# FILTER CONNECTORS
# EMI/EMP/RFI TRANSIENT PROTECTION


FILTER CONNECTORS

# Your Filter Connection to the Future

## Our Products

Sabritec designs and manufactures a full spectrum of sophisticated filter connector products. Our specialty is in the design of interconnect solutions addressing EMI/RFI filtering, and transient protection to meet demanding HIRF and Lightning requirements.

In addition to MIL-Spec interface type products, many of our designs are unique, built to conform to customer specifications requiring a high level of integration, special packaging, and critical electrical performance. Innovation is our distinction and our products address a wide variety of applications. Our achievements lead the industry in the design and manufacture of special filter connector products.

## Our Design Strategy

Sabritec's design strategy for filter connectors is based on extensive experience with filter capacitor arrays and diodes. Our engineers understand the extreme environmental conditions that can cause a filter or diode to fail or, worse yet, cause a system dysfunction. This design strategy is built on the foundation of system reliability and the efficient use of available space. The capacitor array is protected from thermally induced mechanical stresses by a barrier located between the capacitor array surface and the epoxy filled region. This barrier isolates the epoxy and the ceramic array and prevents damage to the array from the expansion influence of the epoxy.

## Modularization

A disciplined design approach that employs methods of grouping multiple components into subassemblies wherever feasible. Such subassemblies may include a filter module, diode module, circuit assembly module and a transition interface assembly. Modularization results in cleaner, more standardized designs that provide flexibility in maintaining and upgrading the connector. An important advantage of modularization is that individual modules may be removed or replaced in the field without disturbing other subassemblies and components.

## Integration

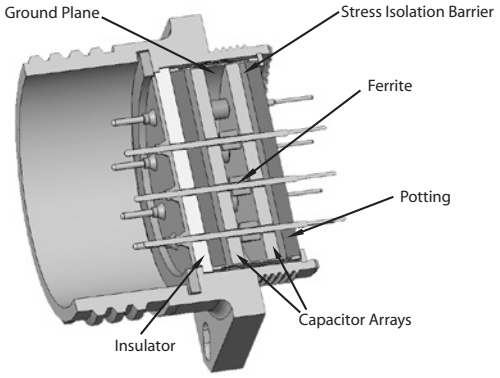
There is considerable unused space available in a standard non-filtered connector. Sabritec takes advantage of this space by removing components from elsewhere in the system and integrating them within the connector freeing up valuable board space. Isolating components electrically eliminates external wire connections and decreases crosstalk. The connector shell protects critical components from environmental or mechanical damage.

Sabritec provides specialty, enhanced performance connectors and cable assemblies and as such does not currently offer circular, rack and panel, or D-subminiature connectors that are listed on military standard Qualified Products Lists (QPL) per applicable detail specification sheets. Sabritec's connectors are fully intermateable with applicable QPL products and meet the applicable requirements of all military standards listed in this catalog.

### Advantages of Sabritec Filter Connectors

- Sabritec's filters connectors use monolithic capacitor arrays, the most reliable method of EMI/RFI filtering
- A single capacitor array can provide multiple capacitance values
- Most space efficient method of packaging EMI/RFI and EMP transient protection
- Connector shell protects the capacitor array and diodes from environmental, mechanical and thermal damage
- Transient voltage suppressors (transorbs) integrated into the connector offer EMP transient protection to sensitive circuitry. JANTX level or equivalent diode reliability screening is available
- System weight is reduced by integrating the filters and diodes into the connector
- Modular design techniques reduce the overall package size and improve connector maintainability
- Tested and documented using automatic test equipment

EMI Filter Cross Section

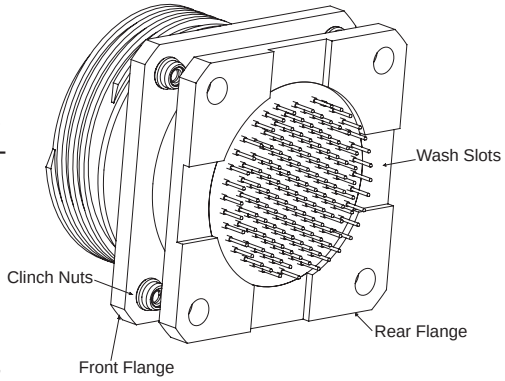



**Integrated Dual Flange**

Another useful feature that can be incorporated into the connector design in order to ease final assembly and reduce system build costs is that of a dual flange. This enables the PCB or Flex Circuit to be soldered or fixed directly to the PC Tails protruding from the rear of the connector, after having been quickly and reliably 'mechanically fixed' by the use of self locking helicoils incorporated into the flange itself. Wash slots machined in the flange enable superior soldered joints to be achieved as a result of the void created, which allows even heat transfer during soldering. Subsequent cleaning processes being undertaken are also improved as a result of the same void, ensuring that no damaging flux residue remains in place.

Incorporation of this feature further acts as a rigid and mechanically strong standoff for the PCB, providing a solid datum point internally thus reducing any force experienced by the rear PC tails. Attachment of heavy PCB's can be easily tolerated with no damage to the connector experienced throughout its service life.

The final assembly stage can also be taken a step further with self-locking clinch nuts fixed to the front flange, resulting in faster assembly to the bulkhead and removing the need to purchase additional assembly components. These features can be accommodated in virtually all filter connector variants and enable the true system cost to be reduced for the user.

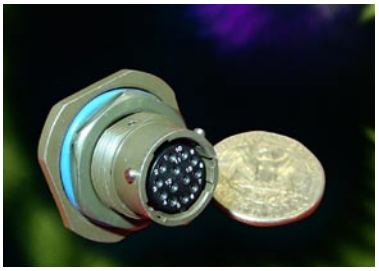



Standard EMI Filter Connector
w/Integrated Dual Flange and Wash Slots

**Water Sealed Filter Connectors**

Electronic equipment that is used in harsh environments requires connectors that can withstand exposure to moisture, dust and other elements. Also many applications require components to meet the Ingress Protection (IP) rating of IP67 as specified by IEC 60529. Sabritec can provide water sealed connectors that can be successfully used in systems where moisture, humidity, water, and dust are present. These connectors are ideal for high-pressure/low leakage applications in land, air, sea, and space environments.

Water sealed connector features can be added to EMI/EMP filtered connector types that meet the applicable requirements of MIL-DTL-38999, MIL-DTL-26482, MIL-DTL-83527, MIL-DTL-81659, and ARINC 600. These connectors can also incorporate any special features desired including different mounting types and unique shell or flange configurations.



MIL-DTL-38999 Compliant Water
Sealed Connector

# Transient Protection

## TVS Devices/Diode Suppression

The increased sensitivity of electronic systems and mandated performance requirements such as RTCA DO-160 make transient protection paramount in system design today. Transient suppression built into the connector provides the most space efficient and effective method of protection against Electromagnetic Pulse (EMP), Lightning, Nuclear EMP and voltage transients. The excess energy is shunted to ground at the connector interface before it can even enter the system.

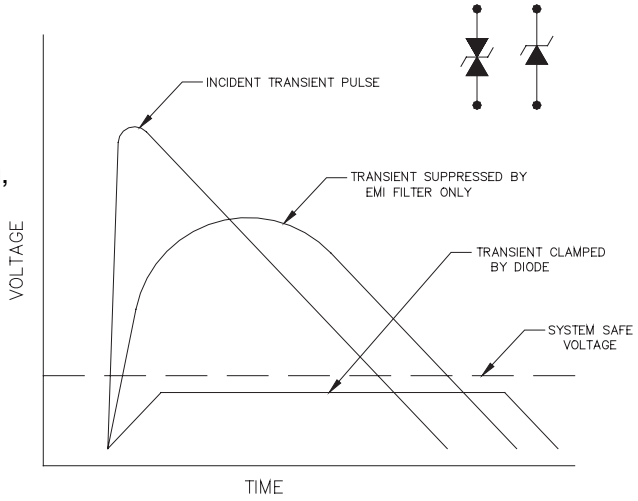
EMI Connector with Diodes

TVS diodes are mounted inside the connector around the periphery of the insert arrangement. Standard “catalog” diodes are utilized in order to increase reliability and minimize cost. JANTX diodes can be supplied; additionally, Sabritec has the capability to pre-screen diodes at component level testing and burn-in which eliminates infant mortality.

The connector shell dimensions vary with the quantity and type of diodes chosen, but generally fit within the outline defined by the mounting flange. Sabritec’s method of mounting the diodes can be incorporated into any connector type including, but not limited to MIL-DTL-38999, ARINC 600 and ARINC 404.

Where required, transient protection can be combined with EMI/RFI filtering to provide maximum protection. The diodes as well as the EMI filter are packaged separately so that the construction of the connector remains modular. Therefore, individual diodes as well as the EMI filter can be removed or replaced without disassembling the connector.

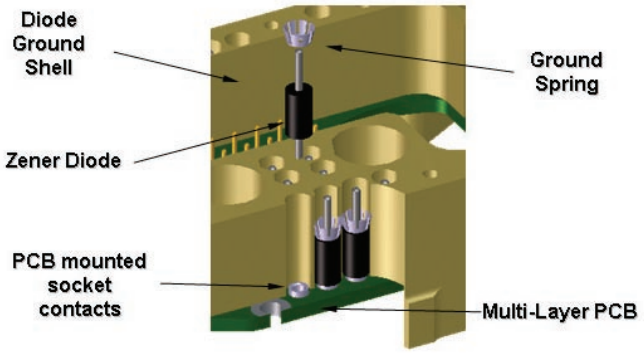
### Transient Curves




### Advantages of Filtered EMP Connectors with Transient Protection and EMI Suppression

- Transient protection can be combined with EMI filtering if required
- Mixture of diode parameters varying power, voltage and polarity within the same connector is available
- Diodes can be removed and replaced without disassembly of the connector
- Transient protection is located at the interface of the system
- Separable diode and filter modules are more easily repaired
- Diodes and filters are protected by the shell reducing environmental and mechanical damage
- System retrofit to EMP/EMI is compatible with unprotected connectors

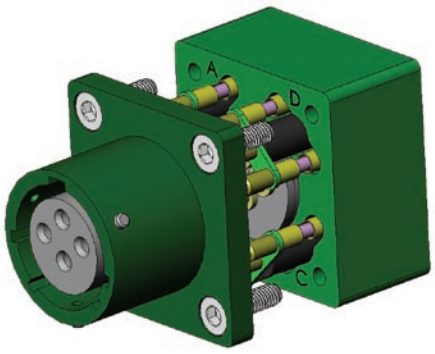
### EMP Filter Construction



# Transient Protection

## High Speed EMP Protection/Surface Mount TVS Chip Diodes

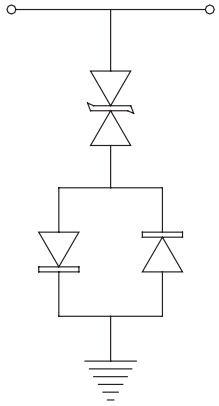
In order to meet the ever increasing EMC system requirements mandated in today's world, Sabritec offers solutions for both EMC and EMP protection on high speed data lines. For Coax, Triax, and Twinax contact types, Sabritec has a unique design solution that offers tailored protection without degradation of the data signals being transmitted. This is accomplished by maintaining extremely low capacitance and leakage current levels on uniquely designed and packaged diode stacks, in combination with in-house manufactured high frequency EMC filters.



High Speed Data Connector
w/ Integrated EMI/EMP

Manufactured in a robust modular manner, the connectors can be quickly disassembled from the front/rear providing access to the diode stacks for removal/replacement if they become damaged as a result of excess transients experienced in service. Operating frequencies in excess of 100 MHz can be successfully used with full EMC/EMP protection, fully safeguarding the equipment and offering a low risk / high performance solution.

With the advent of today's high signal transmission speeds coupled with low-level operating voltages, a need for high speed EMP protection circuitry has arisen. Sabritec has developed a complete series of EMP products ideally suited for this need. Densely packaged and protected within the connector shell, Sabritec employs the use of low voltage transient voltage suppressor (TVS) bipolar diodes connected in series to a parallel network of back-back rectifiers as shown in the schematic diagram.


Schematic High Speed EMP
Protection

**Surface Mount Technology for Transient Protection**

Sabritec can also offer transient protection in our connectors utilizing surface mount technology (SMT) chip diodes. These can be provided as an alternative to axially leaded components in instances where availability or source of supply problems could potentially become an issue. SMT diodes are provided by numerous manufacturers and distributors and in most cases readily available as they are widely used in the electronics industry. The incorporation of SMT components can potentially provide space and weight savings as well based on the particular connector and application requirements. If you have any questions in regards to SMT technology please contact Sabritec for further information.

Pb

Sabritec is able to offer lead free filter connector solutions upon request. Consult factory for more details.

# Transient Voltage Suppression Diode Selection Guide

RTCA DO-160, Environmental Conditions and Test Procedures for Airborne Equipment, is a widely used criterion for verifying the capability of equipment to withstand the effects of lightning induced electrical transients. In Section 22 of this standard, entitled Lightning Induced Transient Susceptibility, the test methods and procedures for performing pin injection and cable bundle testing on aircraft equipment are defined.

In order to verify the capability of an electronic system to withstand the effect of lightning induced transients, test procedures define the lightning induced transient by two characteristics:

1. The **transient waveform** which shows how quickly the transient is induced and how long it lasts. This is sometimes referred to as the pulse width and is measured in microseconds. The pulse width is related to the level of damaging energy contained within the transient, i.e. the longer the pulse, the more damage it will cause. The three most commonly referenced pin injection lightning waveforms from RTCA/DO-160E, Section 22, are shown in the figures below.
2. The **test level** which defines the magnitude of the pulse. This is related to the anticipated level of exposure of the electronic system, i.e. if a system is tucked away in a safe environment, e.g. inside a metal enclosure with the interconnecting wiring being well shielded, the test level will be low. However, if the system is highly exposed to the electromagnetic environment, the test level will be high. The test level is described in terms of the open circuit voltage (Voc) and the short circuit current (Isc).

In the table below for waveforms 3, 4, and 5A, we show the recommended diode clamping voltage (Vc) and power rating (Ppp) at each test level for these waveforms.

| Diode Clamping Voltage (Vc) Selection for Lighting Strike Waveform Threats | | | | | | |
|---|---|---|---|---|---|---|
| RTCA/DO-160 | LEVEL 1 100V/4A | LEVEL 2 250V/10A | LEVEL 3 600V/24A | LEVEL 4 1600V/60A | LEVEL 5A 3200V/128A | Recommended TVS (Ppp) @10/1000µs |
| Waveform 3 1MHz Damped Sinusoidal Wave (Ref. Fig. 22-4 from DO-160E) | Vc ≤ 97 V | Vc ≤ 243 V | Vc ≤ 275 V | Vc ≤ 87 V | Vc ≤ 32.2 V | 500 Watts |
| | Vc ≤ 97 V | Vc ≤ 243 V | Vc ≤ 275 V | Vc ≤ 87 V | Vc ≤ 35.8 V | 600 Watts |
| | All | All | All | Vc ≤ 243 V | Vc ≤ 96.8 V | 1,500 Watts |
| | All | All | All | Vc ≤ 275 V | Vc ≤ 209 V | 3,000 Watts |
| | All | All | All | All | Vc ≤ 275 V | 5,000 Watts |
| | | | | | | |
| RTCA/DO-160 | LEVEL 1 50V/10A | LEVEL 2 125V/25A | LEVEL 3 300V/60A | LEVEL 4 750V/150A | LEVEL 5A 1600V/320A | Recommended TVS (Ppp) @10/1000µs |
| Waveform 4 Double Exponential 6.4 X 69 µsec (Ref. Fig. 22-5 from DO-160E) | All | All | Vc ≤ 31.9 V | Vc ≤ 11.3 V | NONE | 500 Watts |
| | All | All | Vc ≤ 38.2 V | Vc ≤ 13.6 V | NONE | 600 Watts |
| | All | All | All | Vc ≤ 35.0 V | Vc ≤ 16.0 V | 1,500 Watts |
| | All | All | All | Vc ≤ 74.0 V | Vc ≤ 29.2 V | 3,000 Watts |
| | All | All | All | Vc ≤ 134 V | Vc ≤ 35.5 V | 5,000 Watts |
| | All | All | All | All | Vc ≤ 114 V | 15,000 Watts |
| | All | All | All | All | Vc ≤ 146 V | 30,000 Watts |
| | All | All | All | All | All | 200,000 Watts @ 10/40us |
| | | | | | | |
| RTCA/DO-160 | LEVEL 1 50V/50A | LEVEL 2 125V/125A | LEVEL 3 300V/300A | LEVEL 4 750V/750A | LEVEL 5A 1600V/1600A | Recommended TVS (Ppp) @10/1000µs |
| Waveform 5A Double Exponential 40 X 120 µsec (Ref. Fig. 22-6 from DO-160E) | All | Vc ≤ 10 V Vc ≥ 114.9 V | NONE | NONE | NONE | 500 Watts |
| | All | Vc ≤ 12.4 V Vc ≥ 112.6 V | NONE | NONE | NONE | 600 Watts |
| | All | Vc ≤ 42.2 V Vc ≥ 82.8 V | Vc ≤ 12.1 V | None | NONE | 1,500 Watts |
| | All | All | Vc ≤ 25.5 V | Vc ≤ 9.4 V | NONE | 3,000 Watts |
| | All | All | Vc ≤ 45.8 V | Vc ≤ 15.9 V | NONE | 5,000 Watts |
| | All | All | All | Vc ≤ 49.9 V | NONE | 15,000 Watts |
| | All | All | All | Vc ≤ 77.4 V | NONE | 30,000 Watts |
| | All | All | All | Vc ≤ 231 V | NONE | 200,000 Watts @ 10/40us |

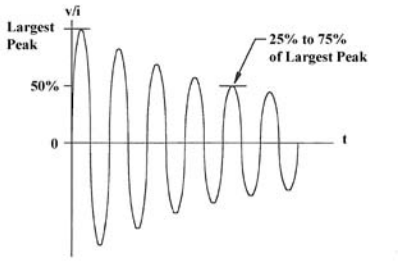


**Figure 22-4:** 1MHz Frequency Damped Sinusoidal Voltage/Current Waveform 3

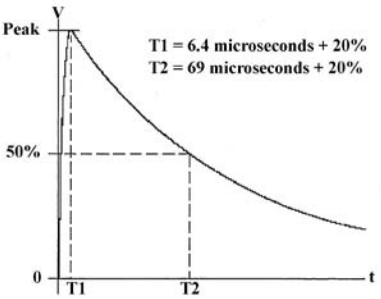


**Figure 22-5:** Voltage Waveform 4

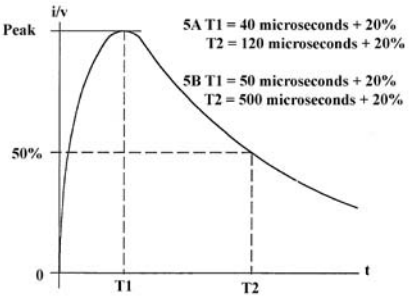


**Figure 22-6:** Voltage Waveform 5A

# Planar Array Technology

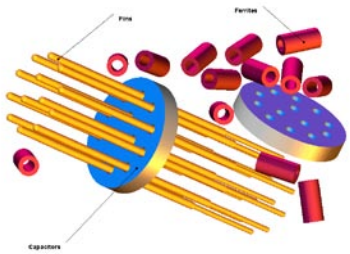
| Parameter | Planar Array | Tubular | Chip |
|---|---|---|---|
| **Capacitance** | >60,000 PF | >10,000 PF | >50,000 PF |
| **DWV** | 750 VDC | 500 VDC | 500 VDC |
| **Resonance** | None | None | 120 MHz |
| **Vibration** | Very Good | Very Poor | Poor |
| **MTBF** | High | Low | Moderate |

Sabritec internally manufacturers the monolithic ceramic capacitor array on both thick and thin film technology. Using a dry process to laminate the layers of X7R and COG material ceramic tape, Sabritec is capable of achieving capacitance values from 100pF to 100nF on the same array.

Our extensive in house capability allows for unique applications and arrangements not engineered elsewhere in the connector world. This may include mixed contact sizes, new insert arrangements, or high voltage applications up to 2000 VDC Dielectric Withstand Voltages (DWV).

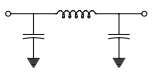
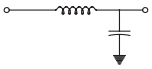
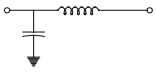
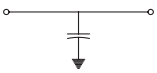
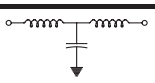
The planar array is much more complex and versatile in its design. The planar uses the same X7R material as the tubular capacitor, however the electrodes run perpendicular to the contact, allowing higher capacitance and higher voltage ratings, as the pin to pin spacing is not effected by this design approach. With the electrodes running perpendicular to the contact, we can stack more electrodes thus increasing capacitance and at the same time, thicken the dielectric between electrodes to increase the withstanding voltages within the medium.

