Amphenol
Filtered
Connectors

Filtered ARINC Connectors
Filtered MIL-C-24308 Connectors
Discrete Filters
Filter Plates
Filter Terminal Blocks

Amphenol
Amphenol Canada Corp.
an ISO 9001 company
About The Company

Amphenol Canada, a subsidiary of Amphenol Corporation, is an international leader in the manufacture of filter connectors and has been pioneering EMI and EMP technologies for more than 40 years.

Located in Toronto, Canada, our modern 60,000 sq. ft. facility employs approximately 250 people, and is dedicated to the manufacture of filter connectors. We design, develop and manufacture EMI and EMP filter connectors which are used worldwide in Military, Aerospace, Communication and Commercial applications. Our products are unique, offering stress-isolated, solderless technology in tubular, planar, and chip capacitor designs.

Amphenol Canada is vertically integrated and, with the exception of diodes, has the capability of manufacturing all elements of our filter connectors. We also have the support of other Amphenol divisions in an integrated working relationship as one of the largest connector manufacturing companies in the world.

Our expertise in understanding and supporting our customers’ filter interconnect needs has earned us a reputation of quality and excellence among the world’s leading users of electronic components.
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Advantages of Filter Connectors

The integration of the filter elements into the connector, rather than a board level solution, results in many advantages to the user:

- reduction in space and weight
- reduction in inspection and assembly labour
- improved high frequency EMI performance by elimination of parasitic effects associated with board level filters
- superior shielding effectiveness

Filter Connector Design

Filter connectors have been used for over thirty years to provide cost and space effective solutions to EMI problems in a wide range of military and commercial applications including avionics systems, satellites, missiles, communications, control systems and tempest equipment. A low pass filter connector incorporates capacitors and ferrite inductors into the connector body. The two capacitor types commonly used in filter connectors for military or avionics applications are planar arrays and tubular capacitors. Each of these capacitor types is an efficient filter at high frequencies (>1 GHz) and has been proven to be extremely reliable when suitably assembled into a connector. Both planar and tubular designs feature Amphenol’s unique solderless construction which reduces stress on the ceramic elements and results in superior physical and thermal shock capabilities.

Planar Array

Amphenol Canada’s planar design consists of planar ceramic capacitor arrays and discrete ferrite inductors assembled concentrically over the contacts and into the connector shell. The planars are compressed between rubber gaskets and have contact springs in each position which form a stress isolated connection with the contact body. The planars are grounded to the shell via a ground spring.

Tubular Capacitor

Amphenol Canada’s tubular design consists of a ferrite bead and ceramic tubular capacitor assembled onto a machined contact. The filter tube is connected to the contact with conductive rubber washers to provide a stress-isolated contact assembly. Grounding is achieved via a ground plate.
Filter Connector Selection

Selection of a particular filter circuit will depend on the required insertion loss characteristics and the system source and load impedances. By arranging the capacitive and inductive elements in a variety of combinations a number of equivalent circuits may be attained. These filter types are available in a wide range of capacitance and voltage values and may be selected in virtually any combination within the connector insert. In addition to filter contacts, insulated contacts, ground contacts and sealing plugs are available.

<table>
<thead>
<tr>
<th>Filter Circuit</th>
<th>Best Filtering Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>PI</td>
<td>Unknown or medium source and load impedance</td>
</tr>
<tr>
<td>LRC</td>
<td>Low source and high load impedance</td>
</tr>
<tr>
<td>CLR</td>
<td>High source and low load impedance</td>
</tr>
<tr>
<td>C</td>
<td>High source and high load impedance</td>
</tr>
<tr>
<td>T</td>
<td>Low source and low load impedance</td>
</tr>
</tbody>
</table>

The following factors may affect the filter performance, and should be considered when selecting a filter connector:

**Operating Voltage**

As a DC voltage is applied across a capacitor, the dielectric constant decreases resulting in a capacitance decrease and a reduction in filter performance. The magnitude of the change is dependant upon the type of ceramic material used, the dielectric thickness and the magnitude of the voltage applied.

**Operating Temperature Range**

Capacitance and insertion loss performance are shown at 25°C. Depending on the type of ceramic material being used, capacitance can drop by up to 80% at temperature extremes. However, commonly used dielectrics have temperature coefficients of +/- 15% from -55°C to +125°C.

**Operating Currents**

Operating currents cause magnetic saturation of inductive elements (ferrites). Therefore filters with ferrite inductors (Pi, CLR, LRC and T) will perform much like C filters as the ferrite approaches saturation.

**Transient Voltage Requirements**

Some transient voltage requirements may necessitate the addition of diodes or MOV's to the PCB or in the connector.
485 Series Introduction and Design Features

The Amphenol 485 series is a range of filtered ARINC 404 and 600 rack and panel connectors designed to provide space and cost-effective solutions to EMC compliance issues in avionics products. Amphenol's filtered ARINC connectors are used extensively on Boeing, McDonnell Douglas and Airbus avionics equipment and a wide range of other military and commercial applications. The majority of the Amphenol filtered ARINC connector designs incorporate planar capacitor array technology in a solderless, stress-isolated configuration. This results in superior thermal and physical shock performance and unparalleled long term reliability. These products have been extensively qualified to the requirements of ARINC 600-9 and MIL-C-81659 and there are numerous qualification test reports available for review.

