X7R available in 50V only.
Feedthru 0805/1206 Capacitors

W3F4 Series - 4 Element 1206 Feedthru Array

DIMENSIONS

<table>
<thead>
<tr>
<th>L</th>
<th>W</th>
<th>T</th>
<th>BW</th>
<th>BL</th>
<th>P</th>
<th>X</th>
<th>S</th>
<th>ES</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.25±0.15</td>
<td>1.60±0.20</td>
<td>1.22 max</td>
<td>0.41±0.10</td>
<td>0.18 ref.</td>
<td>0.76 ref.</td>
<td>1.14±0.10</td>
<td>0.38±0.10</td>
<td>0.41±0.10</td>
</tr>
<tr>
<td>(0.128±0.006)</td>
<td>(0.063±0.008)</td>
<td>(0.048 max)</td>
<td>(0.016±0.004)</td>
<td>(0.007±0.003)</td>
<td>(0.030 ref.)</td>
<td>(0.045±0.004)</td>
<td>(0.015±0.004)</td>
<td>(0.016±0.004)</td>
</tr>
</tbody>
</table>

PAD LAYOUT DIMENSIONS

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>mm</td>
<td>0.6</td>
<td>1.6</td>
<td>2.2</td>
<td>0.35</td>
<td>0.76</td>
</tr>
<tr>
<td>Inches</td>
<td>(0.024)</td>
<td>(0.064)</td>
<td>(0.088)</td>
<td>(0.014)</td>
<td>(0.030)</td>
</tr>
</tbody>
</table>
PERFORMANCE CHARACTERISTICS

S21 vs. Frequency
NP0 4 Element Feedthru

S21 vs. Frequency
X7R 4 Element Feedthru
Applications

APPLICATIONS
EMI Suppression
Broadband I/O Filtering
Vcc Line Conditioning

FEATURES
Standard EIA Sizes
Broad Frequency Response
Low ESR
8 mm Tape and Reel

MARKET SEGMENTS
Computers
Automotive
Power Supplies
Multimedia Add-On Cards
Bar Code Scanners and Remote Terminals
PCMCIA Cards
Medical Instrumentation
Test Equipment
Transceivers/Cell Phones

Typical Circuits Requiring EMI Filtering

THE FOLLOWING APPLICATIONS AND SCHEMATIC DIAGRAMS SHOW WHERE FEEDTHRU CAPACITORS MIGHT BE USED FOR EMI SUPPRESSION

- Digital to RF Interface Filtering
- Voltage Conditioning in RF Amplifiers
- Power Decoupling GaAs FET Transistor Preamplifier
- Vcc Line Filtering on Frequency Control Circuit
- Clock, Data, Control Line High Frequency Decoupling (Frequency Synthesizer)
  (SEE APPLICATION NOTES)

DIGITAL TO RF INTERFACE FILTERING
VOLTAGE CONDITIONING IN RF AMPLIFIERS

POWER DECOUPLING GaAs FET TRANSISTOR PREAMPLIFIER

Vcc LINE FILTERING ON FREQUENCY CONTROL CIRCUIT

6-6.35 MHz VFO
**Applications**

**VCC Filtering**

- **W2H15C2238AT1A**
- **VC121018J390**
- TransGuard

**Dual Power Switch Filtering**

- **3.3V**
- **5V**
- **3V_IN**
- **5V_IN**
- **PCMCIA Card**
- **I/O Bus Controller**

**PA Filtering**

- **W2H15C1048AT1A**
- **W2H15C1038AT1A**
- **VC120630D650**
- TransGuard

**Regulator Filtering**

- **IN**
- **W3H15C4738AT1A**
- **OUT**
- **RF OUT**
EMI REDUCTION THROUGH THE USE OF SMT FEEDTHRU CAPACITORS

ABSTRACT

Today’s high speed, miniaturized semiconductors have made EMI issues a key design consideration. This paper briefly defines EMI and illustrates the capability of SMT feedthru capacitors.

WHAT IS EMI?