The planar array also has the advantage of strength. As the layers of ceramics are stacked perpendicular to the contact, we can increase the planar thickness to about .100" to withstand high vibration scenarios. This far outweighs the .015" thickness found in the tubular capacitor.



Because the capacitor is ceramic, it is relatively brittle in comparison to the other components of a connector (metal, rubber and plastic). Therefore, the internal construction of the filter connector must isolate the capacitors from mechanical stress.

Sabritec uses a thin wall ground plane or spring to house the filter elements. The ground plane is captured between halves of the connector shell to provide mechanical retention as well as electrical contact with 3GG degree attachment to ground. Thermal stress from the connector shell is not transferred to the capacitor arrays due to a compliant fit between the outside diameter of the ground plane or spring and the inside of the shell. Stress from the contacts is eliminated through the use of a block of epoxy on either side of the capacitors. Sabritec further isolates the capacitors with a proprietary stress isolation barrier between the epoxy and the capacitors.

| Filter Type | Filter Circuit | Best Application |
|---|---|---|
| Pi |  | Unknown or medium source and load impedance |
| LC |  | Low source and high load impedance |
| CL |  | High source and low load impedance |
| C |  | High source and high load impedance |
| T |  | Low source and low load impedance |

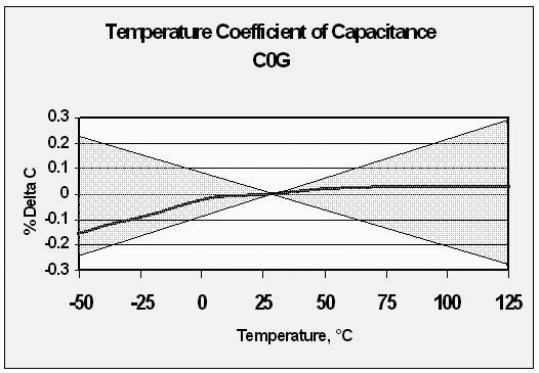
High source or load impedance >100 Ohms
Low source or load impedance < 10 Ohms

Note: All Filters are passive low pass filters. Please consult factory for other types of filters such as band-pass, notch, or high pass filters.

# Ceramic Multi-layer Capacitors

## Design Guide for Monolithic Capacitor Arrays

The heart of the filter connector is the capacitor array, consisting of multiple layers of ceramic insulators and precious metal conductors. The ceramic component has the unique ability to store a charge. The amount of charge that a capacitor can store depends on its capacitance and the applied voltage. The capacitance depends upon the composition of the insulator (better known as the dielectric).

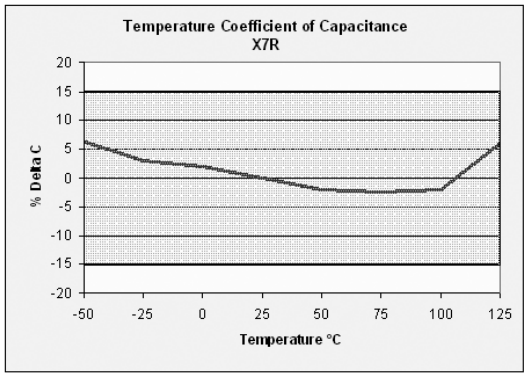



C0G is an EIA designation for a low dielectric constant temperature, voltage, and frequency stable dielectric ceramic material. The above graph shows the stability of capacitance over the temperature range from -55°C to +125°C.

Every dielectric has an inherent ability to store charge when compared to a vacuum. This ratio is called a dielectric constant (K). Air, for example, has a dielectric constant of about 1.0. In comparison, mica has a dielectric constant of 6.0. In other words, mica has the ability to hold 6 times more of a charge than air. The dielectric materials used at Sabritec have dielectric constants of 95 (C0G) and 3000 (X7R). The capacitance also is influenced by the geometry of the capacitor. For a simple single layer capacitor, the capacitance increases with an increase in cross-sectional area. The capacitance can also increase with decreasing thickness.

There are four major guidelines when designing a particular capacitor array:

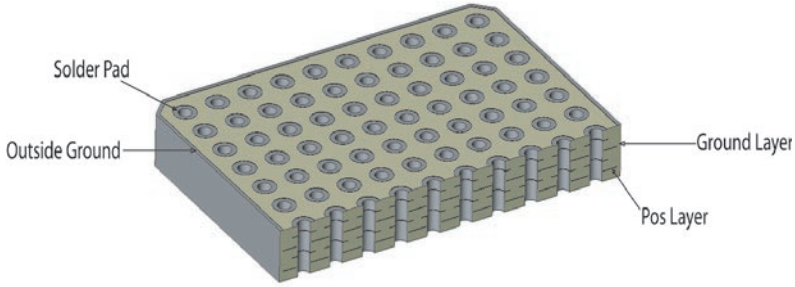
1. The design must be large enough to compensate for shrinkage.
2. Multi-capacitance arrays require several multi screen designs.
3. A high capacitance design should not exceed a certain number of layers.
4. A high voltage design must meet a minimum fired thickness.




X7R is an EIA designation for a class II mid K dielectric material that has a maximum temperature coefficient of ±15% over the temperature range from -55°C to 125°C.

The capacitance is influenced by the number of active printed layers, the overlap area, and the thickness of each layer. There must be a balance between all three parameters to ensure a reliable and economical component. With each printed layer, precious metal is used which is costly. The amount of overlapping area between the ground plane and positive pattern must be small enough to minimize alignment variations, which can lead to failure, yet large enough to minimize the number of printed layers required to obtain a particular capacitance target. Large overlapping areas can increase the distribution of capacitance between the population of holes within a part.

Finally, the layer thickness must be large enough to safely exceed the specified voltage requirements. If the layer thickness design is too large, then more printed layers are needed, increasing the overall thickness, making the capacitor too thick to fit into the connector design. If the capacitor is too thin, it may be prone to cracking during ceramic processing. There will always be at least two screens used for any one ceramic design; the ground plane and positive pad. The ground plane provides the ground connection to the connector shell. The positive pad provides connection to the contact pins.



# Ceramic Multi-layer Capacitors

## Tubular Capacitors vs. Chip Capacitors

### Tubular Capacitor Technology

In the early 1980's the filter connector (still in its infancy) used exclusively tubular type capacitors. These capacitors served the needs of the industry well at that time. However, low yields and an array of quality problems suggested that the tubular capacitor was no longer sufficient for the systems it was designed into. Therefore, in the late 1980's the monolithic planar array was born into existence.

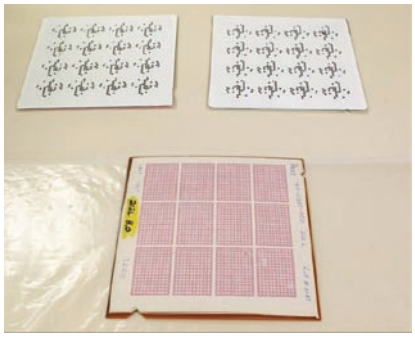
This new technology incorporated the monolithic chip capacitor technology and adapted it to a multi line configuration. This gave both the ability to achieve higher capacitance per line as well as higher dielectric withstanding voltages. The two technologies are vastly different in their design and capabilities. The tubular capacitor is, as it suggests, a tube running the length of the contact with electrodes buried inside. The wall thickness of the tube is dictated by the pin to pin spacing of the connector, the metal ground plate used to ground the capacitor, and the size of the ferrite in a Pi section filter. In a 150 line ARINC 600 module, the pin to pin spacing is .100". Therefore the wall thickness of the tube is .050" minus the web dimension of the ground plane minus the wall thickness of the ferrite. Typically it ends up being around .015" thick. This limited thickness has to be designed to withstand the voltage rating of the system, achieve the desired capacitance and be strong enough for system vibration.

The systems of today typically require much higher capacitance values and/or require higher voltage ratings. The Eurofighter Typhoon has several requirements that exceed 2000 VDC and the vibration requirements are the highest in the industry. The .015" tubular capacitor is not designed to handle these high vibration requirements and there is no space to increase either the capacitance or the voltage rating.

Today's systems mandate harsh environmental constraints to be subjected to component hardware. The dielectric material in the capacitor typically is X7R type material to achieve the highest capacitance with the least change in capacitance over the temperature range. The tube has the electrodes (which when stacked together increase capacitance) running parallel to the contact. This in combination with the pin to pin spacing limits the capacitance to about 7000 pF at 200 VDC working voltage.

### Chip Capacitors

The use of chip capacitors in military applications is typically not allowed in connectors. The reason is two fold; First, chip capacitors tend to resonate at frequencies above 120 MHz and during a swept EMC test tend to fail at those frequencies. Secondly, they also take up too much space and tend to lower the MTBF rating of the connector as a whole. The planar array is much more rugged of an assembly and not subject to the thermal shock and vibration that the chip capacitors surface mounted to the PCB would face. Lastly, the planar array ensures a 360 degree attachment to ground to maximize insertion loss up to 1 GHz and beyond. The chip capacitor does not have a circumferential ground and radiated emissions may not be captured by this solution.

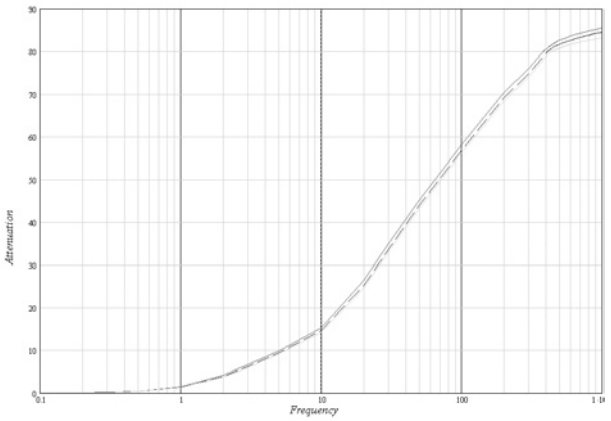


# Filter Connector Terminology

Working or Operational Voltage is the maximum voltage that can be continuously sustained. The dielectric utilized to manufacture the capacitor sets this value, which is directly proportional to the distance between ground planes and electrodes, whether a tubular capacitor or a planar array.

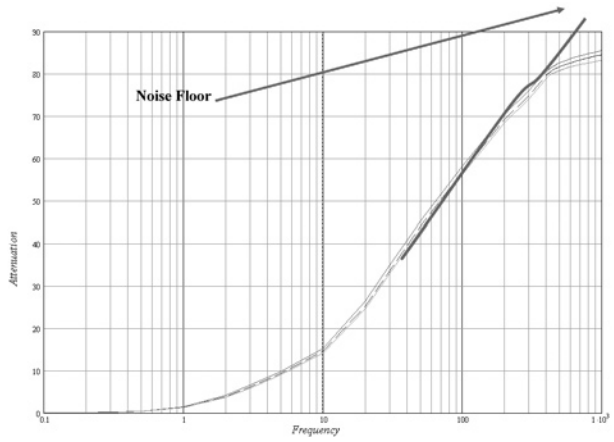
Insulation resistance (IR) is generally measured at the capacitor or connectors working voltage. This ensures that when utilized at these voltages, there is sufficient resistance between contacts and from a contact to ground, so as not to cause electrical shorts. Typical values are approximately 5000 mega-ohms. Lower values may be required for high capacitance values.

Attenuation Curve for Low Pass Filters




Capacitance is a product of the overlap between ground planes and electrodes, and the dielectric utilized (The dielectric constant of the ceramic k). Capacitance plays a key role in the filter performance. Capacitors impedance lowers as frequency increases. The greater the frequency, the greater the effect of filtering or attenuation for a low-pass filter.

Noise Floor is the value at which the connector will not exceed. Typically 75-85dB. This is limited by capacitor performance, source and load impedance and ground resistance. The graph on the right shows attenuation still increasing at 80db.




Cross talk is a disturbance, caused by electromagnetic interference, along a circuit or a cable pair. A telecommunication signal disrupts a signal in an adjacent circuit and can cause the signals to become confused and cross over each other.

Dielectric Withstanding Voltage (DWV) is the connectors upper voltage capability, for short non sustainable periods only. This can be specified as duration. The capacitor array will be weakened by multiple and sustained applied voltages at DWV levels.

Planar Array is the most common form of filter components utilized in connectors within our market areas. They provide high performance filters, are rugged enough to withstand high environmental vibration levels and can be manufactured with working voltages up to 1000 VDC with relative ease.

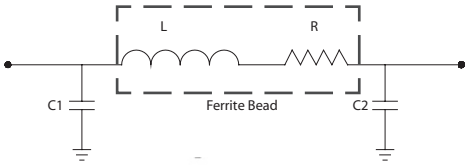
Dissipation Factor (DF) is the ratio of the energy dissipated to the energy stored in a dielectric per hertz, also equal to the tangent of the loss angle. It is also defined as the reciprocal of the ratio between the insulating materials capacitive reactance to its resistance at a specified frequency. It measures the inefficiency of an insulating material. If a material were to be used for strictly insulating purposes, it would be better to have a lower dielectric constant.

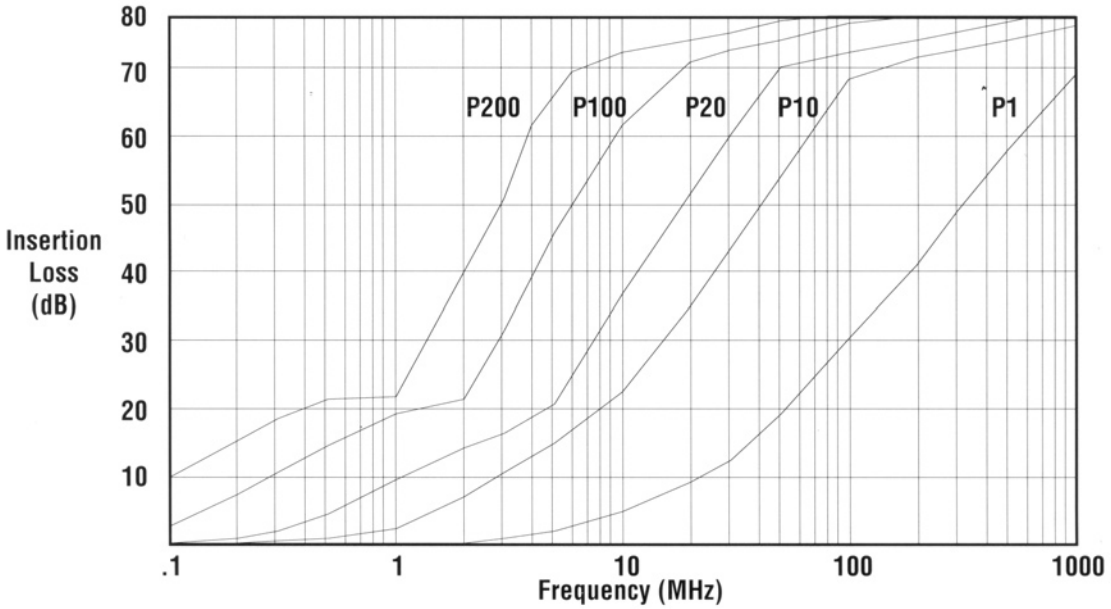
# Electrical Performance Pi Filter

## Electrical Characteristics - 'Pi' Section

| Filter Description | P200 | P100 | P76 | P38 | P20 | P10 | P8 | P4 | P2 | P1 |
|---|---|---|---|---|---|---|---|---|---|---|
| Operating Temperature Range | | | | -55°C to + 125°C | | | | | | |
| Voltage Rating | 100 VDC | | | 200 VDC-120 Vrms 400 Hz | | | | | | |
| Current Rating DC | | | | 15 amps size 16/7.5 amps size 20/5 amps size 22 | | | | | | |
| Insulation Resistance | | | | 5000 megohms min. @100 VDC | | | | | | |
| Current Rating R.F. | | | | 3.0 amps max. | | | | | | |
| DWV Sea Level w/ 50 micro-amps max. charge/discharge | 250 VDC | | | 500 VDC | | | | | | |

## 'Pi' Section Curves




## Insertion Loss Table

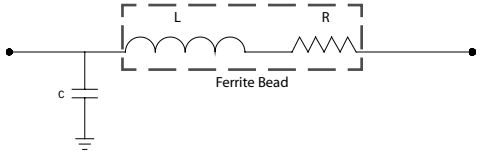
| Filter Description | See Notes | P200 | P100 | P76 | P38 | P20 | P10 | P8 | P4 | P2 | P1 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Capacitance in Nanofarads @ 1Khz,. 1VRMS | | 160<br>240 | 80<br>120 | 60<br>91 | 30<br>46 | 16<br>24 | 8<br>12 | 6.4<br>9.2 | 3.2<br>4.8 | 1.6<br>2.4 | .8<br>1.2 |
| Minimum No Attenuation loss @ 25° | Freq Mhz | | | | | | | | | | |
| | .1 | 8 | 4.1 | 3 | 1 | .3 | .1 | - | - | - | - |
| | 1.0 | 22.2 | 19.6 | 18.2 | 13.3 | 8.2 | 3.9 | 2.9 | .9 | .2 | - |
| | 2 | 32.8 | 21.7 | 19.7 | 16.8 | 12.7 | 8 | 6.6 | 2.9 | 1 | .3 |
| | 10 | 73.5 | 61 | 57 | 44.4 | 31.5 | 20.6 | 18.3 | 12.8 | 8.1 | 4.0 |
| | 100 | 85+ | 85+ | 85+ | 85+ | 78 | 65.8 | 61.9 | 49.6 | 37.3 | 25.6 |
| | 500-1k | 85+ | 85+ | 85+ | 85+ | 85+ | 85+ | 80 | 75 | 64 | 52 |

Notes:
1. P200 & P100 Capacitance Values for Size 20 Contact Arrangement & Larger
2. No Load Minimum Attenuation Values per MIL-STD-220
3. Capacitance in Nanofarads (Nominal Value)
4. Consult Factory for Higher Voltages & Capacitance Values

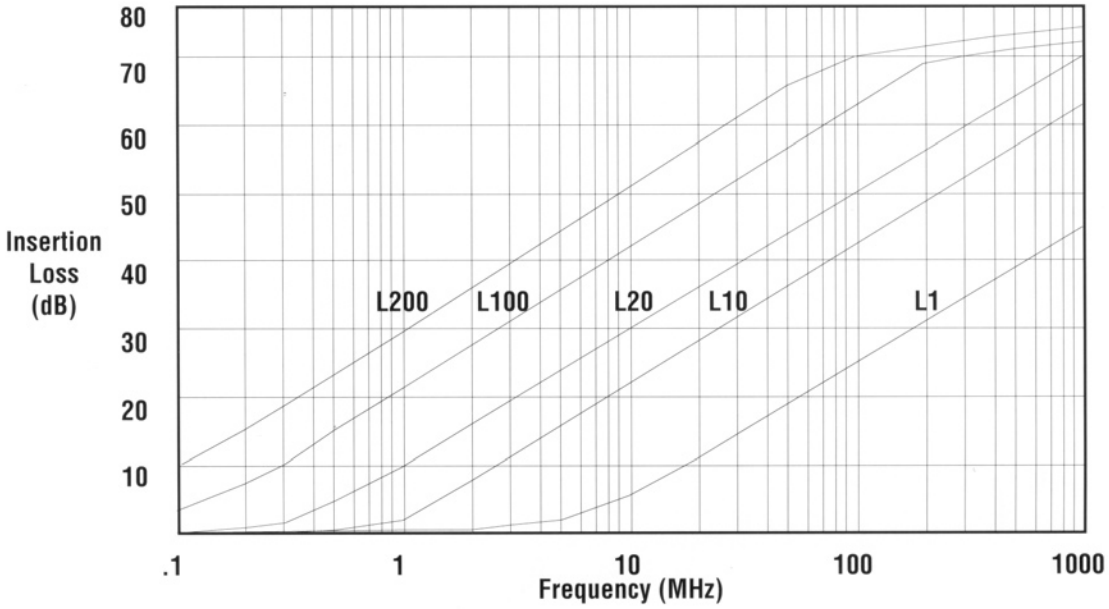
# Electrical Performance "L" Filter

## Electrical Characteristics - 'L' Section

| Filter Description | L200 | L100 | L76 | L38 | L20 | L10 | L8 | L4 | L2 | L1 |
|---|---|---|---|---|---|---|---|---|---|---|
| Operating Temperature Range | | | | -55°C to + 125°C | | | | | | |
| Voltage Rating | 100 VDC | | | 200 VDC-120 Vrms 400 Hz | | | | | | |
| Current Rating DC | | | | 15 amps size 16/7.5 amps size 20/5 amps size 22 | | | | | | |
| Insulation Resistance | | | | 5000 megohms min. @100 VDC | | | | | | |
| Current Rating R.F. | | | | 3.0 amps max. | | | | | | |
| DWV Sea Level w/ 50 micro-amps max. charge/discharge | 250 VDC | | | 500 VDC | | | | | | |