Front Removable Socket Contact Stability

One significant feature of the Amphenol filtered ARINC connector is the ability to remove the front socket contact. This is an important design feature as the size 22D socket contacts in ARINC 404 and 600 connectors are exposed and therefore susceptible to damage. This is one of the most common in-service problems of standard ARINC connectors. A front removable socket contact avoids the potential cost and inconvenience of removing the connector from the avionics box and results in long term improvements in maintainability and reduction in life cycle costs. It is important that the front removable socket be designed such that the contact is mechanically stable and properly positioned to meet the connector interface and mating specifications. The Amphenol design provides for excellent true position location and contact stability by virtue of the solderless design. The Amphenol contact is stabilized at the front by a plastic stabilization insert, through the length of the connector and at the rear engagement area. This approach provides for the best possible contact location and stability and is further augmented by the use of an environmental seal at the connector mating interface.
Machined aluminum alloy shell per QQ-A-225, plated in accordance with
1. Electroless nickel per MIL-C-26074
2. Cadmium per QQ-P-416 with yellow or clear chromate finish

Beryllium copper EMI grounding spring

Fixed rear termination contact

Ferrite inductor

Beryllium copper contact spring, gold plated per MIL-G-45204

Sealing and stress isolating elastomeric gaskets

Monolithic planar capacitor array

Silicone rubber interfacial seal

High temperature dielectric insert, glass-filled polyethersulfone thermoplastic per MIL-P-46185

Stainless steel socket contact hood

Front removable machined copper alloy contact, gold plated per MIL-G-45204

Beryllium copper contact retention clip

Amphenol Filtered Connectors
## Electrical Characteristics

<table>
<thead>
<tr>
<th>Filter Circuit</th>
<th>PI</th>
<th>C,CLR,LRC,T</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Filter Type</strong></td>
<td><strong>PA4</strong></td>
<td><strong>P02</strong></td>
</tr>
<tr>
<td><strong>Capacitance (pF)</strong></td>
<td>400 to 800</td>
<td>1800 to 3600</td>
</tr>
<tr>
<td><strong>Insertion Loss</strong>&lt;sup&gt;+&lt;/sup&gt; (dB min.)</td>
<td>.1 MHz</td>
<td>--</td>
</tr>
<tr>
<td>(per MIL-STD-220)</td>
<td>1 MHz</td>
<td>--</td>
</tr>
<tr>
<td>at 25˚C &amp; no load</td>
<td>10 MHz</td>
<td>2</td>
</tr>
<tr>
<td>100 MHz</td>
<td>20</td>
<td>38</td>
</tr>
<tr>
<td>1000 MHz</td>
<td>58</td>
<td>60</td>
</tr>
<tr>
<td><strong>Working Voltage (VDC)</strong></td>
<td>200</td>
<td>100</td>
</tr>
<tr>
<td>(@ 25˚C &amp; sea level)</td>
<td>500</td>
<td>300</td>
</tr>
<tr>
<td><strong>Dielectric Withstanding Voltage (VDC)</strong></td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>(@ 25˚C &amp; 50 mA max. charging current)</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td><strong>Insulation Resistance (Gohms)</strong></td>
<td>#22 = 5 Amps</td>
<td>#16 = 13 Amps</td>
</tr>
<tr>
<td>(@ 25˚C &amp; working voltage)</td>
<td>#20 = 7.5 Amps</td>
<td>#12 = 23 Amps</td>
</tr>
<tr>
<td><strong>Current Rating by Contact Size</strong></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>(continuous max., DC amperes)</td>
<td>5 Amps</td>
<td></td>
</tr>
<tr>
<td><strong>Filter RF Current Rating</strong></td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>(amperes)</td>
<td>13 Amps</td>
<td></td>
</tr>
<tr>
<td>(max. @ any frequency)</td>
<td>23 Amps</td>
<td></td>
</tr>
</tbody>
</table>

**Note:** Other capacitance values, mixed capacitance arrangements, ground and insulated contacts are available. Consult the factory for your particular application.

<sup>+</sup> Acceptance testing performed to 500MHz maximum

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### Typical Insertion Loss Performance

**PI Filter**

<table>
<thead>
<tr>
<th>Frequency (MHz)</th>
<th>Insertion Loss (dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>100</td>
<td>20</td>
</tr>
<tr>
<td>1000</td>
<td>50</td>
</tr>
</tbody>
</table>

**C, CLR, LRC and T Filters**

<table>
<thead>
<tr>
<th>Frequency (MHz)</th>
<th>Insertion Loss (dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1</td>
<td>10</td>
</tr>
<tr>
<td>1.0</td>
<td>20</td>
</tr>
<tr>
<td>10</td>
<td>50</td>
</tr>
<tr>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>
ARINC 600 Style Filter Connectors
Receptacle Shell Size 1

*This dimension is for all filter styles with PCB, wire wrap or solder cup terminations. For environmental class connectors with rear release contacts, add .600” (15.24mm). Shorter length designs are available. Consult the factory for details.