The term EMI stands for Electromagnetic Interference and refers to signals/energy interfering with a circuit or systems functions.

In an electronic system, two classes of energy are generated - wanted and unwanted. Both are potential sources of EMI\(^1\). Wanted signals such as clocks and bus lines could cause EMI if they were not decoupled, terminated or filtered properly. Unwanted signals (cell phones, police radios, power supply noise, etc.) could be conducted or radiated into the circuit due to poor circuit layout, improper decoupling or a lack of high frequency filtering.

In either type of EMI signal interference, the system could be rendered useless or put into a state which would cause early failure of its semiconductors. Even worse, the unwanted energy could cause an incorrect answer to be generated from a computer by randomly powering a gate up or down.

From all of this we can gather that EMI is a complex problem, usually with no one solution. EMI interference can be a random single shot noise (like a SCR firing) or repetitive in nature (stepper motor or relay noise). The interference can enter into our designs either by being induced by E/B fields, or it can be conducted through control lines or a communication bus. EMI can even be self generated by internal components that generate steep risetime waveforms of voltage or current.

HOW CAN EMI BE CONTROLLED?

EMI is most efficiently controlled by realizing it to be a design parameter in the earliest stages of the design. This way, the board layout can be optimized with large power and ground planes which will be low impedance in nature. The use of SMT feedthru filters will yield optimal results.

SMT FEEDTHRU CAPACITORS

AVX introduced feedthru capacitors to supply a broadband EMI filter capacitor for source suppression and receiver noise reduction.

SMT feedthru capacitors use the same material systems as standard ceramic capacitors. They exhibit the same reliabi-

\(^1\)Practical Design for Electromagnetic Compatibility edited by Rocco F. Ficchi
Hayden Book Company 1978
Feedthru 0805/1206 Capacitors
W2F/W3F/W3F4 Series

SMT FEEDTHRU CAPACITOR TERMINOLOGY
AVX’s feedthru capacitors have additional technical terminologies relative to standard ceramic capacitors. The reason for this is due to the series manner in which the feedthru element is connected to the circuit.

The most important term is DC Resistance. The DC resistance of the feedthru is specified since it causes a minor signal attenuation which designers can calculate by knowing the maximum resistance of the part.

The maximum current capability of the part is also of interest to designers since the feedthru may be placed in series with the voltage line.

APPLICATION AND SELECTION OF SMT FEEDTHRU CAPACITOR FILTERS
EMI suppression and receiver noise reduction can be achieved most effectively with efficient filtering methods. Attenuations of over 100 dB are achievable depending on the complexity and size of the filters involved.

However, before filtering is discussed, another EMI reduction method is noise limiting, using a series element (inductors or resistors). This method is easy to implement and inexpensive. The problem it poses is that it can only reduce noise by -3 to -10 dB. Because of that, series element EMI reduction is primarily used where there is a poor ground.

SMT feedthru filter capacitors can actually replace discrete L/C filter networks (depending on the frequency response needed). The SMT filter capacitors should first be chosen for its specific frequency response. Then the voltage rating, DCR, and current capability must be evaluated for circuit suitability. If there is not a match on voltage, current and DC resistance ratings, the designer must select the closest available frequency response available on parts that will meet the design’s power spec.

The top 5 applications for SMT feedthru filter capacitors are:

1. Digital to RF interface filtering.
2. Control line high frequency decoupling.
3. Data and clock high frequency decoupling.
4. Power line high frequency decoupling.
5. High gain and RF amplifier filtering.
A typical example of data, clock control line and power line filtering is shown below:

**Clock, Data, Control Line High Frequency Decoupling**

*Frequency Synthesizer*

CONCLUSION

EMI problems will continue to play a large role in designers priorities. AVX SMT feedthru filters are an easy way to achieve broad band EMI reduction in a small SMT package. SMT feedthru filters can help reduce cost designs by eliminating some types of L/C filters, increasing system reliability and saving valuable PCB area. SMT feedthru filters are offered in both 0805, 1206 single element packages or in 1206 four element packages.

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