## 'L' Section Curves




## Insertion Loss Table

| Filter Description | See Notes | L200 | L100 | L76 | L38 | L20 | L10 | L8 | L4 | L2 | L1 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Capacitance in Nanofarads @ 1Khz,. 1VRMS | | 160<br>240 | 80<br>120 | 60<br>91 | 30<br>46 | 16<br>24 | 8<br>12 | 6.4<br>9.2 | 3.2<br>4.8 | 1.6<br>2.4 | .8<br>1.2 |
| Minimum No Attenuation loss @ 25° | Freq Mhz | | | | | | | | | | |
| | .1 | 8.6 | 4.1 | 3 | 1 | .3 | .1 | - | - | - | - |
| | 1.0 | 28 | 22 | 20.1 | 14.2 | 8.6 | 4 | 3 | .9 | .2 | - |
| | 2 | 34.3 | 28.3 | 26.3 | 20.3 | 14.4 | 8.8 | 7.2 | 3.1 | 1 | - |
| | 10 | 49 | 43 | 41.1 | 35 | 29 | 23 | 21.1 | 15.1 | 9.5 | 4.8 |
| | 100 | 69.9 | 63.9 | 62 | 55.9 | 49.9 | 43.9 | 42 | 35.9 | 29.9 | 23.9 |
| | 500-1k | 83.7 | 77.7 | 75.8 | 69.7 | 63.7 | 57.7 | 55.8 | 49.7 | 43.7 | 37.7 |

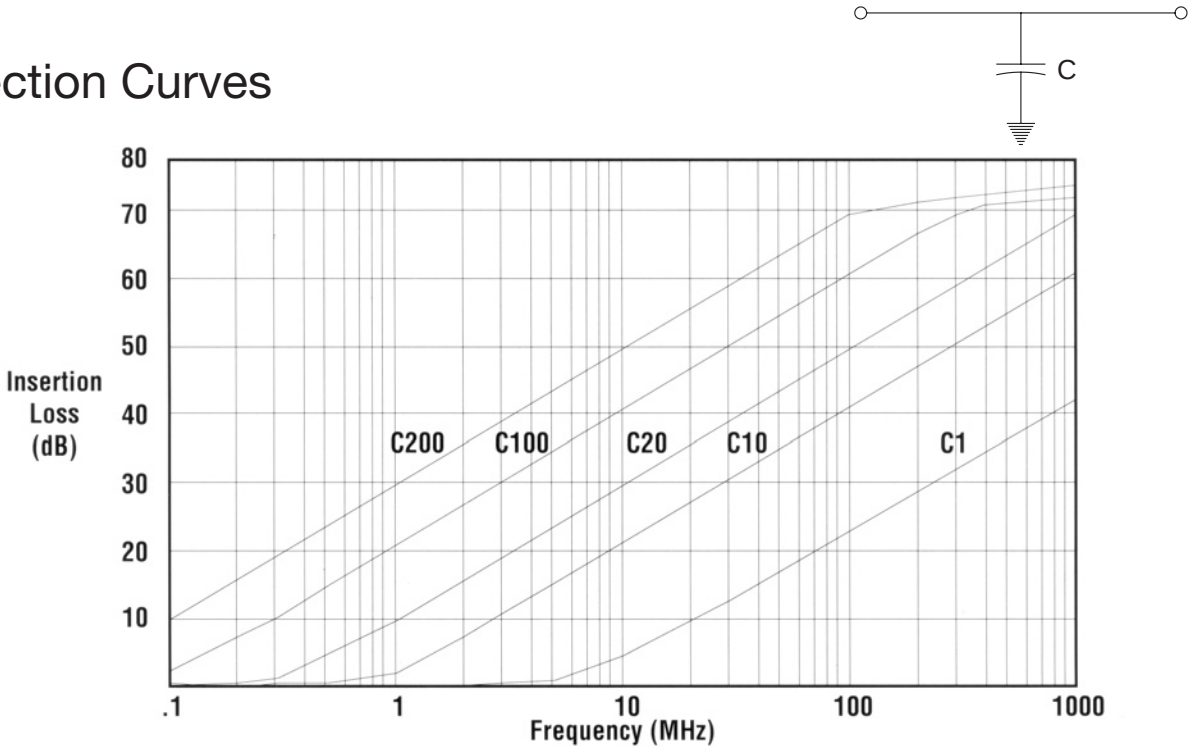
Notes:
1. L200, L100 & L76 Capacitance Values for Size 20 Contact Arrangement & Larger
2. No Load Minimum Attenuation Values per MIL-STD-220
3. Capacitance in Nanofarads (Nominal Value)
4. Consult Factory for Higher Voltages & Capacitance Values

# Electrical Performance "C" Filter

## Electrical Characteristics - 'C' Section

| Filter Description | C200 | C100 | C76 | C38 | C20 | C10 | C8 | C4 | C2 | C1 |
|---|---|---|---|---|---|---|---|---|---|---|
| Operating Temperature Range | | | | -55°C to + 125°C | | | | | | |
| Voltage Rating | 100 VDC | | | 200 VDC-120 Vrms 400 Hz | | | | | | |
| Current Rating DC | | | | 15 amps size 16/7.5 amps size 20/5 amps size 22 | | | | | | |
| Insulation Resistance | | | | 5000 megohms min. @100 VDC | | | | | | |
| Current Rating R.F. | | | | 3.0 amps max. | | | | | | |
| DWV Sea Level w/ 50 micro-amps max. charge/discharge | 250 VDC | | | 500 VDC | | | | | | |

## 'C' Section Curves




## Insertion Loss Table

| Filter Description | See Notes | C200 | C100 | C76 | C38 | C20 | C10 | C8 | C4 | C2 | C1 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Capacitance in Nanofarads @ 1Khz,. 1VRMS | | 160<br>240 | 80<br>120 | 60<br>91 | 30<br>46 | 16<br>24 | 8<br>12 | 6.4<br>9.2 | 3.2<br>4.8 | 1.6<br>2.4 | .8<br>1.2 |
| Minimum No Attenuation loss @ 25° | Freq Mhz | | | | | | | | | | |
| | .1 | 8.6 | 4.1 | 3 | 1 | .3 | .1 | - | - | - | - |
| | 1.0 | 28 | 22 | 20.1 | 14.2 | 8.6 | 4.1 | 3 | 1 | .3 | .1 |
| | 2 | 34 | 28 | 26.1 | 20.1 | 14.2 | 8.6 | 7 | 3 | 1 | .3 |
| | 10 | 48 | 42 | 40 | 34 | 28 | 22 | 20.1 | 14.2 | 8.6 | 4.1 |
| | 100 | 68 | 62 | 60 | 54 | 48 | 42 | 40 | 34 | 28 | 22 |
| | 500-1k | 82 | 76 | 74 | 68 | 62 | 56 | 54 | 48 | 42 | 36 |

Notes:
1. C200, C100 & C76 Capacitance Values for Size 20 Contact Arrangement & Larger
2. No Load Minimum Attenuation Values per MIL-STD-220
3. Capacitance in Nanofarads (Nominal Value)
4. Consult Factory for Higher Voltages & Capacitance Values

# Mechanical & Qualification Data

Sabritec connectors conform to the applicable military specifications and standards for materials, finishes and mechanical form, fit, and function. Filter connectors are fully intermateable and interchangeable in most instances with standard non-filtered QPL MIL-SPEC connectors.

| Material and Finishes | |
|---|---|
| **Shell & Jam Nut** | Aluminum Alloy<br>Electroless Nickel per MIL-C-26074 |
| **Pin Contacts** | Brass per ASTM B16<br>Gold Plate per MIL-G-45204 |
| **Socket & Contacts** | Copper Alloy<br>Gold Plate per MIL-G-45204 |
| **Insulators** | High Grade Plastic/Epoxy |
| **Seal & Grommet** | Silicon Base Elastomer |

| Production Automation Test System Measurements | | | |
|---|---|---|---|
| | **Range** | **Accuracy** | **Notes** |
| **Capacitance** | 1 pF-1µf | 0.2% + 0.1 pf | 1 |
| **DF** | 0.00001-10 | 1% | 2 |
| **Inductance** | 100 nH-10KH | 0.2%+10 nH | 1 |
| **IR** | 1 K Ohm - 5 T Ohm | 1% | 3,4,5 |
| **DWV** | 10 pA-100 mA | 1%+10 pA | 3,4,6 |
| **VR** | 10 mV-100V | 0.2% + 10 mV | 7 |
| **Ground & Contact Resistance** | 0.1 mV-1V | 0.1%+0.1 mV | 7 |

**Notes:**

1. Frequency = 20 Hz to 1 MHz
2. Dissipation factor
3. With 5-500 volts applied
4. Measures each pin to all other pins grounded to shell
5. Insulation resistance
6. Dielectric withstanding voltage
7. Isource = 1nA-1A

## Performance Data

Sabritec's Filter Connectors meet or exceed the applicable requirements of the following specifications:

MIL-DTL-38999
MIL-DTL-83723
MIL-DTL-24308
MIL-DTL-83513
MIL-DTL-83527
MIL-C-26482
MIL-DTL-26500
MIL-DTL-83723
MIL-C-81511
ARINC 600
ARINC 404 (MIL-C-81659)

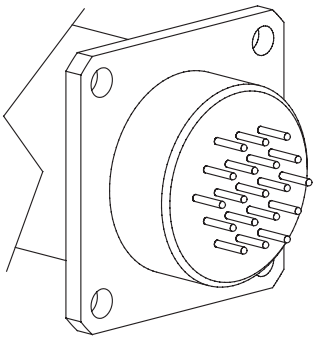
Sabritec connectors can meet qualification requirements of MIL-DTL-38999, MIL-C-26482, ARINC 404 (MIL-C-81659), and ARINC 600. Sabritec can perform most test requirements in-house. This includes both electrical and mechanical testing for qualification, engineering evaluation and final acceptance. All products are available for space grade applications.

*All specifications subject to change without notice.*

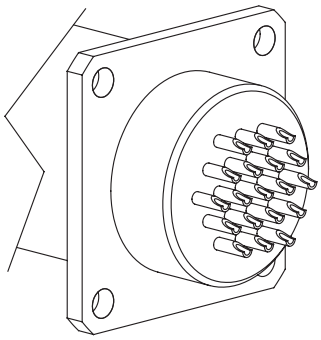
Sabritec provides specialty, enhanced performance connectors and cable assemblies and as such does not currently offer circular, rack and panel, or D-subminiature connectors that are listed on military standard Qualified Products Lists (QPL) per applicable detail specification sheets. Sabritec's connectors are fully intermateable with applicable QPL products and meet the applicable requirements of all military standards listed in this catalog.

# Contact Termination

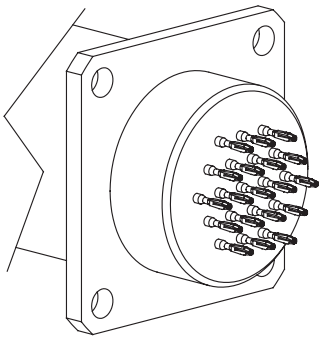
PC TAIL

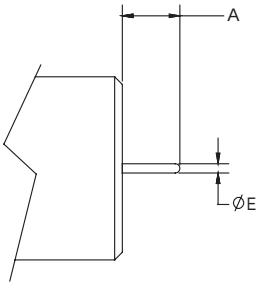


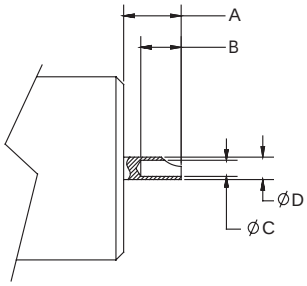
SOLDER CUP

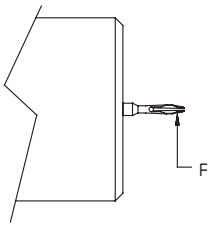


COMPLIANT PRESS-FIT
(SOLDERLESS)



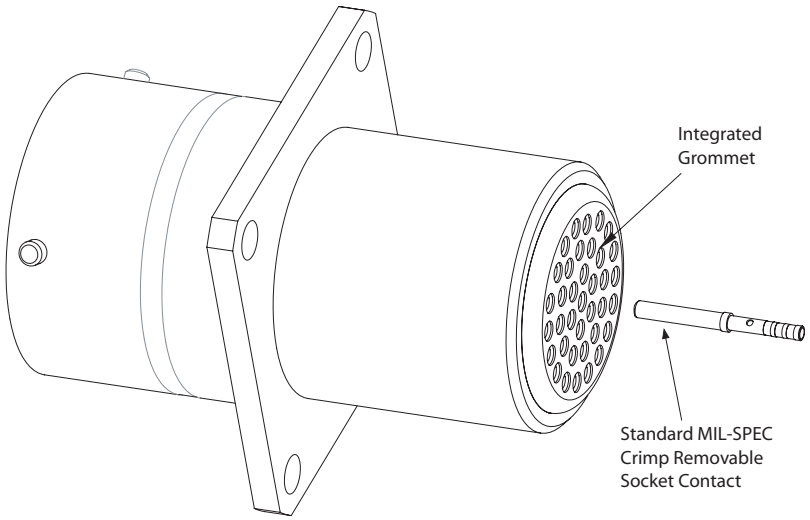



| Dimensions | | | | | | |
|---|---|---|---|---|---|---|
| **Contact Size** | **A** ± .025 | **B** | **C** | **D** | **E** ±.003 | **F** |
| **22** | 0.175 | .125<br>.094 | .040<br>.035 | .055<br>.051 | .020 | PCB Finished Hole<br>0.026 ± .002 |
| **20** | | .156<br>.125 | .048<br>.042 | .088<br>.061 | .030 | Consult factory for alternate size |
| **16** | | .172<br>.141 | .082<br>.069 | .103<br>.097 | .050 | |
| **12** | | | .120<br>.112 | .142<br>.136 | .065 | |

Crimp / Removable*

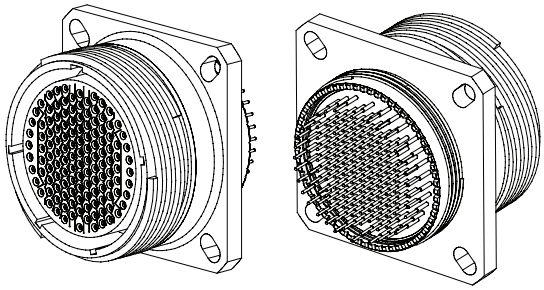



* Add 0.700" to overall length for crimp removable connector with integrated grommet.

# ESD Connectors & Composite Connectors

Sabritec's ESD Connector line is available for circular, rack and panel (ARINC), and D-Sub receptacles. These connectors offer the utmost protection against EMI and ESD environments. ESD connectors have a faraday cage which protects the components inside the connector from electrostatic discharges. The composite material shell is able to resist severe corrosion up to 2000 hours of salt spray and helps increase durability (up to 1500 cycles). ESD connectors meet protection requirements of IEC 801-2 and MIL-STD-1686.

| Material and Finishes | |
|---|---|
| **Shell** | Composite Material |
| **Insulator** | High grade plastic/epoxy |
| **Contacts** | Copper alloy, gold plate |
| **Grommet & Seal** | Silicon base elastomer |
| **Ground Plane** | Aluminum Nickel |
| **Capacitor** | Barium Titanate |
| **Inductor** | Ferrite bead |



# Composite Connectors

Sabritec's filter composite connectors are available for the MIL-DTL-38999 circular connector series. The filter composite materials can resist severe corrosion of up to 2000 hrs of salt spray. Using composite filter connectors can help increase durability up to 1500 cycles. Filter composite connectors have magnetic permeability that meet all MIL-DTL-38999 requirements. These connectors are ideal for power management systems, video processing equipment, and military fighter jets.

Filter connectors are also available with transient and EMI suppression. These connectors conform to the applicable military specifications and standards for materials and mechanical form, fit, and function. All Sabritec filter connectors can mate with non-filter connectors and in most cases are interchangeable.

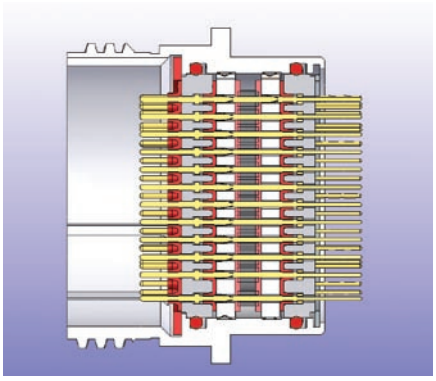
**Features:**

- All shell sizes and contact layouts for MIL-DTL-38999 series
- Composite materials resist severe corrosion up to 2000 hrs of salt spray
- Nickel, electroless nickel and cadmium plated versions
- Increased durability (up to 1500 cycles) with composite materials
- Magnetic permeability meets all MIL-DTL-38999 requirements

Crimp Removable Composite Filter Connector

# RoHS Compliant Solderless Filter Connectors

Sabritec has developed a new series of filtered connectors that are capable of providing exceptional low pass filtering and effective insertion loss without the use of soldered components.



Sabritec has qualified the solderless filter connector design to the applicable requirements listed in MIL-DTL-38999. For the qualification test report summary, please visit the technical notes section of our website.

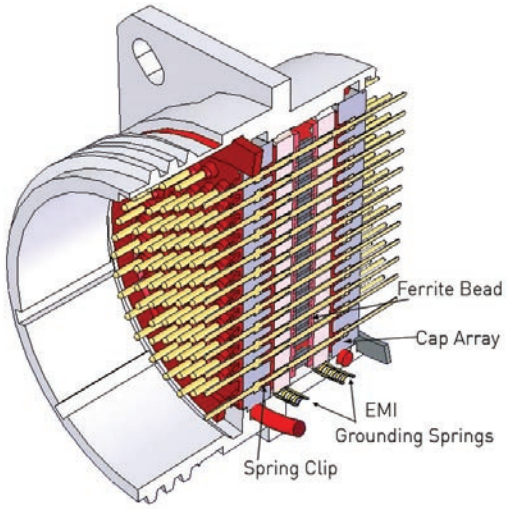
Solderless filter connectors contain a specially designed contact clip to make the connection from the signal/power contact to the capacitor array. An EMI ground spring provides a low resistance path between the capacitor array and connector shell. These connectors meet the same stringent electrical and mechanical requirements of soldered type filter connectors. A uniquely designed seal allows for water wash immersion of the connector in the unmated condition.