Note: Size 22D contacts are supplied installed and are removable with Amphenol insertion/removal tool 485-905. Cavity C and F power contacts are packaged separately. Coax and triax contacts may be ordered separately.

† Cavity C dimension is shown unfiltered
ARINC 600 Style Filter Connectors
Receptacle Shell Size 3

MIL-C-83527 Style Filter Connectors
Receptacle Shell Size 3

* This dimension is for all filter styles with PCB, wire wrap or solder cup terminations. For environmental class connectors with rear release contacts, add .600" (15.24mm). Shorter length designs are available. Consult the factory for details.

Note: Size 22D contacts are supplied installed and are removable with Amphenol insertion/removal tool 485-905. Cavity C and F power contacts are packaged separately. Coax and triax contacts may be ordered separately.

† ARINC 600 Cavity C and F and MIL-C-83527 Cavity B and D dimensions are shown unfiltered.
ARINC 600 Insert Arrangements

Shell Size 2 or 3, Cavity A, B, D or E

- Insert 121
  - 110 #22 Contacts
  - 5 #16 Contacts
  - 6 #20 Contacts

- Insert 120T2
  - 118 #22 Contacts
  - 2 #8 Triax/Coax Contacts

- Insert 150
  - 150 #22 Contacts

- Insert 71C1
  - 70 #22 Contacts
  - 1 #1 Coax Contact

- Insert 71C1A
  - 70 #22 Contacts
  - 1 #1 Coax Contact

- Insert C2
  - 2 #1 Coax Contacts

- Insert C4
  - 4 #1 Coax Contacts

- Insert 10T10
  - 10 #8 Triax/Coax Contacts

- Insert 6T6
  - 6 #8 Twinax/Coax Contacts

- Insert 13C2
  - 4 #12 Contacts
  - 3 #16 Contacts
  - 4 #20 Contacts
  - 2 #5 Coax Contacts

- Insert 100
  - 100 #22 Contacts

- Insert 85
  - 80 #22 Contacts
  - 4 #20 Contacts
  - 1 #16 Contact

Shell Size 2 or 3, Cavity C or F

- Insert 60
  - 60 #22 Contacts

Shell Size 1

Cavity A or B

- Insert 5C2
  - 1 #12 Contact
  - 2 #16 Contacts
  - 2 #5 Coax Contacts

Cavity C

- Insert 60
  - 60 #22 Contacts

Note: Consult the factory for other insert patterns.
ARINC 404 and MIL-C-81659 Filtered Connectors
Receptacle Shell Size 1

*This dimension is for all filter styles with PCB, wire wrap or solder cup terminations. For environmental class connectors with rear release contacts, add .600" (15.24mm). Shorter length designs are available. Consult the factory for details.

Note: Size 22D contacts are supplied installed and are removable with Amphenol insertion/removal tool 485-905. Pin contacts are not removable. Coax and triax contacts may be ordered separately.
ARINC 404 and MIL-C-81659 Filtered Connectors
Receptacle Shell Size 3

*This dimension is for all filter styles with PCB, wire wrap or solder cup terminations. For environmental class connectors with rear release contacts, add .600" (15.24mm). Shorter length designs are available. Consult the factory for details.

Receptacle Shell Size 4

Note: Size 22D contacts are supplied installed and are removable with Amphenol insertion/removal tool 485-905. Pin contacts are not removable. Coax and triax contacts may be ordered separately.
ARINC 404 and MIL-C-81659 Insert Arrangements

* Various lengths are available. Consult the factory for details.

Note: Consult the factory for other insert patterns.

ARINC 404 and 600 Termination Styles

Rear Crimp Removable

Solder Cup

Printed Circuit Tail

Wire Wrap Tail*

Amphe...
Transient Suppression for Lightning and EMP Applications

Designing for Lightning Induced Transient Susceptibility

In addition to designing for control of steady state electromagnetic interference (EMI/EMC), modern avionics engineers must also design for the recent advent of much stricter requirements for immunity to lightning induced transient susceptibility. These requirements vary by equipment type and environmental area and are defined by a variety of military and commercial specifications including RTCA/DO-160 C Section 22. The nature of the transient events ranges from very low level disturbances requiring little or no protection, to high frequency and high energy events that can be disruptive or destructive to the avionics equipment.