**Benefits of Solderless Filter Technology**

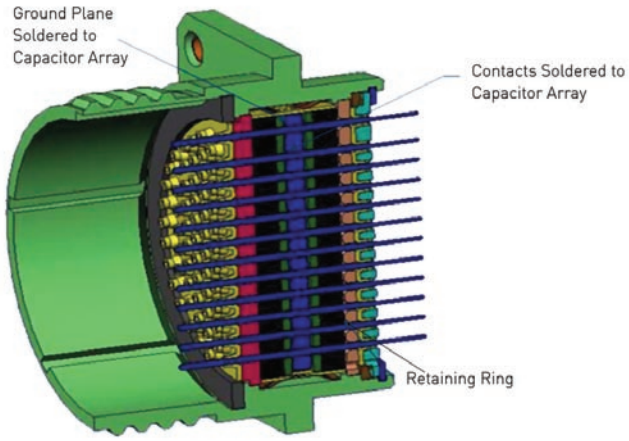
- RoHS Compliant
- No Solder design (not potted)
- Reworkable filter module assembly
- Modular construction
- High temperature lead free solder tolerant
- Qualification data available upon request

| Material and Finishes | |
|---|---|
| **Connector Shell** | Aluminum alloy/Steel/Composite |
| **Insulator** | High grade plastic/epoxy |
| **Contacts** | Copper alloy, gold plate |
| **Grommet & Seal** | Silicon base elastomer |
| **Jam Nut (if used)** | Aluminum alloy |
| **Capacitor** | Barium Titanate |
| **Inductor** | Ferrite bead |

## Solderless Filter Assembly




## Solder Filter Assembly



# MIL-DTL-38999 Connectors

MIL-DTL-38999 filter connectors are designed to meet or exceed all applicable requirements of Series I, II, III and IV. Filter connectors are intermateable and interchangeable with the standard non-filtered connectors.

| Material and Finishes | |
|---|---|
| **Shell** | Aluminum alloy/Steel/Composite |
| **Insulator** | High grade plastic/epoxy |
| **Contacts** | Copper alloy, gold plate |
| **Grommet & Seal** | Silicon base elastomer |
| **Jam Nut** | Aluminum alloy |
| **Ground Plane** | Brass, silver plate |
| **Capacitor** | Barium Titanate |
| **Inductor** | Ferrite bead |

## Part Number Description Code

P76 - 38999 - C - J - R - C - 25 - 61 - P - P - N

FILTER TYPE:
P, L, C

PREFIX:

SERIES:
A - I
B - II
C - III
D - IV

SHELL STYLE:
J - Jam Nut (Rear Mount)
B - Box Mount (Series II)
W - Wall Mount (Front or Rear Mount)

MOUNTING:
F - Front Mount
R - Rear Mount

MATERIAL/PLATING:
C - Aluminum Alloy/Cadmium over Nickel
N - Aluminum Alloy/Electroless Nickel
S - Stainless Steel /Electrolytic
CC - Composite/Cadmium over Nickel
CN - Composite/Electroless Nickel
SP - Stainless Steel/Passivated
(Consult factory for alternate plating options)

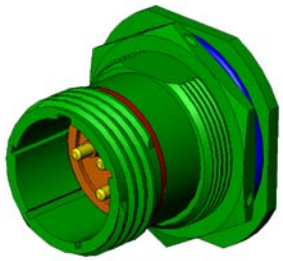
SHELL SIZE:
9 thru 25: Series I, III and IV
8 thru 24: Series II

INSERT ARRANGEMENT:

CONTACT TYPE:
P - Pin
S - Socket

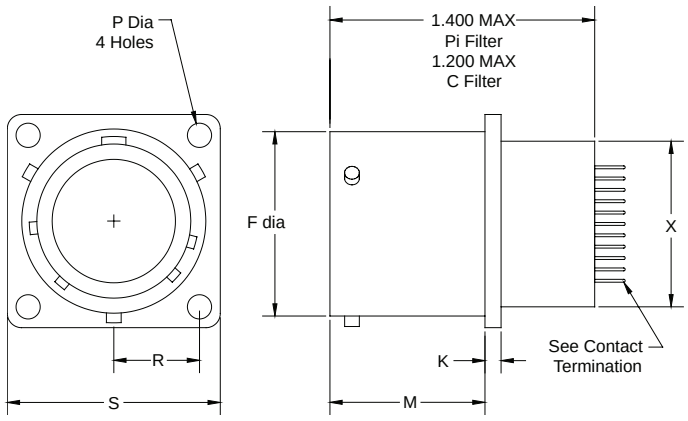
CONTACT TERMINATION:
S - Solder Cup
P - PC Tail
C - Crimp

POLARIZATION:
N, A, B, C, D, E



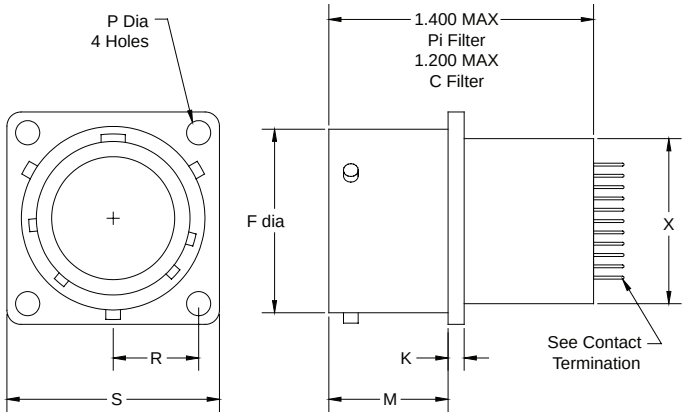
Sabritec provides specialty, enhanced performance connectors and cable assemblies and as such does not currently offer circular, rack and panel, or D-subminiature connectors that are listed on military standard Qualified Products Lists (QPL) per applicable detail specification sheets. Sabritec's connectors are fully intermateable with applicable QPL products and meet the applicable requirements of all military standards listed in this catalog.

## MS27505 Square Flange Receptacle
## Rear Mount



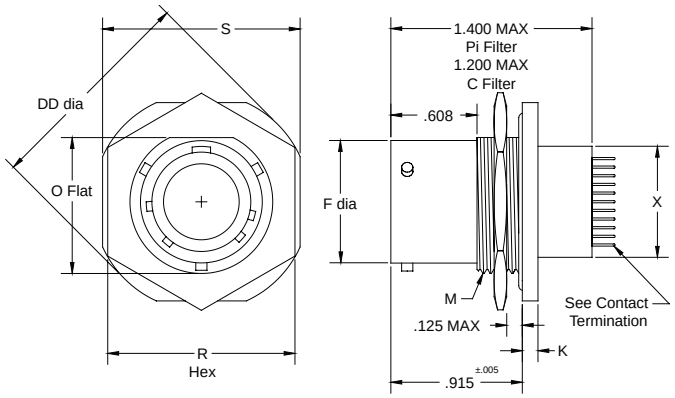

| Dimensions | | | | | | | |
|---|---|---|---|---|---|---|---|
| Shell Size | F ± .001 -.005 | K ± .015 -.000 | M ± .000 -.005 | P Dia ± .010 -.005 | R BSC | S ± .020 | X Max. Dia |
| 9 | 0.572 | 0.085 | 0.820 | 0.128 | 0.3595 | 0.938 | .500 |
| 11 | .700 | | | | 0.406 | 1.031 | .620 |
| 13 | .850 | | | | 0.453 | 1.125 | .740 |
| 15 | .975 | | | | 0.4845 | 1.219 | .890 |
| 17 | 1.100 | | | | 0.531 | 1.312 | 1.000 |
| 19 | 1.207 | 0.115 | | | 0.578 | 1.438 | 1.120 |
| 21 | 1.332 | | 0.790 | | 0.625 | 1.562 | 1.250 |
| 23 | 1.457 | | | 0.147 | 0.6875 | 1.688 | 1.390 |
| 25 | 1.582 | | | | .750 | 1.812 | 1.500 |

## MS27466 Square Flange Receptacle
## Front Mount



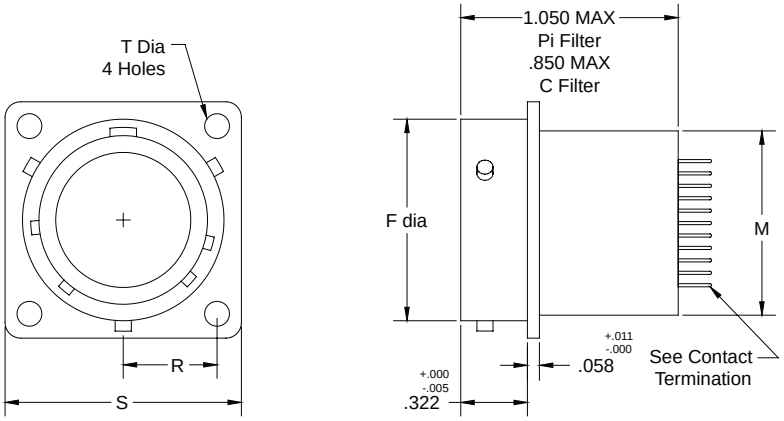

| Dimensions | | | | | | | |
|---|---|---|---|---|---|---|---|
| Shell Size | F ± .001 -.005 | K ± .015 -.000 | M ± .000 -.005 | P Dia ± .010 -.005 | R BSC | S ± .020 | X Max. Dia |
| 9 | 0.572 | 0.085 | 0.632 | 0.128 | 0.3595 | 0.938 | .500 |
| 11 | .700 | | | | 0.406 | 1.031 | .620 |
| 13 | .850 | | | | 0.453 | 1.125 | .740 |
| 15 | .975 | | | | 0.4845 | 1.219 | .890 |
| 17 | 1.100 | | | | 0.531 | 1.312 | 1.000 |
| 19 | 1.207 | 0.115 | | | 0.578 | 1.438 | 1.120 |
| 21 | 1.332 | | 0.602 | | 0.625 | 1.562 | 1.250 |
| 23 | 1.457 | | | 0.147 | 0.6875 | 1.688 | 1.390 |
| 25 | 1.582 | | | | .750 | 1.812 | 1.500 |

## MS27468 Jam Nut Receptacle



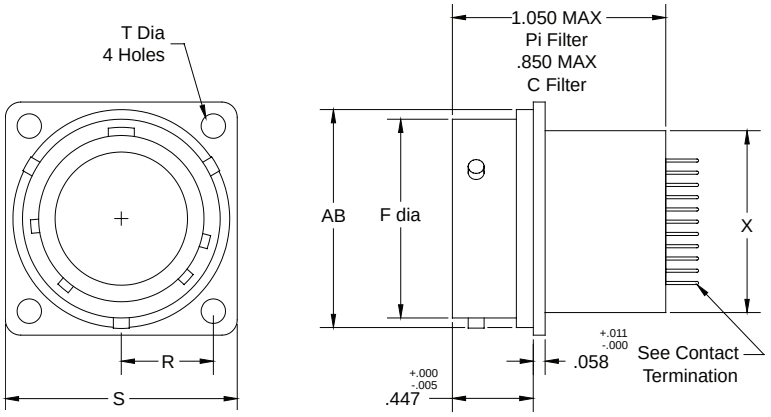

| Dimensions | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Shell Size | F ± .001 -.005 | K ± .015 -.000 | M Thread | O Flat ± .000 -.010 | R Hex ± .017 -.016 | S ± .016 | X Max. Dia | DD ± .016 |
| 9 | 0.572 | 0.085 | .6875-24 | .655 | .875 | 1.062 | .500 | 1.188 |
| 11 | .700 | | .8125-20 | .755 | 1.000 | 1.250 | .620 | 1.375 |
| 13 | .850 | | 1.000-20 | .942 | 1.188 | 1.375 | .740 | 1.5 |
| 15 | .975 | | 1.125-18 | 1.066 | 1.312 | 1.500 | .890 | 1.625 |
| 17 | 1.100 | | 1.250-18 | 1.191 | 1.438 | 1.625 | 1.000 | 1.75 |
| 19 | 1.207 | 0.115 | 1.375-18 | 1.316 | 1.562 | 1.812 | 1.120 | 1.938 |
| 21 | 1.332 | | 1.500-18 | 1.441 | 1.688 | 1.938 | 1.250 | 2.062 |
| 23 | 1.457 | | 1.625-18 | 1.566 | 1.812 | 2.062 | 1.390 | 2.188 |
| 25 | 1.582 | | 1.750-18 | 1.691 | 2.000 | 2.188 | 1.500 | 2.312 |

## MS27508 Square Flange Receptacle
## Rear Mount



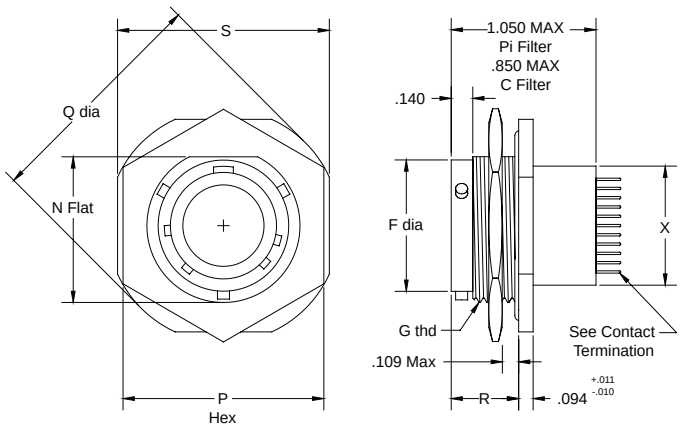

| Dimensions | | | | | |
|---|---|---|---|---|---|
| Shell Size | F ± .001 -.005 | T ± .010 -.005 | R BSC | S ± .020 | X Max. Dia |
| 8 | 0.473 | 0.12 | 0.297 | 0.828 | 0.5 |
| 10 | 0.59 | | 0.3595 | 0.954 | 0.62 |
| 12 | 0.75 | | 0.406 | 1.047 | 0.74 |
| 14 | 0.875 | | 0.453 | 1.141 | 0.89 |
| 16 | 1.000 | | 0.4845 | 1.234 | 1 |
| 18 | 1.125 | | 0.531 | 1.328 | 1.12 |
| 20 | 1.25 | | 0.578 | 1.453 | 1.25 |
| 22 | 1.375 | | 0.625 | 1.578 | 1.39 |
| 24 | 1.5 | 0.147 | 0.6875 | 1.703 | 1.5 |

## MS27499 Square Flange Receptacle
## Front Mount



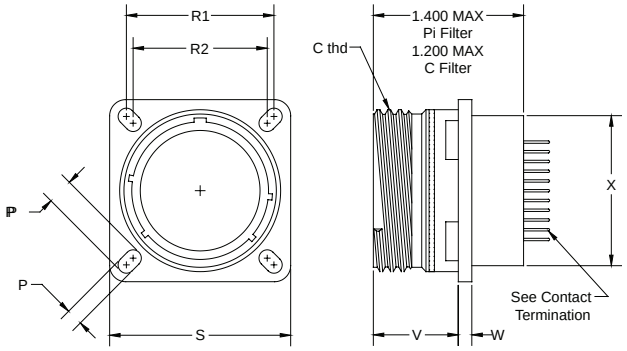

| Dimensions | | | | | | |
|---|---|---|---|---|---|---|
| Shell Size | F ± .001 -.005 | T ± .010 -.005 | R BSC | S Max | X Max | AB Max |
| 8 | 0.473 | 0.120 | 0.297 | 0.828 | 0.500 | 0.547 |
| 10 | 0.590 | | 0.360 | 0.954 | 0.620 | 0.672 |
| 12 | 0.750 | | 0.406 | 1.047 | 0.740 | 0.844 |
| 14 | 0.875 | | 0.453 | 1.141 | 0.890 | 0.969 |
| 16 | 1.000 | | 0.485 | 1.234 | 1.000 | 1.094 |
| 18 | 1.125 | | 0.531 | 1.328 | 1.120 | 1.219 |
| 20 | 1.250 | | 0.578 | 1.453 | 1.250 | 1.344 |
| 22 | 1.375 | | 0.625 | 1.578 | 1.390 | 1.469 |
| 24 | 1.500 | 0.147 | 0.688 | 1.703 | 1.500 | 1.594 |

## MS27474 Jam Nut Receptacle



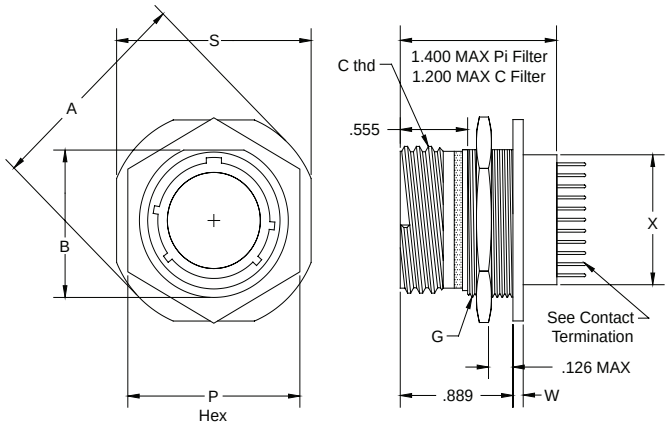

| Dimensions | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Shell Size | F ± .001 -.005 | N + .001 -.006 | G Thread | P Hex + .017 -.016 | Q + .016 | S + .016 | X Max. Dia | R ± .005 |
| 8 | .473 | .817 | .875-20 | 1.062 | 1.375 | 1.250 | .500 | 0.438 |
| 10 | .590 | .941 | 1.000-20 | 1.188 | 1.5 | 1.375 | .620 | |
| 12 | .750 | 1.065 | 1.125-18 | 1.312 | 1.625 | 1.500 | .740 | |
| 14 | .875 | 1.190 | 1.250-18 | 1.438 | 1.75 | 1.625 | .890 | |
| 16 | 1.000 | 1.320 | 1.375-18 | 1.562 | 1.938 | 1.781 | 1.000 | |
| 18 | 1.125 | 1.440 | 1.500-18 | 1.688 | 2.016 | 1.890 | 1.120 | |
| 20 | 1.250 | 1.565 | 1.625-18 | 1.812 | 2.141 | 2.016 | 1.250 | 0.464 |
| 22 | 1.375 | 1.690 | 1.750-18 | 2.000 | 2.265 | 2.140 | 1.390 | |
| 24 | 1.500 | 1.815 | 1.875-16 | 2.125 | 2.39 | 2.265 | 1.500 | |

## D38999/20 Box Mount Receptacle



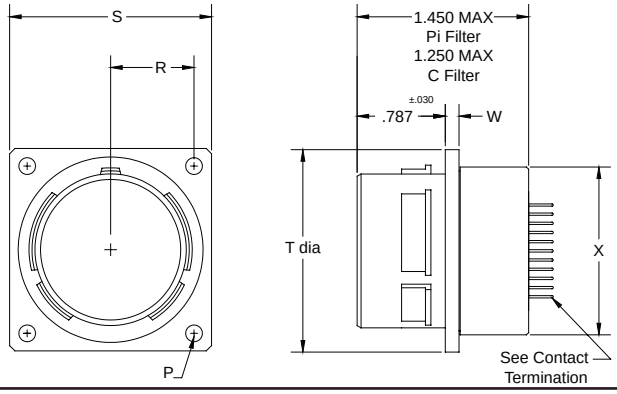

| Dimensions | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Shell Size | C Thread .1 Pitch .3 Lead | P ± .008 | R1 BSC | R2 BSC | V Max | W Max | X Max | PP Max ± .008 | S + .012 |
| 9 | 0.625 | 0.128 | .719 | .564 | .820 | .098 | .500 | .194 | .937 |
| 11 | .750 | | .812 | .719 | | | .620 | | 1.031 |
| 13 | .875 | | .906 | .812 | | | .740 | | 1.126 |
| 15 | 1.000 | | .969 | .906 | | | .890 | | 1.220 |
| 17 | 1.188 | | 1.062 | .969 | | | 1.000 | | 1.311 |
| 19 | 1.250 | | 1.156 | 1.062 | | | 1.120 | | 1.437 |
| 21 | 1.375 | 0.154 | 1.250 | 1.156 | .790 | .126 | 1.250 | .242 | 1.563 |
| 23 | 1.500 | | 1.375 | 1.250 | | | 1.390 | | 1.689 |
| 25 | 1.625 | | 1.500 | 1.375 | | | 1.500 | | 1.811 |

## D38999/24 Jam Nut Receptacle



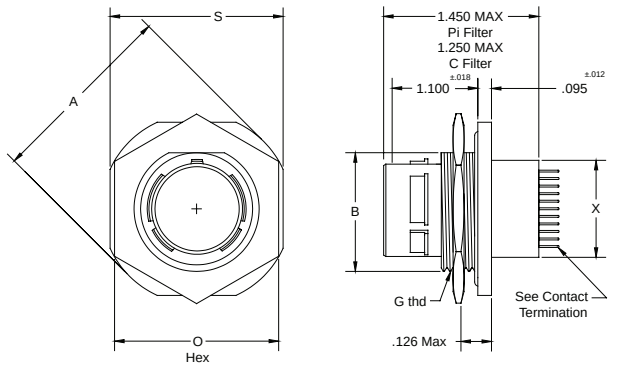

| Dimensions | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Shell Size | A ±.012 | B + .004 -.006 | C Thread .1 Pitch .3 Lead | G Thread 6g .10R | P Hex | S ±.015 | W +.028 -.004 | X Max |
| 9 | 1.189 | .651 | .625 | M17X1 | .945 \| .912 | 1.063 | .087 | .500 |
| 11 | 1.374 | .751 | .750 | M20x1 | 1.062 \| .0983 | 1.252 | | .620 |
| 13 | 1.500 | .938 | .875 | M25x1 | 1.260 \| 1.234 | 1.374 | | .740 |
| 15 | 1.625 | 1.062 | 1.000 | M28x1 | 1.456 \| 1.424 | 1.500 | | .890 |
| 17 | 1.812 | 1.187 | 1.1875 | M32x1 | 1.614 \| 1.581 | 1.626 | | 1.000 |
| 19 | 1.938 | 1.312 | 1.250 | M35x1 | 1.811 \| 1.781 | 1.811 | .118 | 1.120 |
| 21 | 2.062 | 1.437 | 1.375 | M38x1 | 1.968 \| 1.938 | 1.937 | | 1.250 |
| 23 | 2.188 | 1.562 | 1.500 | M41x1 | | 2.063 | | 1.390 |
| 25 | 2.312 | 1.687 | 1.625 | M44x1 | | 2.189 | | 1.500 |

## D38999/40 Box Mount Receptacle




| Dimensions | | | | | | |
|---|---|---|---|---|---|---|
| Shell Size | T ±.008 | W ± .010 | P ± .008 | R BSC | S ± .021 | X Max |
| 11 | 0.786 | 0.093 | 0.139 | 0.406 | 1.029 | 0.620 |
| 13 | 0.912 | | | 0.453 | 1.124 | 0.740 |
| 15 | 1.036 | | | 0.485 | 1.218 | 0.890 |
| 17 | 1.162 | | | 0.531 | 1.312 | 1.000 |
| 19 | 1.286 | | | 0.578 | 1.439 | 1.120 |
| 21 | 1.412 | 0.124 | | 0.625 | 1.561 | 1.250 |
| 23 | 1.536 | | 0.150 | 0.688 | 1.706 | 1.390 |
| 25 | 1.662 | | | 0.750 | 1.813 | 1.500 |

## D38999/44 Jam Nut Receptacle




| Dimensions | | | | | | |
|---|---|---|---|---|---|---|
| Shell Size | B Flat ±.004 | G THD 6g 0.1R | A Dia. ± .020 | O Hex ± .013 | S ± .020 | X Max |
| 11 | 0.938 | M25x1 | 1.500 | 1.250 | 1.374 | 0.620 |
| 13 | 1.062 | M28x1 | 1.622 | 1.405 | 1.5 | 0.740 |
| 15 | 1.1875 | M31x1 | 1.749 | 1.600 | 1.622 | 0.890 |
| 17 | 1.318 | M34x1 | 1.937 | | 1.78 | 1.000 |
| 19 | 1.4375 | M38x1 | 2.015 | 1.796 | 1.89 | 1.120 |
| 21 | 1.562 | M41x1 | 2.138 | 1.954 | 2.016 | 1.250 |
| 23 | 1.6875 | M44x1 | 2.268 | | 2.138 | 1.390 |
| 25 | 1.812 | M47x1 | 2.390 | 2.141 | 2.264 | 1.500 |

# MIL-DTL-38999 Insert Arrangements

3 #20
9-98
8-98

6 #22D
9-35
8-35

2 #16
11-2

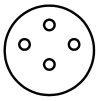
4 #20
11-4

5 #20
11-5
10-5

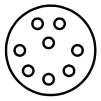
6 #20
11-98
10-98

7 #20
11-99
10-99

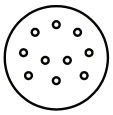
13 #22D
11-35
10-35



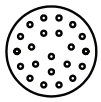
4 #16
13-4
12-4



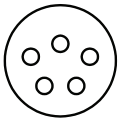
8 #20
13-8
12-8



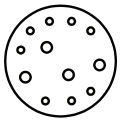
10 #20
13-98
12-98



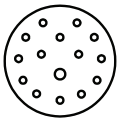
22 #22
13-35
12-35



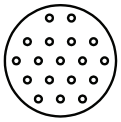
5 #16
15-5
14-5



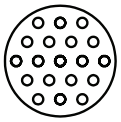
8 #20, 4#16
15-97
14-97



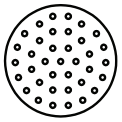
14 #20, 1 #16
15-15
14-15



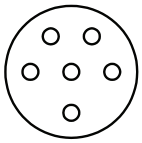
18 #20
15-18
14-18



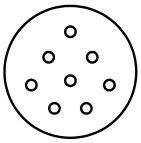
19 #20
15-19
14-19



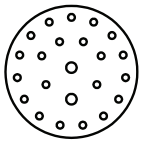
37 #22D
15-35
14-35



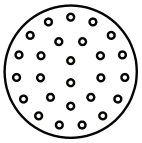
6 #12
17-6
16-6



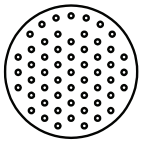
8 #16
17-8
16-8



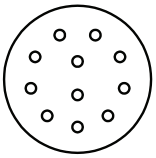
21 #20, 2 #16
17-99
16-99



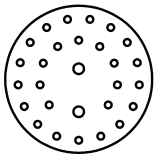
26 #20
17-26
16-26



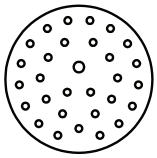
55 #22D
17-35
16-35



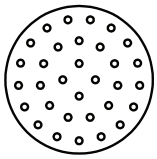
11 #16
19-11
18-11



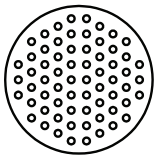
26 #20, 2 #16
19-28
18-28



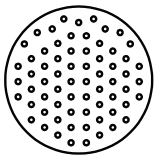
29 #20, 1 #16
19-30
18-30



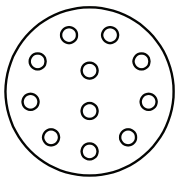
32 #20
19-32
18-32



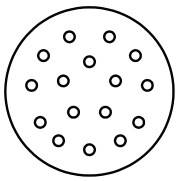
66 #22D
19-35
18-35



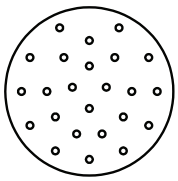
67 #22D
19-45
18-45



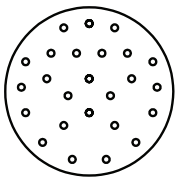
11 #12
21-11



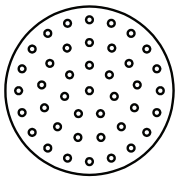
16 #16
21-16
20-16



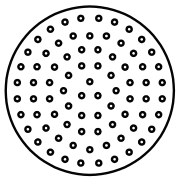
24 #20
21-24
20-24



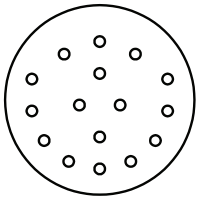
25 #20
21-25
20-25



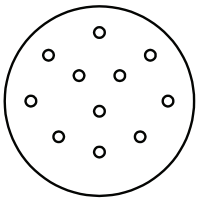
41 #20
21-41
20-41



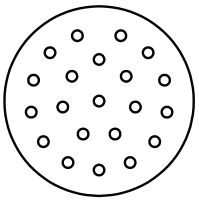
79 #22D
21-35
20-35



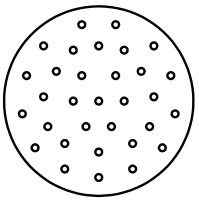
16 #16
23-97



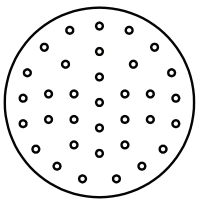
11 #16
23-99



21 #16
23-21



32 #20
23-32



34 #20
23-34



36 #20
23-36



55 #20
23-55



100 #22D
23-35



19 #12
25-19



10 #20, 13 #16, 4 #12
3 #8 TWINAX
25-20



23 #20, 20 #16
25-43



29 #16
25-29



40 #20, 4 #16
2 #8 COAX
25-46



61 #20
25-61



128 #22D
25-35



Custom Layout*
XX-XX

* Odd Numbered Shell Sizes Series I, III & IV, Even Numbered Shell Sizes Series II

# MIL-DTL-83723 Series III / MIL-DTL-26500


Type T


Type B

MIL-DTL-83723 Series III / MIL-DTL-26500 filter connectors are designed to meet or exceed all applicable requirements of the military specifications. The filter connectors are intermateable and interchangeable with the standard non-filtered connectors.

| Material and Finishes | |
|---|---|
| **Shell** | Aluminum alloy/Steel/ Composite |
| **Insulator** | High grade plastic/epoxy |
| **Contacts** | Copper alloy, gold plate |
| **Grommet & Seal** | Silicon base elastomer |
| **Jam Nut** | Aluminum alloy |
| **Ground Plane** | Brass, silver plate |
| **Capacitor** | Barium Titanate |
| **Inductor** | Ferrite bead |

## Part Number Description Code

P200 - 83723 - J - 20 - 41 - P - S - N - N

FILTER TYPE:
Pi, L, C

PREFIX:

SHELL STYLE:
J - Jam Nut
F - 4 Hole Flange

SHELL SIZE:
8 thru 24

INSERT ARRANGEMENT:

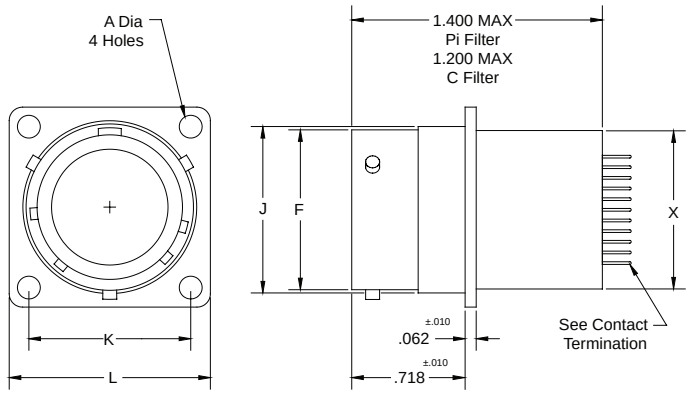
POLARIZATION:
N, 6, 7, 8, 9

PLATING:
C - Olive Drab Cadmium over Nickel
N - Electroless Nickel

CONTACT TERMINATION:
S - Solder Cup
P - PC Tail
C - Crimp

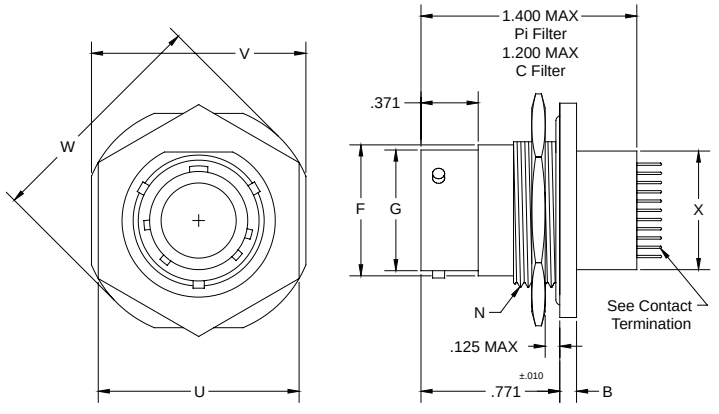
CONTACT TYPE:
P - Pin
S - Socket

## Square Flange Receptacle - Type B




| Shell Size | DIMENSIONS A Max | K BSC | L | J Dia | F Dia | X Max Dia |
|---|---|---|---|---|---|---|
| 8 | .120 | .594 | .812 | .561 | .536<br>.531 | .500 |
| 10 | .120 | .719 | .937 | .696 | .659<br>.654 | .620 |
| 12 | .120 | .812 | 1.031 | .875 | .829<br>.824 | .740 |
| 14 | .120 | .906 | 1.125 | .925 | .898<br>.893 | .890 |
| 16 | .120 | .969 | 1.250 | 1.062 | 1.025<br>1.020 | 1.000 |
| 18 | .120 | 1.062 | 1.343 | 1.187 | 1.131<br>1.126 | 1.120 |
| 20 | .120 | 1.156 | 1.437 | 1.312 | 1.256<br>1.251 | 1.250 |
| 22 | .120 | 1.250 | 1.562 | 1.437 | 1.381<br>1.376 | 1.390 |
| 24 | .149 | 1.375 | 1.703 | 1.562 | 1.506<br>1.501 | 1.500 |

## Jam Nut Receptacle - Type B




| Shell Size | DIMENSIONS B | F Dia | G Dia | N Thrd | U | V | W | X |
|---|---|---|---|---|---|---|---|---|
| 8 | .137<br>.097 | .561 | .536<br>.531 | .625-20 | .670 | .979 | 1.068 | .500 |
| 10 | .137<br>.097 | .696 | .659<br>.654 | .750-20 | .796 | 1.104 | 1.192 | .620 |
| 12 | .113<br>.097 | .875 | .829<br>.824 | .9375-20 | .984 | 1.291 | 1.380 | .740 |
| 14 | .137<br>.097 | .935 | .898<br>.893 | 1.000-20 | 1.046 | 1.391 | 1.505 | .890 |
| 16 | .137<br>.097 | 1.062 | 1.025<br>1.020 | 1.125-20 | 1.171 | 1.516 | 1.630 | 1.00 |
| 18 | .137<br>.097 | 1.187 | 1.131<br>1.126 | 1.250-18 | 1.296 | 1.641 | 1.756 | 1.120 |
| 20 | .137<br>.097 | 1.312 | 1.256<br>1.251 | 1.375-18 | 1.484 | 1.766 | 1.860 | 1.250 |
| 22 | .168<br>.128 | 1.437 | 1.381<br>1.376 | 1.500-18 | 1.609 | 1.954 | 2.068 | 1.390 |
| 24 | .168<br>.128 | 1.562 | 1.506<br>1.501 | 1.625-18 | 1.734 | 2.079 | 2.160 | 1.500 |

Sabritec provides specialty, enhanced performance connectors and cable assemblies and as such does not currently offer circular, rack and panel, or D-subminiature connectors that are listed on military standard Qualified Products Lists (QPL) per applicable detail specification sheets. Sabritec's connectors are fully intermateable with applicable QPL products and meet the applicable requirements of all military standards listed in this catalog.

# MIL-DTL-83723 Series III / MIL-DTL-26500

## Insert Arrangements


2 #20
8-2


3 #20
8-3

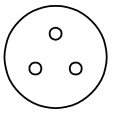

3 #20
8-98

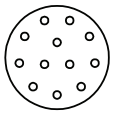

2 #20
10-2

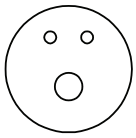

5 #20
10-5

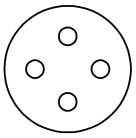

6 #20
10-6

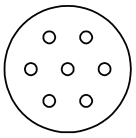

2 #16
10-20

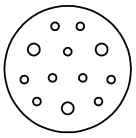

3 #16
12-3

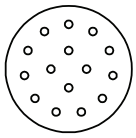

12 #20
12-12

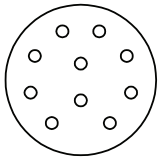

2 #16, 1 #8 COAX
14-3

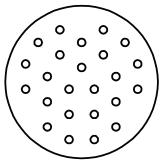

4 #12
14-4


7 #16
14-7


9 #20, 3 #16
14-12


15 #20
14-15


10 #16
16-10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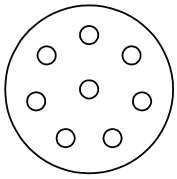
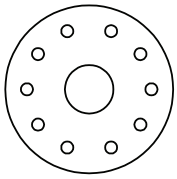
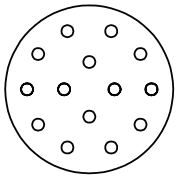
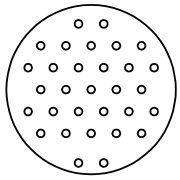
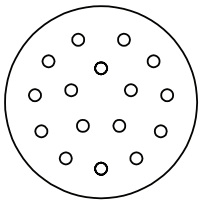
16-24

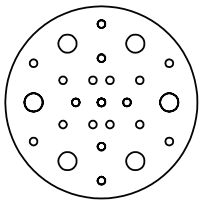

8 #12
18-8


10 #16, 1 #8 COAX
18-11


14 #16
18-14


31 #20
18-31


16 #16
20-16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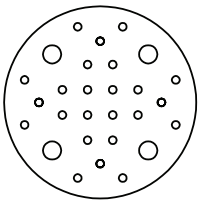
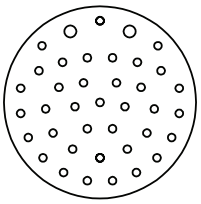
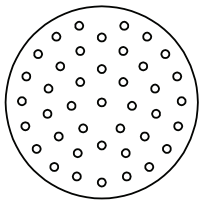

24 #20, 4 #12
20-28


37 #20, 2 #16
20-39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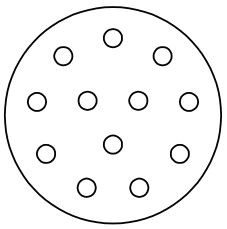
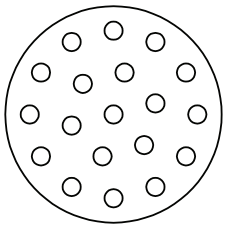
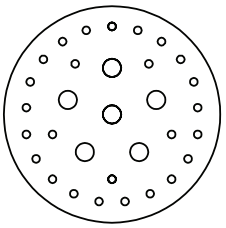
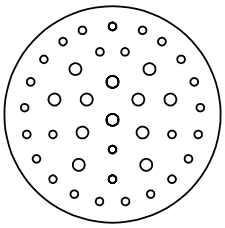
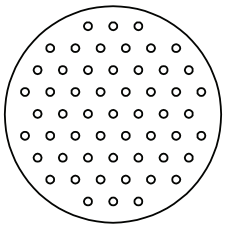
20-41

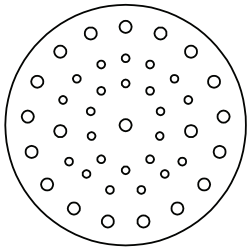

12 #12
22-12

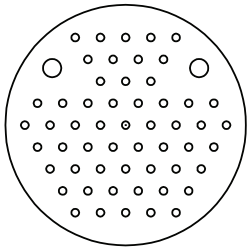

19 #16
22-19

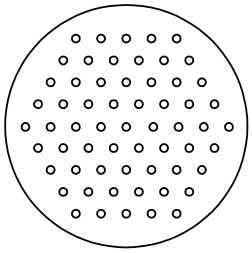

26 #20, 6 #12
22-32

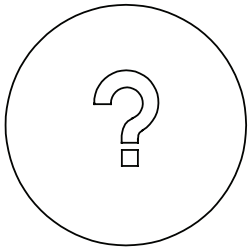

27 #20, 12 #16
22-39


55 #20
22-55


23 #20, 20 #16
24-43


55 #20, 2 #12
24-57


61 #20
24-61


Custom Layout*
XX-XX

# MIL-C-26482 Series II
# MIL-DTL-83723 Series I

MIL-C-26482 Series II / MIL-DTL-83723 Series I filter connectors are designed to meet or exceed all applicable requirements of the military specifications. The filter connectors are intermateable and interchangeable with the standard non-filtered connectors.