Filter Connectors with Transient Supressors

While conventional EMI filter connectors have been shown to be effective in providing protection against low energy transients, they offer little protection from high voltage/high energy transients that may result from lightning, load switching, electrostatic discharge (ESD) or electromagnetic pulse (EMP). For those applications requiring protection of sensitive circuitry from such over-voltage events, Zener suppression diodes or MOV’s can be incorporated into the connector body in combination with EMI filtering or alone. Combining the transient suppression device into the connector provides several advantages:

• saves space and weight versus placing discrete components onto a PCB
• reduces system design time
• reduces number of components
• improves voltage clamping performance by eliminating parasitic lead resistance and inductance of board level components
• allows for retrofit of existing equipment requiring lightning or EMP hardening
• improves system repairability and maintenance logistics

Amphenol Diode Protected Connectors

The approach employed by Amphenol to incorporate diode protection into the connector body is to install a custom diode/contact assembly into an insert with a ground plate. This design provides for a 600 W device to be installed on each contact in the connector while minimizing the package size and weight. In the ARINC connector products this design still allows for easy removal and replacement of the front socket contacts. In addition, each diode is individually replaceable at the factory in the event that repair is necessary.
## Diode Contact Characteristics

<table>
<thead>
<tr>
<th>Diode Contact Designation</th>
<th>Breakdown Voltage $V_{BR}$</th>
<th>Test Current $I_T$</th>
<th>Rated Stand-off Voltage $V_{WOM}$</th>
<th>Maximum Reverse Leakage Current $I_R @ V_{WOM}$</th>
<th>Maximum Peak Reverse Clamping Voltage $V_{MAX @ I_P}$</th>
<th>Maximum Peak Pulse Current $I_{PP}$</th>
<th>Power Capability @ 1 msec Pulse</th>
</tr>
</thead>
<tbody>
<tr>
<td>485-D0068</td>
<td>6.4</td>
<td>10.8</td>
<td>1000</td>
<td>10.5</td>
<td>57.0</td>
<td>600</td>
<td></td>
</tr>
<tr>
<td>485-D0100</td>
<td>9.5</td>
<td>10.0</td>
<td>1.0</td>
<td>14.5</td>
<td>41.0</td>
<td>600</td>
<td></td>
</tr>
<tr>
<td>485-D0150</td>
<td>14.3</td>
<td>15.0</td>
<td>1.0</td>
<td>21.2</td>
<td>28.0</td>
<td>600</td>
<td></td>
</tr>
<tr>
<td>485-D0220</td>
<td>20.9</td>
<td>22.0</td>
<td>21.3</td>
<td>30.6</td>
<td>20.0</td>
<td>600</td>
<td></td>
</tr>
<tr>
<td>485-D0330</td>
<td>31.4</td>
<td>33.0</td>
<td>34.7</td>
<td>45.7</td>
<td>13.2</td>
<td>600</td>
<td></td>
</tr>
<tr>
<td>485-D0470</td>
<td>44.7</td>
<td>47.0</td>
<td>49.4</td>
<td>64.8</td>
<td>9.3</td>
<td>600</td>
<td></td>
</tr>
<tr>
<td>485-D0680</td>
<td>64.6</td>
<td>68.0</td>
<td>71.4</td>
<td>92.0</td>
<td>6.5</td>
<td>600</td>
<td></td>
</tr>
<tr>
<td>485-D1000</td>
<td>95.0</td>
<td>100.0</td>
<td>105.0</td>
<td>137.0</td>
<td>4.4</td>
<td>600</td>
<td></td>
</tr>
<tr>
<td>485-D1500</td>
<td>143.0</td>
<td>150.0</td>
<td>158.0</td>
<td>207.0</td>
<td>2.9</td>
<td>600</td>
<td></td>
</tr>
<tr>
<td>485-D2000</td>
<td>190.0</td>
<td>200.0</td>
<td>210.0</td>
<td>274.0</td>
<td>2.2</td>
<td>600</td>
<td></td>
</tr>
</tbody>
</table>

Note: Other diode contacts having different voltage and power capabilities are available. Consult the factory for additional information.

* 10 x 1000 µsec pulse
+ Available in unidirectional and bidirectional devices

## MOV Contact Characteristics

<table>
<thead>
<tr>
<th>MOV Contact Designation</th>
<th>Maximum Ratings (125°C)</th>
<th>Characteristics (25°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Continuous</td>
<td>Transient</td>
</tr>
<tr>
<td></td>
<td>RMS Voltage</td>
<td>DC Voltage</td>
</tr>
<tr>
<td></td>
<td>$V_{MAX}$ Volts</td>
<td>$V_{MIN}$ Volts</td>
</tr>
<tr>
<td>485-M-0160</td>
<td>6.0</td>
<td>8.0</td>
</tr>
<tr>
<td>485-M-0220</td>
<td>10.0</td>
<td>14.0</td>
</tr>
<tr>
<td>485-M-0390</td>
<td>25.0</td>
<td>31.0</td>
</tr>
<tr>
<td>485-M-0470</td>
<td>30.0</td>
<td>38.0</td>
</tr>
<tr>
<td>485-M-2000</td>
<td>130.0</td>
<td>130.0</td>
</tr>
<tr>
<td>485-M-2400</td>
<td>150.0</td>
<td>150.0</td>
</tr>
</tbody>
</table>

Note: Values are for size 22 contacts. Other MOV contacts are available. Consult the factory for additional information.
Termination Module

A termination module is a removable extension of the connector which is recommended for use with ARINC connectors which have transient suppression devices. The engagement side of the termination module is designed to mate to the rear of the connector and the termination end is designed to attach to the PCB or wire harness (PC tails, solder-cups, wire-wrap or crimp). Proper engagement of the connector and termination module is guaranteed by guide posts in the connector and front or rear activated jack screws. Sealing is accomplished with a rubber interfacial gasket.