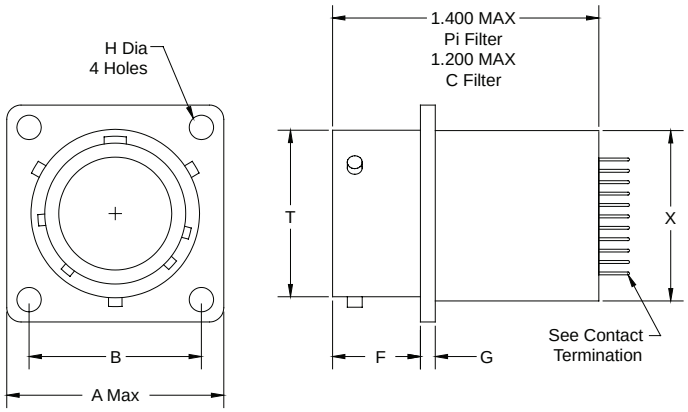
| Material and Finishes | |
|---|---|
| **Shell** | Aluminum alloy |
| **Insulator** | High grade plastic/epoxy |
| **Contacts** | Copper alloy, gold plate |
| **Grommet & Seal** | Silicon base elastomer |
| **Jam Nut** | Aluminum alloy |
| **Ground Plane** | Brass, silver plate |
| **Capacitor** | Barium Titanate |
| **Inductor** | Ferrite bead |

## Part Number Description Code

P200 - 26482 - B - 20 - 41 - P - S - N - N

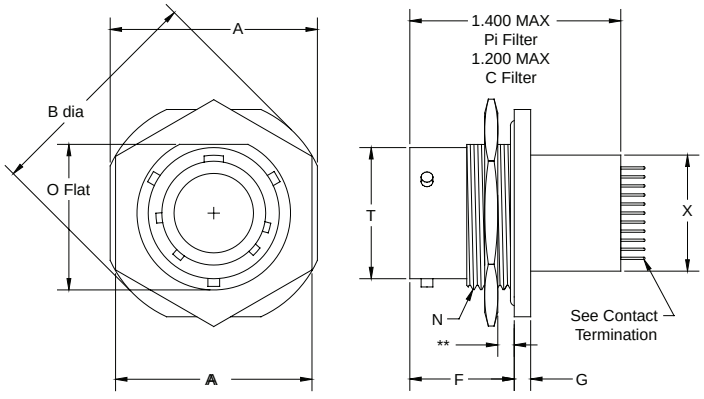
- FILTER TYPE: Pi, L, C
- PREFIX:
- SHELL STYLE: J - Jam Nut; B - Box Mount; W - Wall Mount
- SHELL SIZE: 8 thru 24
- INSERT ARRANGEMENT:
- CONTACT TYPE: P - Pin; S - Socket
- CONTACT TERMINATION: S - Solder Cup; P - PC Tail; C - Crimp
- PLATING: C - Olive Drab Cadmium over Nickel; N - Electroless Nickel
- POLARIZATION: N, W, X, Y, Z

## MS3470 Square Flange Receptacle




| DIMENSIONS | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Shell Size** | **A Max** | **B BSC** | **F** | **G Dia** | **H Dia** | **T Max** | **X Max Dia** |
| **8** | .828 | .594 | .462 .431 | .078 .046 | .120 | .474 .468 | .500 |
| **10** | .954 | .719 | | | | .591 .585 | .620 |
| **12** | 1.047 | .812 | | | | .751 .745 | .740 |
| **14** | 1.141 | .906 | | | | .876 .870 | .890 |
| **16** | 1.231 | .969 | | | | 1.001 .995 | 1.000 |
| **18** | 1.328 | 1.062 | | | | 1.126 1.120 | 1.120 |
| **20** | 1.458 | 1.156 | .587 | .110 | | 1.251 1.245 | 1.250 |
| **22** | 1.578 | 1.250 | .556 | | | 1.376 1.370 | 1.390 |
| **24** | 1.703 | 1.375 | .620 .589 | .078 | .147 | 1.501 1.495 | 1.500 |

## MS3474 Jam Nut Receptacle



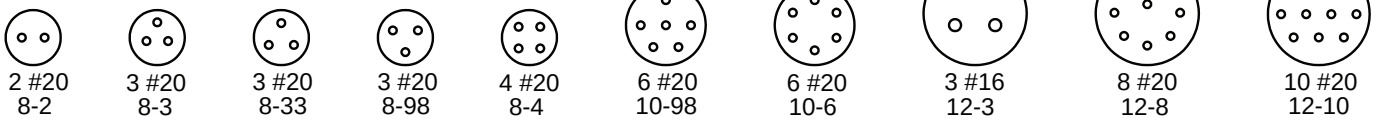

| DIMENSIONS | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Shell Size** | **A Max** | **B Dia.** | **F** | **G Dia** | **N** | **O 1.005 Flat** | **T Dia.** | **X Max Dia** | **AA Hex Dia** |
| **8** | .954 .923 | 1.078 1.047 | .707 .658 | .113 .086 | .5625-24 | .525 | 4.74 4.68 | .500 | 0.767 |
| **10** | 1.078 1.047 | 1.203 1.172 | | | .6875-24 | .650 | .591 .585 | .620 | 0.892 |
| **12** | 1.266 1.235 | 1.391 1.360 | | | .875-20 | .813 | .751 .745 | .740 | 1.079 |
| **14** | 1.391 1.360 | 1.516 1.485 | | | 1.000-20 | .937 | .876 .870 | .890 | 1.205 |
| **16** | 1.516 1.485 | 1.641 1.610 | | | 1.125-18 | 1.061 | 1.001 .995 | 1.000 | 1.329 |
| **18** | 1.641 1.610 | 1.766 1.735 | | | 1.120-18 | 1.166 | 1.126 1.120 | 1.120 | 1.455 |
| **20** | 1.828 .797 | 1.954 1.923 | .772 .721 | .148 .096 | 1.375-18 | 1.311 | 1.251 1.245 | 1.250 | 1.579 |
| **22** | 1.954 1.923 | 2.078 2.047 | | | 1.500-18 | 1.436 | 1.376 1.370 | 1.390 | 1.705 |
| **24** | 2.078 2.047 | 2.203 2.172 | | | 1.625-18 | 1.561 | 1.501 1.495 | 1.500 | 1.829 |

**.187 Max Shell Size 8-18
.250 Max Shell Size 20-24

Sabritec provides specialty, enhanced performance connectors and cable assemblies and as such does not currently offer circular, rack and panel, or D-subminiature connectors that are listed on military standard Qualified Products Lists (QPL) per applicable detail specification sheets. Sabritec's connectors are fully intermateable with applicable QPL products and meet the applicable requirements of all military standards listed in this catalog.

# MIL-C-26482 / MIL-DTL-83723

## Insert Arrangements



2 #20
8-2

3 #20
8-3

3 #20
8-33

3 #20
8-98

4 #20
8-4

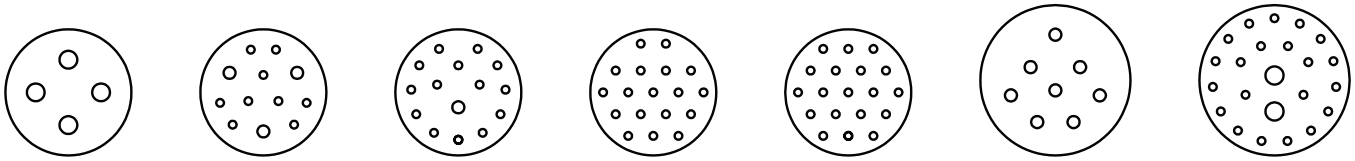
6 #20
10-98

6 #20
10-6

3 #16
12-3

8 #20
12-8

10 #20
12-10



4 #12
14-4

8 #20, 4 #16
14-12

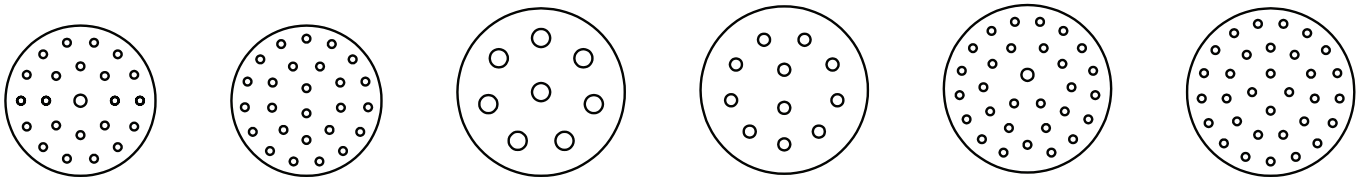
14 #20, 1 #16
14-15

18 #20
14-18

19 #20
14-19

8 #16
16-8

21 #20, 2 #16
16-99



22 #20, 1 #16
16-23

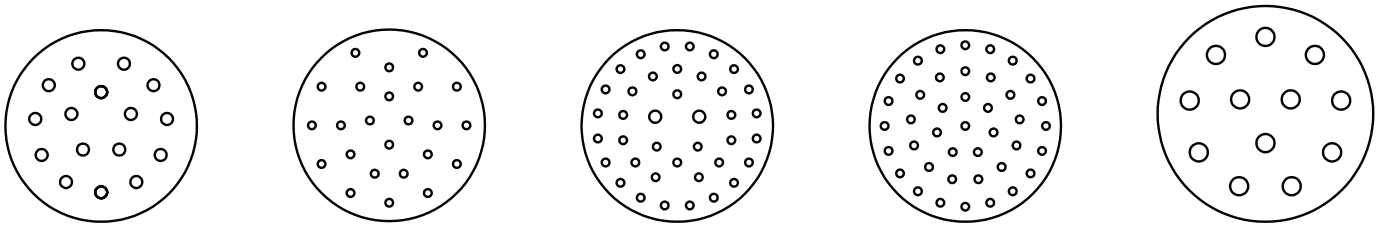
26 #20
16-26

8 #12
18-8

11 #16
18-11

29 #20, 1 #16
18-30

32 #20
18-32



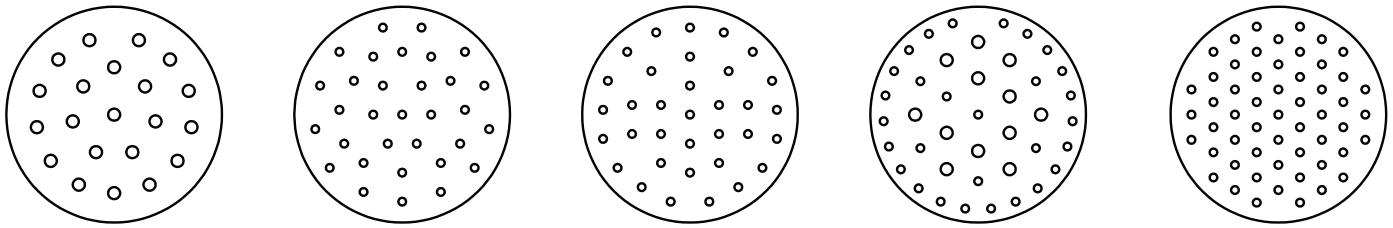
16 #16
20-16

24 #20
20-24

37 #20, 2 #16
20-39

41 #20
20-41

12 #12
22-12



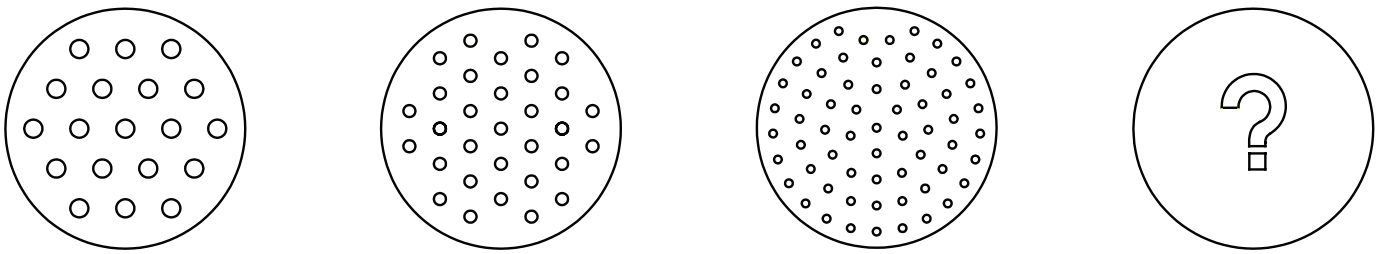
21 #16
22-21

32 #20
22-32

34 #20
22-34

27 #20, 14 #16
22-41

55 #20
22-55



19 #12
24-19

31 #16
24-31

61 #20
24-61

Custom Layout*
XX-XX

# ARINC 404

## MIL-C-81659

Sabritec's ARINC 404 filter connectors are designed to meet or exceed all applicable requirements of the military specification. These connectors are intermateable and interchangeable with the standard non-filtered connectors.

| Material and Finishes | |
|---|---|
| **Shell** | Aluminum alloy/Steel/Composite |
| **Insulator** | High grade plastic/epoxy |
| **Contacts** | Copper alloy, gold plate |
| **Grommet & Seal** | Silicon base elastomer |
| **Ground Plane** | Beryllium copper, silver plate |
| **Capacitor** | Barium Titanate |
| **Inductor** | Ferrite bead |

## Part Number Description Code

P200 - 404 - 2 - N - A106 - P - B57 - P - P

FILTER TYPE:
Pi, L, C

PREFIX:

SHELL SIZE:
1, 2, 3, 4

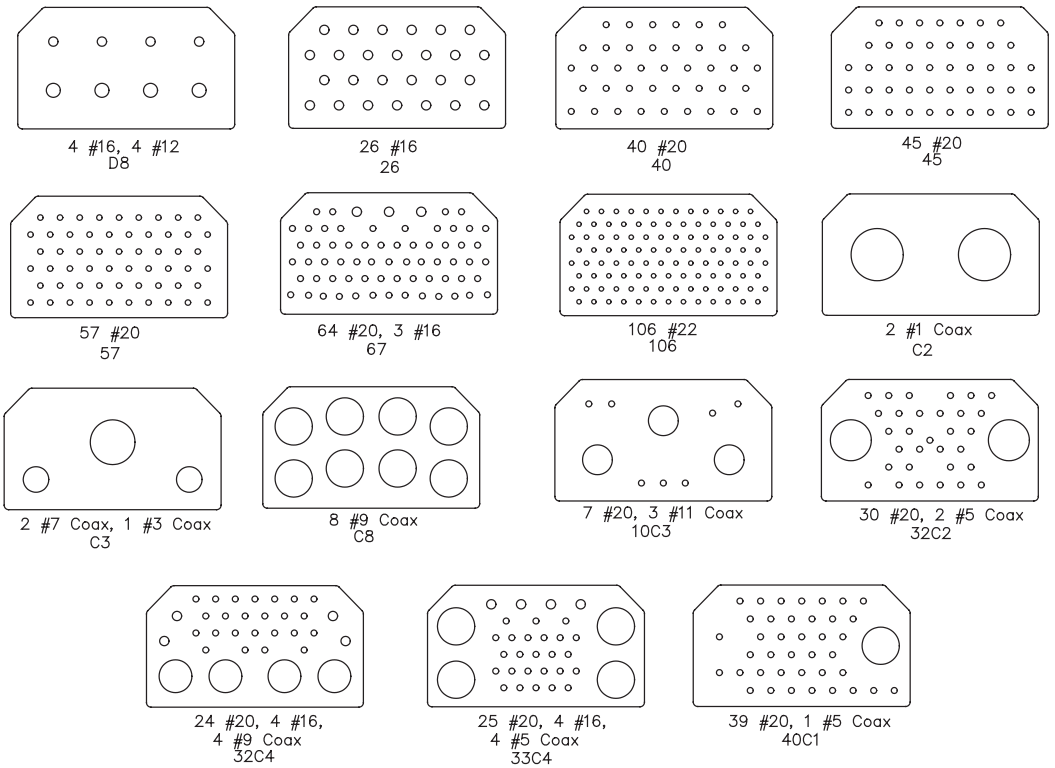
PLATING:
C - Cadmium (Yellow Chromate)
N - Electroless Nickel

CONTACT TERMINATION:
S - Solder Cup
P - PC Tail
C - Crimp

INSERT ARRANGEMENTS
Cavity A, B, C, D

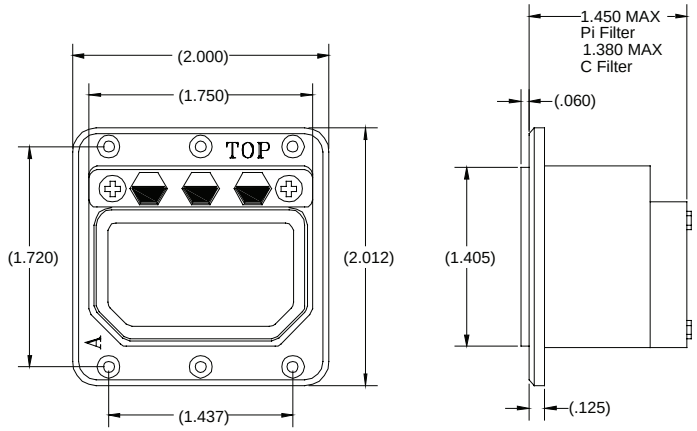
CONTACT TYPE:
P - Pin
S - Socket

## Insert Arrangements

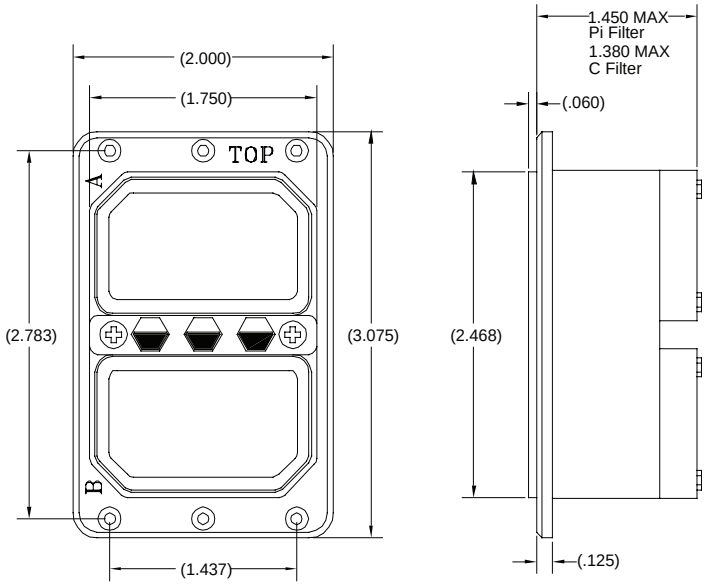



Sabritec provides specialty, enhanced performance connectors and cable assemblies and as such does not currently offer circular, rack and panel, or D-subminiature connectors that are listed on military standard Qualified Products Lists (QPL) per applicable detail specification sheets. Sabritec's connectors are fully intermateable with applicable QPL products and meet the applicable requirements of all military standards listed in this catalog.

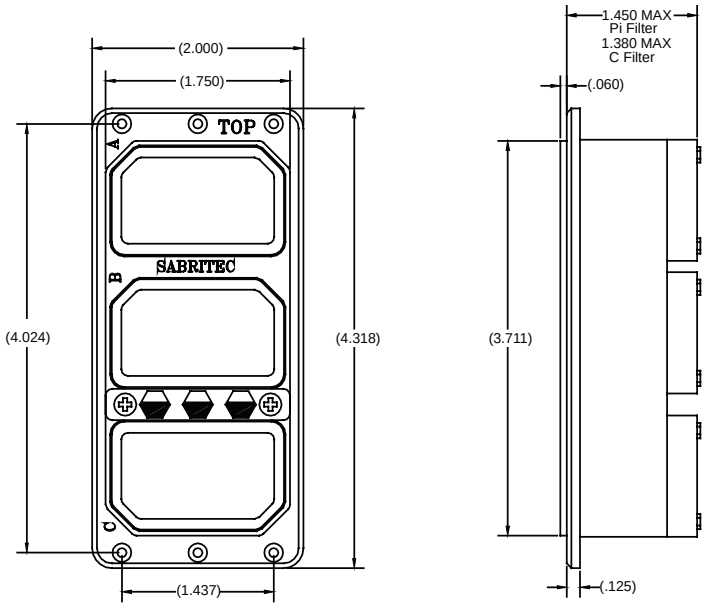
### Shell Size 1



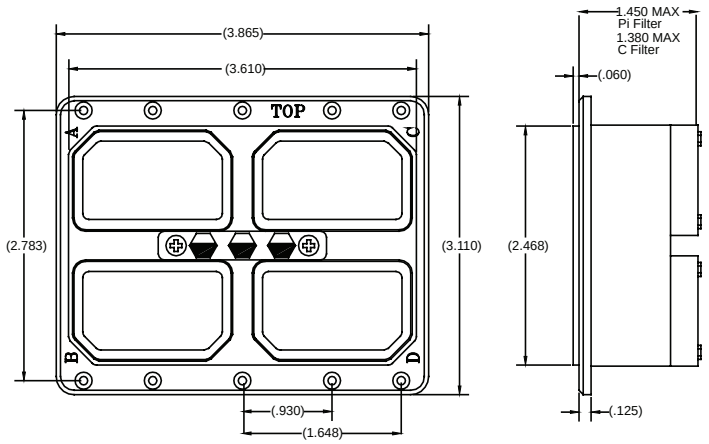

### Shell Size 2




### Shell Size 3

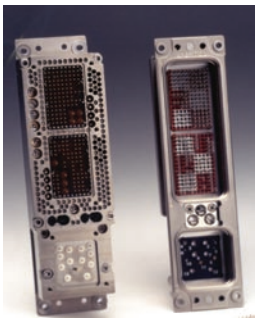



### Shell Size 4



# ARINC 600

ARINC 600 filter connectors are designed to meet or exceed all applicable requirements of the specification. These connectors are intermateable and interchangeable with the standard non-filtered connectors.



| Material and Finishes | |
|---|---|
| **Shell** | Aluminum alloy |
| **Insulator** | High grade plastic/epoxy |
| **Contacts** | Copper alloy, gold plate |
| **Grommet & Seal** | Silicon base elastomer |
| **Ground Plane** | Brass, Silver Plate |
| **Capacitor** | Barium Titanate |
| **Inductor** | Ferrite bead |

## Part Number Description Code

P200 - 600 - 2 - N - 150 - P - 13C2 - P - S

FILTER TYPE:
Pi, L, C

PREFIX:

SHELL SIZE:
1, 2, 3

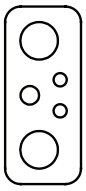
PLATING:
C - Cadmium (Yellow Chromate)
N - Electroless Nickel

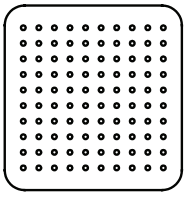
CONTACT TERMINATION:
S - Solder Cup
P - PC Tail
C - Crimp

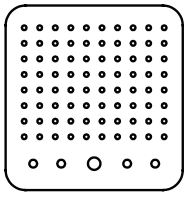
INSERT ARRANGEMENTS:
Cavity A, B, C, D, E, F