Connectors designed to engage to a termination module are designed with one-piece front removable socket contacts to minimize the number of interconnects.

The use of a termination module provides several advantages:

• simplifies the assembly process by soldering to the lighter weight termination module rather than to the connector itself
• facilitates repair and rework procedures due to easy installation and removal from the motherboard
ARINC Accessories
ARINC replacement contacts can be ordered separately if required. Additional accessories such as EMI backshells and fibre optic contacts are also available. Contact the factory for details.

ARINC 600

<table>
<thead>
<tr>
<th>Contact Size</th>
<th>Contact P/N</th>
<th>Insertion/Removal tool</th>
<th>Crimp tool</th>
<th>Positioner</th>
</tr>
</thead>
<tbody>
<tr>
<td>#22 socket</td>
<td>485-1034*</td>
<td>485-905</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>#22 crimp termination</td>
<td>485-6222</td>
<td></td>
<td>M22520/2-01 or M22520/7-01</td>
<td>M22520/2-06 or M22520/7-06</td>
</tr>
<tr>
<td>#20 pin+</td>
<td>485-120</td>
<td>MB1969/1-02 or MB1969/14-10</td>
<td>M22520/2-01 or M22520/7-01</td>
<td>M22520/2-06 or M22520/7-06</td>
</tr>
<tr>
<td>#16 pin+</td>
<td>485-116</td>
<td>MB1969/1-03 or MB1969/14-03</td>
<td>M22520/1-01</td>
<td>M22520/1-02</td>
</tr>
<tr>
<td>#12 pin+</td>
<td>485-112</td>
<td>MB1969/14-04</td>
<td>M22520/1-01</td>
<td>M22520/1-11</td>
</tr>
</tbody>
</table>

ARINC 404

<table>
<thead>
<tr>
<th>Contact Size</th>
<th>Contact P/N</th>
<th>Insertion/Removal tool</th>
<th>Crimp tool</th>
<th>Positioner</th>
</tr>
</thead>
<tbody>
<tr>
<td>#22 socket</td>
<td>485-1236*</td>
<td>485-905</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>#22 crimp termination</td>
<td>485-4222</td>
<td></td>
<td>M22520/2-01 or M22520/7-01</td>
<td>M22520/2-06 or M22520/7-06</td>
</tr>
</tbody>
</table>

* Some connectors have custom socket contacts. Consult the factory for details.
+ Cavity C or F contacts

485 Series Part Numbering Information

485-6 2 R B 2 00 - 000

Series
ARINC Series
4 = ARINC 404 or MIL-C-81659
6 = ARINC 600
8 = MIL-C-83527 or EN3682

ARINC Class
1 = Unsealed
2 = Sealed

Style
A = Adapter
P = Plug
R = Receptacle

Deviation
(assigns insert arrangements, filtering and custom requirements)

Key Position
00 = N/A
01 to 99 per ARINC 600 and 404

Shell Size
1, 2, 3 or 4

Termination Styles
B = PC. Tails
S = Solder Cup
T = Crimp Removable (UTS)
W = Wire Wrap
Amphenol offers a variety of filtered D–Sub connectors to address aerospace and commercial EMI requirements. There are two products in particular which are designed for aerospace applications where high reliability and superior environmental and electrical performance are required. The 481 series of filtered D–Sub connectors has been in production for over 20 years using tubular capacitor filter technology. In the late 1980’s, Amphenol developed a planar filter capacitor version of the same connector, the 308 series. As a result, Amphenol has the widest product offering in the industry and can provide either technology as the application and production requirements dictate.

308 Series – Planar Capacitor Technology

- superior pin–pin cross talk isolation
- cost effective for small quantities
- can accommodate a wider range of capacitance values than planar designs
- fully tooled in medium density pin and selected socket and high density arrangements
- short production leadtimes
- solderless stress–isolated construction (see page 23 for details)

Quality Conformance Inspection

The 308 series connectors have been extensively qualified per the requirements of MIL–C–24308. All products shipped receive the following inspection tests:

- 100% visual and mechanical inspection
- 100% capacitance, dielectric withstanding voltage, insulation resistance and dissipation factor testing
- sample insertion loss testing (AQL 1.0%)

For high reliability applications, the following inspection tests or certifications are also available:

- thermal shock
- elevated temperature voltage conditioning
- elevated temperature insulation resistance and capacitance
- outgassing per JSC–SPR–0022 for space borne applications
- baseline and single lot date code manufacturing
- other tests as required (consult the factory)

308 Special

- Filtered D-Sub programmable
- EMI Grounded Special
- Zinc Nickel Plating
  Environmentally friendly, conductive and able to withstand up to 2000 hours of salt spray per ASTM-B1117

Please consult factory for any custom arrangements
Planar D-Sub Filter Connector Construction and Material Specifications

Copper alloy crimp barrel termination, gold plated per MIL-G-45204

Copper alloy solder cup termination, gold plated per MIL-G-45204

Monolithic planar capacitor array

Ferrite inductor

Single piece machined aluminum alloy shell per QQ-A-225, plated in accordance with
1) Electroless nickel per MIL-C-26074 or
2) Tin per MIL-T-10727 or
3) Cadmium per QQ-P-416 with clear chromate or
4) Gold per MIL-G-45204 over electroless nickel per MIL-C-26074

Beryllium copper EMI grounding spring

Beryllium copper contact springs, gold plated per MIL-G-45204

Sealing and stress isolating elastomeric gaskets (3 places)

Machined copper alloy contact, gold plated per MIL-G-45204

High temperature dielectric insert - polyethersulfone thermoplastic per MIL-P-46185
308 Series Electrical Characteristics

<table>
<thead>
<tr>
<th>Filter Circuit</th>
<th>PI</th>
<th>C, CLR, LRC, T</th>
</tr>
</thead>
<tbody>
<tr>
<td>Filter Type</td>
<td>PA4</td>
<td>P02</td>
</tr>
<tr>
<td>Capacitance (pF) (@ 25˚C, 1kHz &amp; 1.0 VRMS)</td>
<td>400 to 1800 to 8000 to 16000 to 32000</td>
<td>200 to 900 to 1800 to 3600 to 8000</td>
</tr>
<tr>
<td>Insertion Loss (dB min.)</td>
<td>.1 MHz</td>
<td>800</td>
</tr>
</tbody>
</table>

Note: Other capacitance values, mixed capacitance arrangements, ground and insulated contacts are available. Consult the factory for your particular application.† Not available in high density arrangements.

Typical Insertion Loss Performance

**PI Filter**

![PI Filter Chart](image1)

**C, CLR, LRC and T Filters**

![C, CLR, LRC and T Filters Chart](image2)
## 308 Series Plug Dimensions

- **Front View**
- **Side View**
- **Rear View**

### Dimension

<table>
<thead>
<tr>
<th>Shell Size</th>
<th>Number of Contacts</th>
<th>A ±.005&quot;</th>
<th>B Max ±.13mm</th>
<th>C ±.015&quot;</th>
<th>B Max ±.38mm</th>
<th>D Max ±.005&quot;</th>
<th>E Max ±.13mm</th>
<th>F ±.005&quot;</th>
<th>G ±.13mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>9 or 15</td>
<td>0.984</td>
<td>24.99</td>
<td>0.685</td>
<td>17.34</td>
<td>1.213</td>
<td>30.81</td>
<td>0.534</td>
<td>13.56</td>
</tr>
<tr>
<td>A</td>
<td>15 or 26</td>
<td>1.312</td>
<td>33.32</td>
<td>1.009</td>
<td>25.63</td>
<td>1.541</td>
<td>39.14</td>
<td>0.534</td>
<td>13.56</td>
</tr>
<tr>
<td>B</td>
<td>25 or 44</td>
<td>1.852</td>
<td>47.04</td>
<td>1.557</td>
<td>39.55</td>
<td>2.088</td>
<td>53.04</td>
<td>0.534</td>
<td>13.56</td>
</tr>
<tr>
<td>C</td>
<td>37 or 62</td>
<td>2.500</td>
<td>63.50</td>
<td>2.205</td>
<td>56.01</td>
<td>2.729</td>
<td>69.32</td>
<td>0.534</td>
<td>13.56</td>
</tr>
<tr>
<td>D</td>
<td>50 or 78</td>
<td>2.406</td>
<td>61.11</td>
<td>2.110</td>
<td>53.59</td>
<td>2.635</td>
<td>66.93</td>
<td>0.641</td>
<td>16.28</td>
</tr>
<tr>
<td>6</td>
<td>104</td>
<td>2.500</td>
<td>63.50</td>
<td>2.255</td>
<td>57.28</td>
<td>2.729</td>
<td>69.32</td>
<td>0.680</td>
<td>17.27</td>
</tr>
</tbody>
</table>

*For Dimension P, see page 21*

## 308 Series Receptacle Dimensions

- **Front View**
- **Side View**
- **Rear View**

### Dimension

<table>
<thead>
<tr>
<th>Shell Size</th>
<th>Number of Contacts</th>
<th>A ±.005&quot;</th>
<th>B Max ±.13mm</th>
<th>C ±.015&quot;</th>
<th>B Max ±.38mm</th>
<th>D Max ±.005&quot;</th>
<th>E Max ±.13mm</th>
<th>F ±.005&quot;</th>
<th>G ±.13mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>9 or 15</td>
<td>0.984</td>
<td>24.99</td>
<td>0.685</td>
<td>17.34</td>
<td>1.213</td>
<td>30.81</td>
<td>0.534</td>
<td>13.56</td>
</tr>
<tr>
<td>A</td>
<td>15 or 26</td>
<td>1.312</td>
<td>33.32</td>
<td>1.009</td>
<td>25.63</td>
<td>1.541</td>
<td>39.14</td>
<td>0.534</td>
<td>13.56</td>
</tr>
<tr>
<td>B</td>
<td>25 or 44</td>
<td>1.852</td>
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<td>C</td>
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<td>2.500</td>
<td>63.50</td>
<td>2.205</td>
<td>56.01</td>
<td>2.729</td>
<td>69.32</td>
<td>0.534</td>
<td>13.56</td>
</tr>
<tr>
<td>D</td>
<td>50 or 78</td>
<td>2.406</td>
<td>61.11</td>
<td>2.110</td>
<td>53.59</td>
<td>2.635</td>
<td>66.93</td>
<td>0.641</td>
<td>16.28</td>
</tr>
<tr>
<td>6</td>
<td>104</td>
<td>2.500</td>
<td>63.50</td>
<td>2.255</td>
<td>57.28</td>
<td>2.729</td>
<td>69.32</td>
<td>0.680</td>
<td>17.27</td>
</tr>
</tbody>
</table>