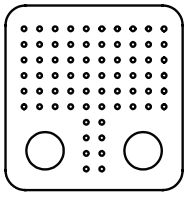
CONTACT TYPE:
P - Pin
S - Socket

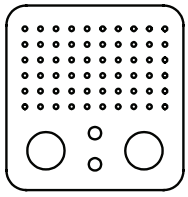
## Insert Arrangements

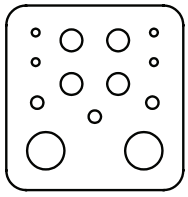

1 #12, 2 #16,
2 #5 Coax
5C2

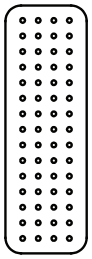

100 #22
100

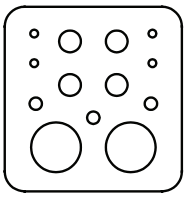

80 #22, 4 #20, 1 #16
85

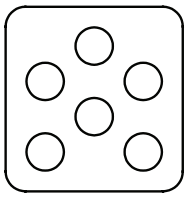

68 #22, 2 #8
68Q2

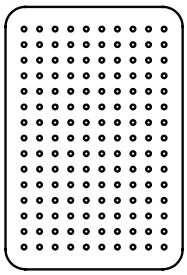

60 #22, 2 #16, 2 #8
62Q2

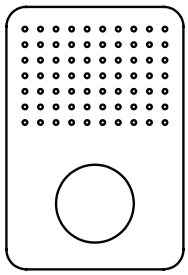

4 #20, 3 #16, 4 #12
11Q2

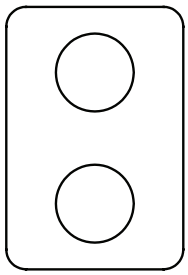

60 #22
60


4 #20, 4 #12, 3 #16
2 #5 Coax
13C2


6 #8
Q6
Metallic Insert


150 #22
150


70 #22, 1 #1 Coax
150

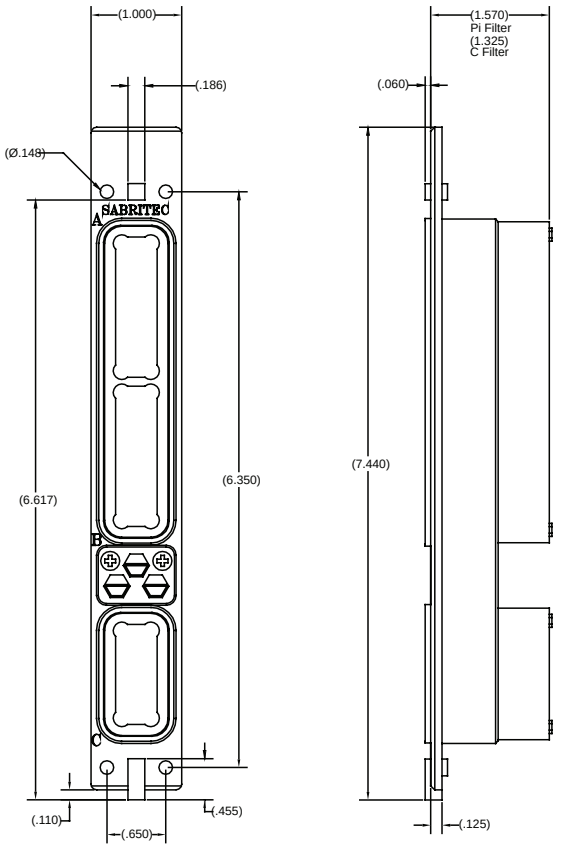

2 #1 Coax
C2

Sabritec provides specialty, enhanced performance connectors and cable assemblies and as such does not currently offer circular, rack and panel, or D-subminiature connectors that are listed on military standard Qualified Products Lists (QPL) per applicable detail specification sheets. Sabritec's connectors are fully intermateable with applicable QPL products and meet the applicable requirements of all military standards listed in this catalog.

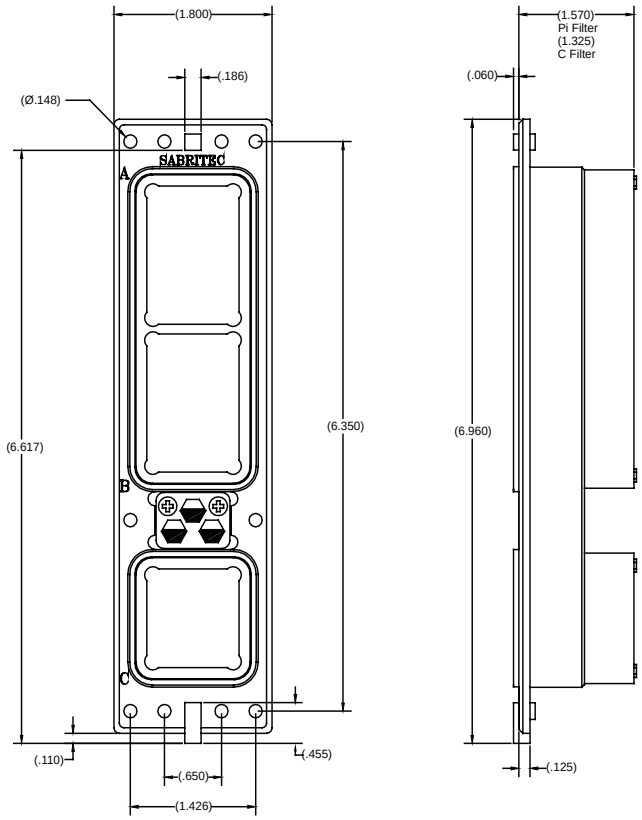
# ARINC 600

## Shell Sizes 1-3

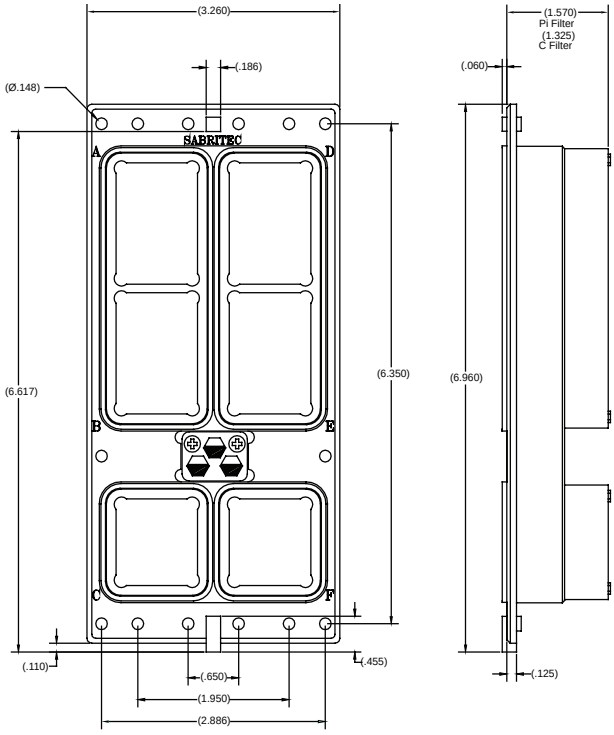
### Shell Size 1



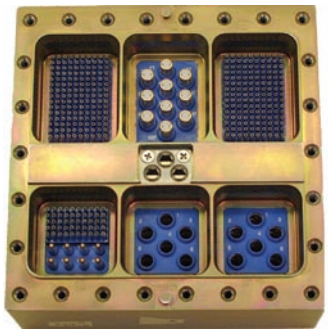

### Shell Size 2




### Shell Size 3



# MIL-DTL-83527



MIL-DTL-83527 connectors are designed to meet or exceed all applicable requirements of the military specification. These connectors come standard with anti-rotational keyed insert assemblies for filter, high-speed fibre channel or Ethernet twinax and quadrax contacts. Offered in a number of different contact arrangements and shell sizes, these connectors are intermateable and interchangeable with the standard non-filtered MIL-DTL-83527 connectors.

## Part Number Description Code

P200 - 83527 - 4A - N - 150 - P - 150 - P - S

FILTER TYPE:
Pi, L, C

PREFIX:

SHELL SIZE:
2A, 3A, 4A

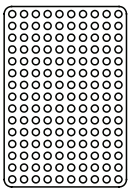
PLATING:
C - Cadmium (Yellow Chromate)
N - Electroless Nickel

CONTACT TERMINATION:
S - Solder Cup
P - PC Tail
C - Crimp

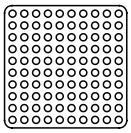
INSERT ARRANGEMENTS:
Cavity A, B, C, D, E, F

CONTACT TYPE:
P - Pin
S - Socket

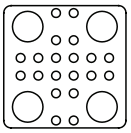
## Insert Arrangements



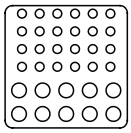
I-150
150 #22



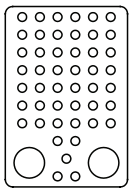
II-100
100 #22



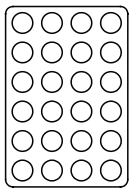
II-20T4
20 #20
4 #8 T/C



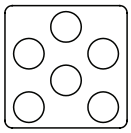
II-34
24 #20
10 #16



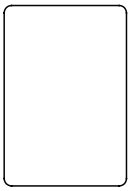
I-47T2
47 #20
2 #8 T/C



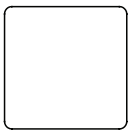
I-24
24 #12



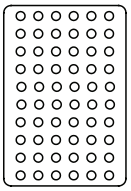
II-T6
6 #8 T/C



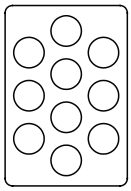
I-0
BLANK
CUSTOM



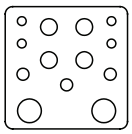
II-0
BLANK
CUSTOM



I-60
60 #20



10P10
10 #8 T/C



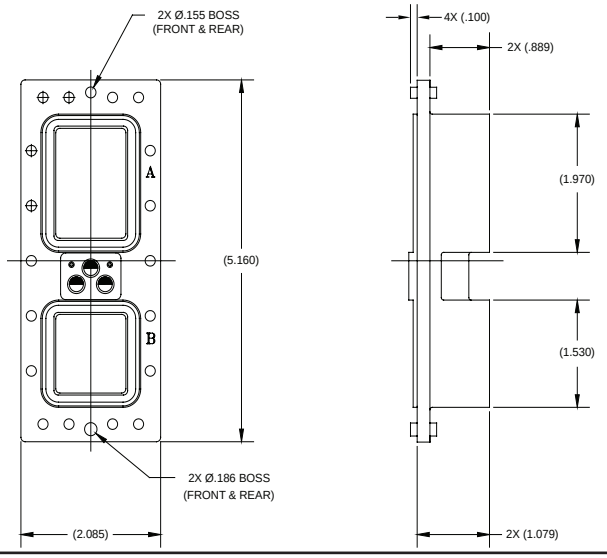
II-11C2
4 #20
3 #16
4 #12
2 #5

For Size 8 Contacts Please Specify:
T = Twinax/Quadrax Cavity (Anti-Rotational)
C = Coaxial/Triaxial Cavity

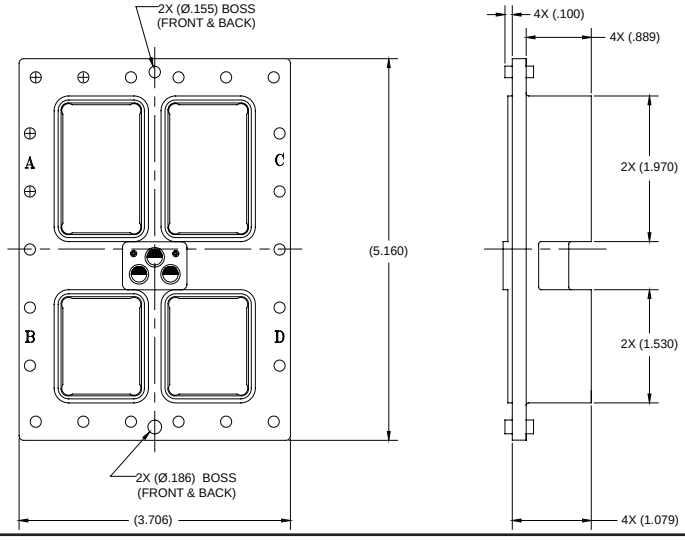
Sabritec provides specialty, enhanced performance connectors and cable assemblies and as such does not currently offer circular, rack and panel, or D-subminiature connectors that are listed on military standard Qualified Products Lists (QPL) per applicable detail specification sheets. Sabritec's connectors are fully intermateable with applicable QPL products and meet the applicable requirements of all military standards listed in this catalog.

## Receptacle Shell Sizes 2-4

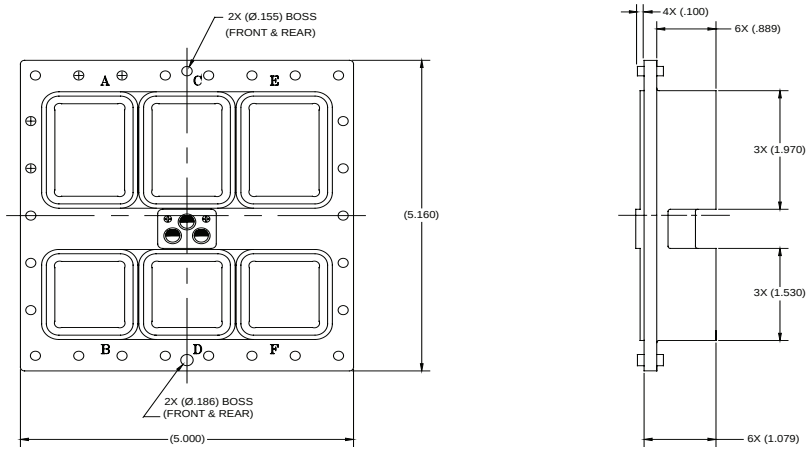
### Shell Size 2 Receptacle




### Shell Size 3 Receptacle




### Shell Size 4 Receptacle

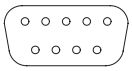


# MIL-DTL-24308 D-Subminiature Connectors

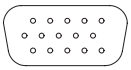
MIL-DTL-24308 D-Subminiature filter connectors are designed to meet or exceed all applicable requirements of the military specification. These connectors are intermateable and interchangeable with the standard non-filtered connectors. Sabritec also offers combo D-Sub arrangements for power coaxial and signal contacts mixed arrangements. These layouts include 5W5, 8W8, 17W2, 9W1 and 24W7.

| Material and Finishes | |
|---|---|
| **Shell** | Aluminum alloy/Steel/Composite |
| **Insulator** | High grade plastic/epoxy |
| **Contacts** | Copper alloy, gold plate |
| **Grommet & Seal** | Silicon base elastomer |
| **Capacitor** | Barium Titanate |
| **Inductor** | Ferrite bead |

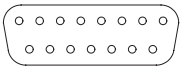
## Insert Arrangements



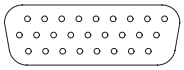
9 #20



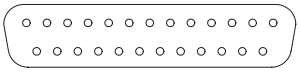
15 #22



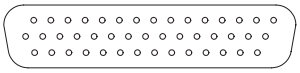
15 #20



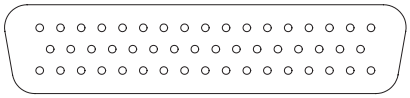
26 #22



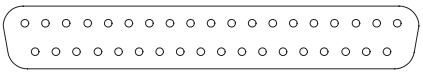
25 #20



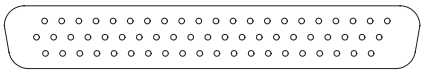
44 #22



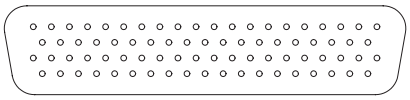
50 #20



37 #20



62 #22



78 #22

Consult Factory for Combo D-Sub Arrangements.

## Part Number Description Code

P200 - 24308 - 25 - S - P - N

FILTER TYPE:
Pi, L, C

PREFIX:

CONTACT ARRANGEMENT:
Low Density
9, 15, 25, 37, 50

High Density
15HD, 26HD, 44HD, 62HD, 78HD

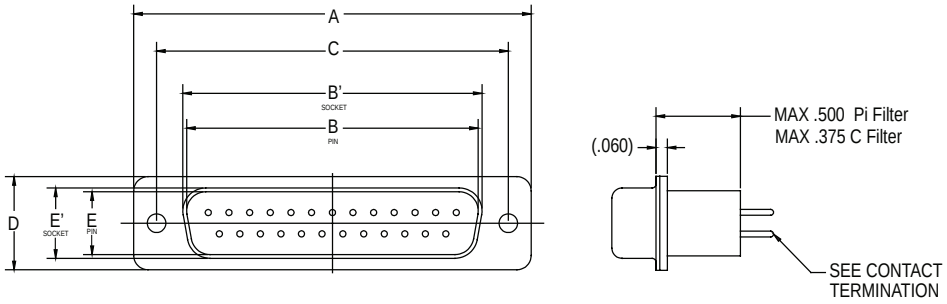
CONTACT TYPE:
P - Pin
S - Socket

CONTACT TERMINATION:
S - Solder Cup
P - PC Tail
C - Crimp
R - Right Angle

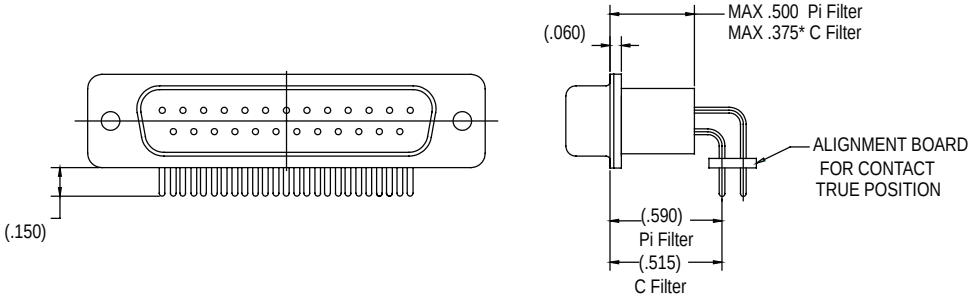
PLATING:
C - Cadmium (Yellow Chromate)
N - Electroless Nickel

Sabritec provides specialty, enhanced performance connectors and cable assemblies and as such does not currently offer circular, rack and panel, or D-subminiature connectors that are listed on military standard Qualified Products Lists (QPL) per applicable detail specification sheets. Sabritec's connectors are fully intermateable with applicable QPL products and meet the applicable requirements of all military standards listed in this catalog.