*For Dimension P, see page 21*
308 Series Termination Styles

<table>
<thead>
<tr>
<th>Filter Circuit</th>
<th>Termination Style and Shell Length (P Max dimension)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>1 and 2</strong></td>
</tr>
<tr>
<td></td>
<td>inches</td>
</tr>
<tr>
<td>PI,LRC,CLR,T</td>
<td>0.575</td>
</tr>
<tr>
<td>C</td>
<td>0.450</td>
</tr>
</tbody>
</table>

† This dimension is 0.078” (1.98) for high density arrangements

308 Series Mounting Styles

Filter 1 and 2 3 4 6 7 8 9
### 308 Series Part Numbering Information

<table>
<thead>
<tr>
<th>Shell Size</th>
<th>Number of Contacts</th>
<th>Number of A</th>
<th>B Max</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>9 or 15</td>
<td>±0.004” 0.331</td>
<td>8.41 0.250</td>
<td>0.647</td>
<td>16.43</td>
<td>0.270</td>
<td>6.86</td>
</tr>
<tr>
<td>A</td>
<td>15 or 26</td>
<td>±0.004” 0.331</td>
<td>8.41 0.250</td>
<td>0.647</td>
<td>16.43</td>
<td>0.270</td>
<td>6.86</td>
</tr>
<tr>
<td>B</td>
<td>25 or 44</td>
<td>±0.004” 0.331</td>
<td>8.41 0.250</td>
<td>0.647</td>
<td>16.43</td>
<td>0.270</td>
<td>6.86</td>
</tr>
<tr>
<td>C</td>
<td>37 or 62</td>
<td>±0.004” 0.331</td>
<td>8.41 0.250</td>
<td>0.647</td>
<td>16.43</td>
<td>0.270</td>
<td>6.86</td>
</tr>
<tr>
<td>D</td>
<td>50 or 78</td>
<td>±0.004” 0.387</td>
<td>9.83 0.250</td>
<td>0.703</td>
<td>17.86</td>
<td>0.324</td>
<td>8.23</td>
</tr>
</tbody>
</table>

**Series**
Planar D-Sub

**Shell Size**
E(1), A(2), B(3), C(4), D(5), 6

**Contact**
P = Pin
S = Socket

**Termination Style**
1 - .025” (.64mm) diameter PCB
2 - .020” (.51mm) diameter PCB
3 - Solder cup
4 - .900” (22.86mm) footprint right angle
5 - 500” (14.99mm) footprint right angle
6 - .328” (8.33mm) footprint right angle
7 - Crimp, non-removable
8 - .025” (.64mm) diameter PCB with short connector body
9 - .900” (22.86mm) footprint right angle

**Filter Circuit**
P = Pi
C = Capacitive
L = LRC

**Mounting Style**
1 - .120” (3.04mm) mounting hole
2 - .4-40 threaded clinch nut
3 - Right Angle mounting bracket
4 - 4-40 threaded clinch nut
5 - .590” (14.99mm) footprint right angle
6 - .328” (8.33mm) footprint right angle

**Capacitance (pF)**

- 04 = 400 to 620
- 08 = 800 to 1600
- 16 = 1600 to 3200

**Shell Plating**
1 = Electroless Nickel
2 = Tin
3 = Cadmium (clear)
4 = Gold
5 = Zinc Nickel

**Density**
H High Density
Blank if medium

**Deviation**
000 = Standard

---

**Dimensions**

- **A**: ±.004" ±,11mm
- **B Max**: ±.015" ±,39mm
- **C**: ±.020" ±,51mm
- **D**: ±.008" ±,21mm
- **E**: ±.015" ±,39mm
- **F Max**: ±.020" ±,51mm

---

**Mounting Style 3 (two row)**

**Mounting Style 3 (three row)**
308 Series Insert Arrangements
Pin Engaging Face Shown

Shell Size 1 (E)

- 9 #20 Contacts
- 15 #22 Contacts

Shell Size 2 (A)

- 15 #20 Contacts
- 26 #22 Contacts

Shell Size 3 (B)

- 25 #20 Contacts
- 44 #22 Contacts

Shell Size 4 (C)

- 37 #20 Contacts
- 62 #22 Contacts

Shell Size 5 (D)

- 50 #20 Contacts
- 78 #22 Contacts

Shell Size 6

- 104 #22 Contacts

Note: Consult the factory for other insert patterns.