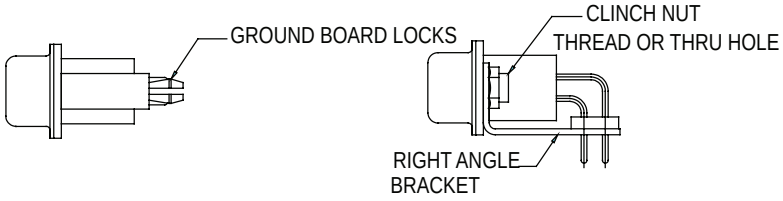
## Straight D-Subminiature




## Right Angle D-Subminiature

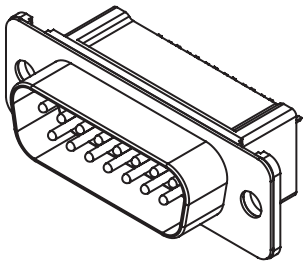


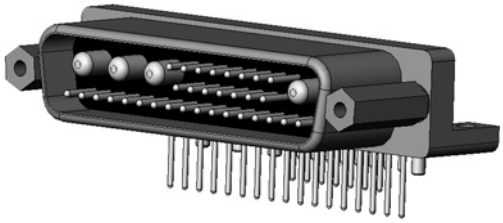

## Optional Hardware




Straight

Right Angle

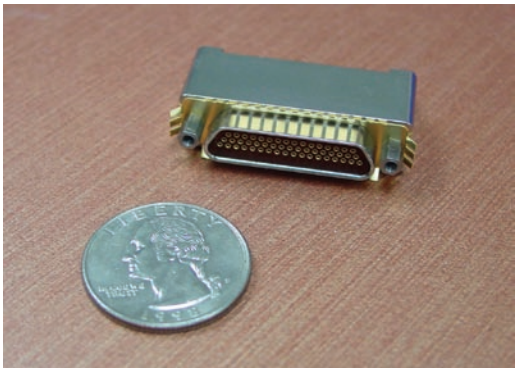




| Dimensions | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Shell Size** | **Standard Layout Size 20** | **A ± 0.015** | **B (Pin) ± 0.005** | **B' (Socket) ± 0.005** | **C Basic** | **D ± 0.010** | **E (Pin) ± 0.005** | **E' (Socket) ± 0.005** |
| **E** | 9 Contact | 1.213 | .667 | .642 | .984 | .494 | .330 | .310 |
| **A** | 15 Contact | 1.541 | .995 | .970 | 1.312 | .494 | .330 | .310 |
| **B** | 25 Contact | 2.088 | 1.535 | 1.150 | 1.852 | .494 | .330 | .310 |
| **C** | 37 Contact | 2.729 | 2.183 | 2.158 | 2.500 | .494 | .330 | .310 |
| **D** | 50 Contact | 2.635 | 2.063 | 2.063 | 2.406 | .605 | .437 | .422 |

# MIL-DTL-83513 Microminiature D

MIL-DTL-83513 Micro-D filter connectors are designed to meet or exceed all applicable requirements of the military specification. These connectors are intermateable and interchangeable with the standard non-filtered connectors. Unique configurations are also available with customized shells and EMI ground springs.



| Material and Finishes | |
|---|---|
| **Shell** | Aluminum alloy |
| **Insulator** | High grade plastic/epoxy |
| **Contacts** | Copper alloy, gold plate |
| **Grommet & Seal** | Silicon base elastomer |
| **Capacitor** | Barium Titanate |
| **Inductor** | Ferrite bead |

## Part Number Description Code

P38 - 83513 - 25 - S - P - N

FILTER TYPE:
Pi, L, C

PREFIX:

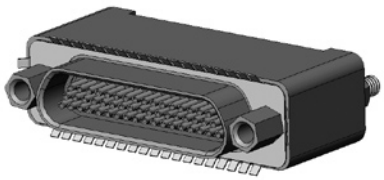
CONTACT ARRANGEMENT:
9, 15, 21, 25, 31, 37, 51, 100

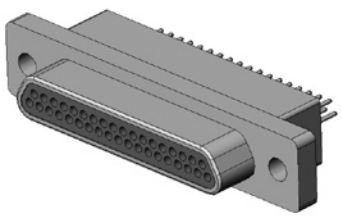
PLATING:
C - Cadmium (Yellow Chromate)
N - Electroless Nickel

CONTACT TERMINATION:
S - Solder Cup
P - PC Tail
F - Flying Leads
R - Right Angle *

CONTACT TYPE:
P - Pin
S - Socket

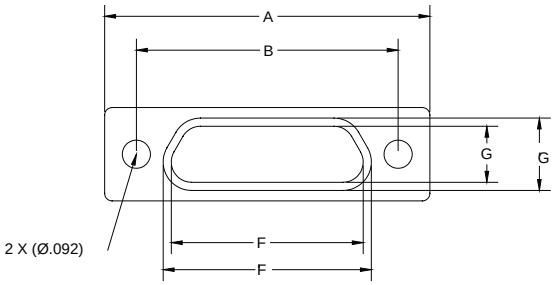
* Consult factory for alternate plating options
* Consult factory for footprint dimensions

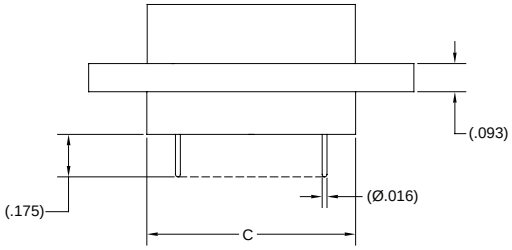


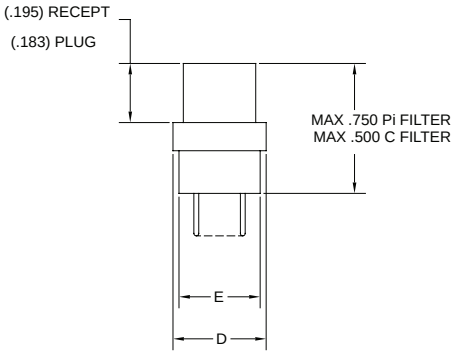


Sabritec provides specialty, enhanced performance connectors and cable assemblies and as such does not currently offer circular, rack and panel, or D-subminiature connectors that are listed on military standard Qualified Products Lists (QPL) per applicable detail specification sheets. Sabritec's connectors are fully intermateable with applicable QPL products and meet the applicable requirements of all military standards listed in this catalog.

# MIL-DTL-83513 Microminiature D

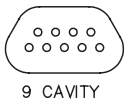


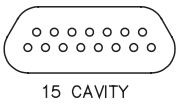



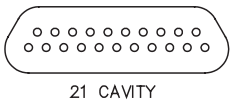



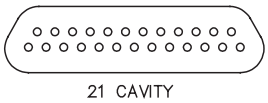

| Dimensions | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Cavity** | **A ± .010** | **B Basic** | **C + .010 -.018** | **D ± .010** | **E Max** | **F Basic Recept** | **F' Basic Plug** | **G Basic Recept** | **G' Basic Plug** |
| **9** | .775 | .565 | .390 | .298 | .270 | .3342 | .338 | .1852 | .1848 |
| **15** | .925 | .715 | .540 | .298 | .270 | .4842 | .4838 | .1852 | .1848 |
| **21** | 1.075 | .865 | .690 | .298 | .270 | .6342 | .6338 | .1852 | .1848 |
| **25** | 1.175 | .956 | .790 | .298 | .270 | .7342 | .7338 | .1852 | .1848 |
| **31** | 1.325 | 1.115 | .940 | .298 | .270 | .8842 | .8838 | .1852 | .1848 |
| **37** | 1.475 | 1.265 | 1.090 | .298 | .270 | 1.0342 | 1.0338 | .1852 | .1848 |
| **51** | 1.425 | 1.215 | 1.040 | .341 | .310 | .9842 | .9838 | .2282 | .2278 |
| **100** | 2.160 | 1.800 | 1.432 | .384 | .360 | 1.3842 | 1.3838 | .2712 | .2708 |

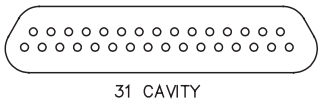
## Insert Arrangements

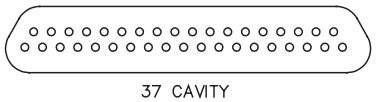

9 CAVITY

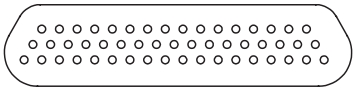

15 CAVITY

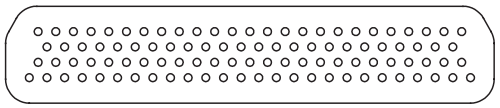

21 CAVITY


21 CAVITY


31 CAVITY


37 CAVITY


51 CAVITY


100 CAVITY

* Consult Factory For Additional or Custom Layouts

# Filter D-Sub Connectors

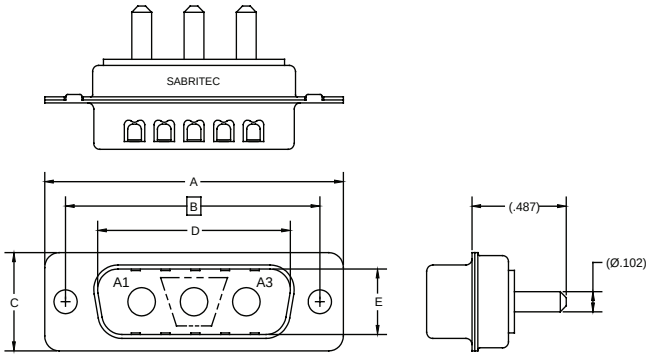
## High Power Filter Combo D-Subminiature Connectors

Combo D-Sub 3W3/3WK3 Filtered Power Connectors

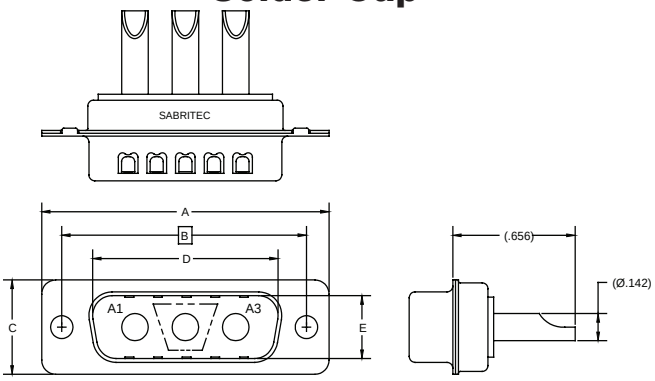
Sabritec offers a complete line of high powered EMI filtered D-Sub connectors including the single row size #8 power contacts (3W3, 3WK3, etc.). With the addition of Sabritec's in-house production of ceramic planar capacitors, we can easily achieve up to 47 nF per line on this series. The planar capacitor provides excellent attenuation as well as meeting the Bellcore requirements for 1000 VDC Dielectric Withstanding Voltage. The materials used in the construction meet the UL flammability requirements of 94V-0. Sabritec's filtered D-Sub connectors are intermateable with standard non-filter D-Sub connectors.

This series is available in PC tail, solder cup and solderless press-fit terminations into standard plated-thru holes. Sabritec also offers combo D-Sub arrangements for power coaxial and signal contacts mixed arrangements including layouts 5W5, 8W8, 17W2, 9W1 and 24W7.

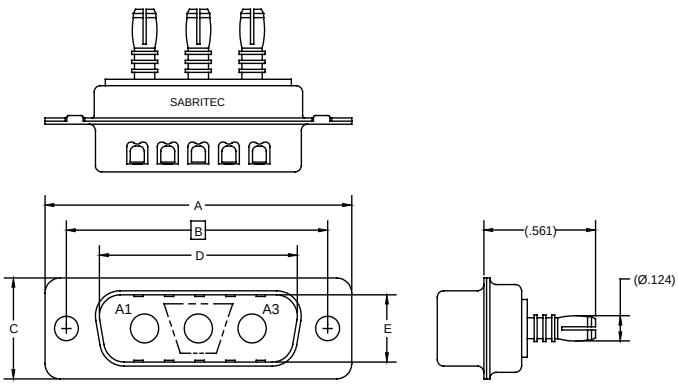
### PC Tail




### Solder Cup




### Press-Fit




### D-Sub High Power Plugs

| Sabritec Part Number | EMI Filter | | Voltage Rating |
|---|---|---|---|
| | Cap Value | Layout | |
| 310031-1000 | 1 nF | 3W3 | 400 VDC |
| 310032-1001 | 1 nF | 3WK3 | 400 VDC |
| 310031-1002 | 5 nF | 3W3 | 400 VDC |
| 310032-1003 | 5 nF | 3WK3 | 400 VDC |
| 310031-1004 | 47 nF | 3W3 | 400 VDC |
| 310032-1005 | 47 nF | 3WK3 | 400 VDC |

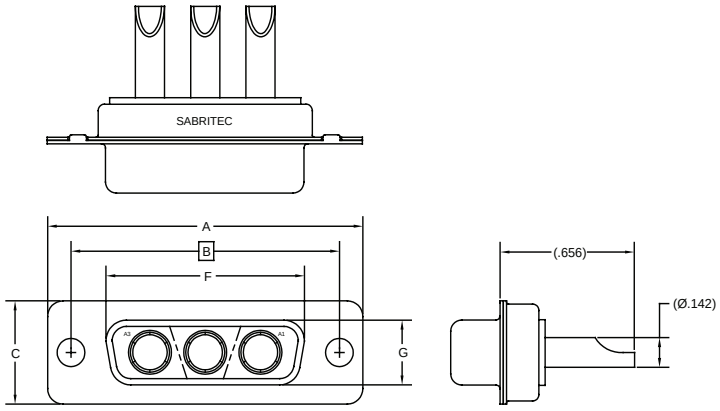
| Sabritec Part Number | EMI Filter | | Voltage Rating |
|---|---|---|---|
| | Cap Value | Layout | |
| 310031-2000 | 1 nF | 3W3 | 400 VDC |
| 310032-2001 | 1 nF | 3WK3 | 400 VDC |
| 310031-2002 | 5 nF | 3W3 | 400 VDC |
| 310032-2003 | 5 nF | 3WK3 | 400 VDC |
| 310031-2004 | 47 nF | 3W3 | 400 VDC |
| 310032-2005 | 47 nF | 3WK3 | 400 VDC |

| Sabritec Part Number | EMI Filter | | Voltage Rating |
|---|---|---|---|
| | Cap Value | Layout | |
| 310031-4000 | 1 nF | 3W3 | 400 VDC |
| 310032-4001 | 1 nF | 3WK3 | 400 VDC |
| 310031-4002 | 5 nF | 3W3 | 400 VDC |
| 310032-4003 | 5 nF | 3WK3 | 400 VDC |
| 310031-4004 | 47 nF | 3W3 | 400 VDC |
| 310032-4005 | 47 nF | 3WK3 | 400 VDC |

| Dimensions | A ± .010 | B Basic | C ±.010 | D ±.004 | E ±.004 | F ±.004 | G ±.004 |
|---|---|---|---|---|---|---|---|
| | 1.541 | 1.312 | 0.494 | 0.995 | 0.329 | 0.970 | 0.310 |

# Filter D-Sub Connectors

## Solder Cup

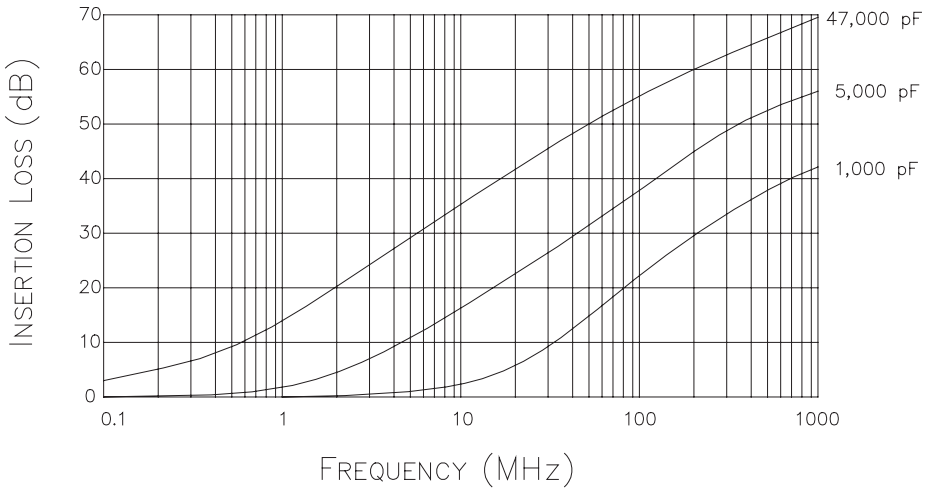



## D-Sub High Power Receptacles

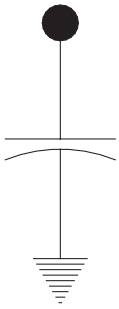
| Sabritec Part Number | EMI Filter | | Voltage Rating |
|---|---|---|---|
| | Cap Value | Layout | |
| 310031-3000 | 1 nF | 3W3 | 400 VDC |
| 310032-3001 | 1 nF | 3WK3 | 400 VDC |
| 310031-3002 | 5 nF | 3W3 | 400 VDC |
| 310032-3003 | 5 nF | 3WK3 | 400 VDC |
| 310031-3004 | 47 nF | 3W3 | 400 VDC |
| 310032-3005 | 47 nF | 3WK3 | 400 VDC |

| Dimensions | A ± .010 | B Basic | C ±.010 | D ±.004 | E ±.004 | F ±.004 | G ±.004 |
|---|---|---|---|---|---|---|---|
| | 1.541 | 1.312 | 0.494 | 0.995 | 0.329 | 0.970 | 0.310 |

## Insertion Loss Curves




"C" Filter Schematic



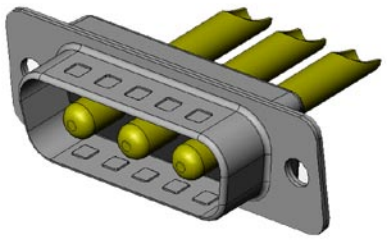
| Insertion Loss Table | | | |
|---|---|---|---|
| Frequency (MHz) | C1 (1 nF) | C5 (5 nF) | C47 (47 nF) |
| 1 | 0.1 | 1.4 | 15 |
| 10 | 4 | 16 | 34 |
| 100 | 22 | 36 | 52 |
| 1000 | 42 | 56 | 68 |

| Materials and Finishes | |
|---|---|
| **Shell** | Tin plated steel |
| **Insulator** | Thermoplastic (UL 94V-Ø rated) |
| **Contacts** | Copper Alloy, Gold plate per ASTM-B488 over nickel plate per QQ-N-290 |
| **Filter Array** | Monolithic Capacitor, X7R Material |

| Electrical Characteristics | |
|---|---|
| **Operating Temperature** | -55°C to + 125°C |
| **Voltage** | 1,000 VDC DWV<br>400 VDC Working |
| **DC Current Rating** | 30 Amps max per contact |
| **Surge Voltage** | 1,000 Volts, 1.2 x 50µ's Waveform (12 ohms)<br>1,000 Volts, 8 x 20µ's Waveform (2 ohms) |
| **Insulation Resistance** | 5,000 Mega ohms @ 400 VDC |
| **Capacitance** | 1 nF, 5 nF, 47 nF, (± 20%) |
| **International Standard for EMC** | Meets or exceeds<br>EN 61000-4-5<br>IEC 1000-4-5 |

## Terminations

PC Tail
Solder Cup
Press Fit



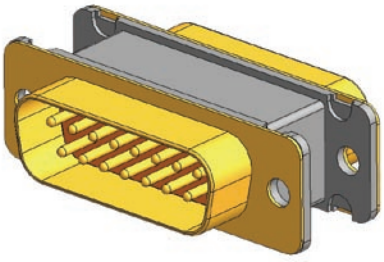
# Filtered Adapters

Non–filter applications can easily be upgraded to EMI/Transient protection without modification to the system with Sabritec's In–Line Filter Adapters. Filter adapters provide the system designer great flexibility in situations where the filtering or system requirements are subject to change. The adapters are designed to be installed between the existing plug and receptacle without having to re–wire or disassemble the system. Both in–line cable and bulkhead/ panel mount versions are available. Adapters can be built for any connector series including MIL-DTL-38999, MIL–C–26482, MIL–DTL–83723, MIL-DTL–24308, MIL–DTL–83513, ARINC 404, and ARINC 600. Consult the factory for more information.

## MIL-DTL-38999 Series I Adapter

## MIL-DTL-38999 Series III Adapter

## MIL-DTL-24308 D-Subminiature Adapter



# Soldering Procedure Guidelines

RECOMMENDED GUIDELINES FOR CUSTOMER SOLDERING AND CLEANING OF SABRITEC EMI/EMP FILTERED CONNECTORS HAVING PC-TAIL OR SOLDER CUP TERMINATIONS

Sabritec's filter connectors are built to be rugged and able to withstand the environments they will be exposed to during their service life. However, since there are filter components inside the connectors, care should be taken during the processing of these types of products. The following is a brief overview of some general guidelines on how to handle the connectors during the soldering process.

**Soldering Precautions**

**Preheating:** It is always a good idea to preheat the connector prior to soldering to minimize subjecting the filter components to any thermal shock related to the soldering operation. We recommend preheating to 120°C - 132°C (250°F - 270°F) for five (5) minutes prior to soldering. This preheat is recommended for all soldering methods.

**Hand Soldering:** For solder cup arrays it is strongly recommended that the contacts be soldered in a "crisscross" pattern, alternating between central and peripheral locations as much as possible. The goal is to avoid a sustained buildup of heat in any one area of the filter assembly. Where permissible/applicable, the use of a suitable heat sink attached directly to the contact being soldered is recommended in order to reduce the amount of heat being applied to the filter assembly. In some cases there will be certain configurations and/or high-density arrays that may preclude the use of a heat sink.

**Cleaning/Handling**

**Hand Cleaning:** Sabritec recommends that cleaning after soldering not be done by immersion in a cleaning solution. After soldering, solder joints may be brush cleaned with isopropyl alcohol, preferably while holding the connector with its soldered contact array facing downward at approximately a 45° angle. Allow the isopropyl alcohol to air dry at room temperature, followed by a 70°C (158°F) oven cure for approximately two (2) hours.

**Immersion/Automated Cleaning**: If immersion or "auto-wash" cleaning using an aqueous pressure jet system is required, care must be taken to prevent exposure of the front end (mating side) to cleaning solutions. Please contact Sabritec for further information for any questions related to cleaning our connectors with this type of system.

**Handling:** Avoid severe bending or flexing of the contact terminals at the point of exit from the connector backshell or epoxy/RTV seal.

**Please contact us If you have any further questions regarding how to handle or process Sabritec EMI/EMP filter connectors.**