Recommended Panel Cutout
Front and Rear Mounting

<table>
<thead>
<tr>
<th>Shell Size</th>
<th>A min</th>
<th>B</th>
<th>C min</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shell Size</td>
<td>inches</td>
<td>mm</td>
<td>±.005&quot;</td>
</tr>
<tr>
<td>1 (E)</td>
<td>0.801</td>
<td>20.35</td>
<td>0.984</td>
</tr>
<tr>
<td>2 (A)</td>
<td>1.129</td>
<td>28.68</td>
<td>1.312</td>
</tr>
<tr>
<td>3 (B)</td>
<td>1.669</td>
<td>42.39</td>
<td>1.852</td>
</tr>
<tr>
<td>4 (C)</td>
<td>2.321</td>
<td>58.95</td>
<td>2.500</td>
</tr>
<tr>
<td>5 (D)*</td>
<td>2.213</td>
<td>56.21</td>
<td>2.406</td>
</tr>
<tr>
<td>5 (D)+</td>
<td>2.250</td>
<td>57.15</td>
<td>2.406</td>
</tr>
<tr>
<td>6 *</td>
<td>2.360</td>
<td>59.94</td>
<td>2.500</td>
</tr>
</tbody>
</table>

* Rear mounting dimensions
+ Front mounting dimensions
Amphenol’s FX series of Discrete Feed-thru Filters offer excellent, low cost filter solutions for telecom, industrial, military and aerospace electronics applications, especially where small size and high performance are important.

Manufactured to meet the requirements of Mil-F-15733, the FX filters are available in threaded bushing and solder-mount styles with capacitance ranges from 10pF to 600nF.

Due to Amphenol’s unique manufacturing process, higher capacitance values and greater voltage withstand capabilities are achieved with the same industry standard package sizes.

Consult factory for custom filter and/or filter plate requirements.

**Materials**

Terminals: Copper Alloy, silver plated (filter pins shown are gold plated)

Eyelets/Bushings: Brass, silver plated

**Ordering Information**

- **Capacitance Code**
  - 101 - 100pF
  - 202 - 2000pF
  - 203 - 20,000pF
  (Last digit of 3 number code is the number of zeros after first 2 digits)

- **Deviator Code**
  - 100 - Standard Catalogue Package Sizes (see page 4)

- **Termination**
  - 1 - Straight Lead
  - 2 - Nail Head (Turret)
  - 3 - Solder Cup
  - 4 - P.C. Tail
  - 5 - Flattened & Pierced
  - 6 - Hooked Term

- **Mtg Style**
  - 1 - .110 Mtg Hole Dia. Bushing Only
  - 2 - .138 Mtg Hole Dia. 5 - 6-32 Thread
  - 3 - .145 Mtg Hole Dia. 6 - 8-32 Thread
  - 4 - .210 Mtg Hole Dia. 7 - 12-32 Thread
  - 0 - Special Size 8 - 5/16-32 Thread

- **Circuit Type**
  - P - Pi
  - C - Capacitive
  - L - L

Coax Filter Plate Assembly  
Filtered Terminal Block  
Filter Plate Assembly  
Special Filter Plate Shell Assembly
For EMI/EMP Protection, Look to the Leader -

Amphenol Aerospace

Amphenol Aerospace, the Interconnection Leader, offers advanced EMI/EMP Protection with high reliability. The proven performance of Amphenol® EMI Filter/Transient Protection Connectors means dependable protection for the costly and sensitive circuitry in sophisticated avionics.

Each circuit of the filter connector is individually filtered and internally housed in the connector, eliminating the need for costly and bulky exterior discrete protection devices. Amphenol Filter connectors are intermateable and intermountable with MIL-C-38999, MIL-C-27599, MIL-C-83723, MIL-C-26482, MIL-C-24308, MIL-C-5015.

Amphenol offers a broad range of cost saving filter options with versatility in sizes, styles and arrangements.

EMI Programmable Connectors
An alternative to non-removable filter contacts. Crimp style EMI contacts are insertable and removable from the rear of the connector. Allows the user to run diagnostic EMI evaluations of systems before going into production, easily modifying circuitry and pinouts at the test bench level. Available in a wide range of capacitance values in both Pi and C type filters, crimp and PC termination styles.

EMI/EMP Adapters
Provide cost effective solutions to problems on existing applications. Designed to be installed between the existing cable plug and unit receptacle. Circuit protection at MF, HF, VHF, and UHF levels is available in contact sizes 22 to 12 with all the popular Mil-specs.

Header Assemblies
For time and cost savings. Can be vapor phase or wave soldered to flex or printed circuit boards prior to the receipt of an EMI/EMP connector. Expensive connector assemblies can be easily removed from and reattached to the header assembly as the manufacturing process dictates. Available to fit all major cylindrical Mil-spec connectors.

Contact us for your special application requirements: Amphenol Aerospace, 40-60 Delaware Ave., Sidney, NY 13838-1395
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