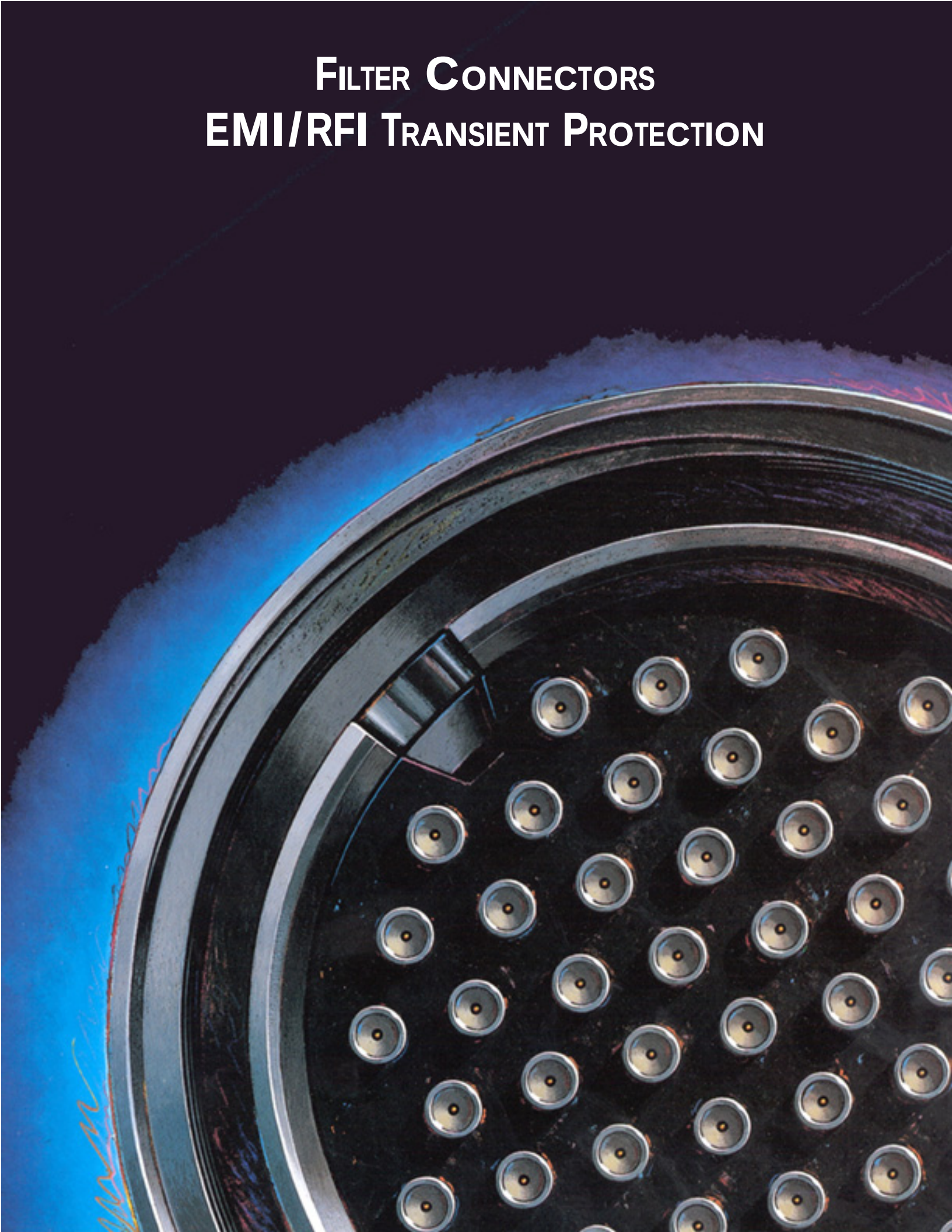
Filter Connectors
EMI/RFI Transient Protection



Your Filter Connection to the Future

Our Products

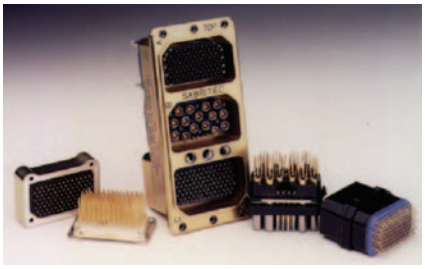
Sabritec designs and manufactures a full spectrum of sophisticated filter connector products. Our specialty is in the design of interconnect solutions addressing EMI/RFI filtering, and transient protection to meet demanding HIRF and Lightning requirements.

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.

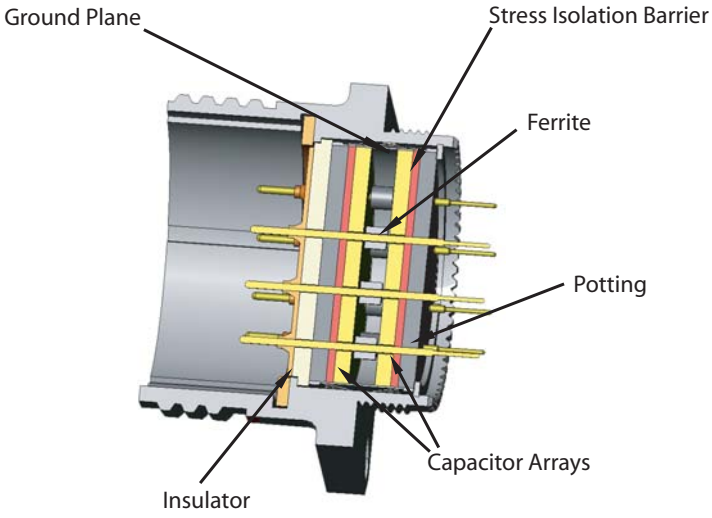
Integration

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 making available valuable board space. Isolating components electrically eliminates external wire connections and decreases crosstalk. The connector shell protects critical components from environmental or mechanical damage.

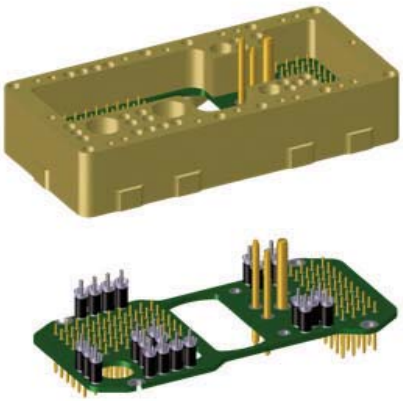
Advantages of Sabritec Filter Connectors

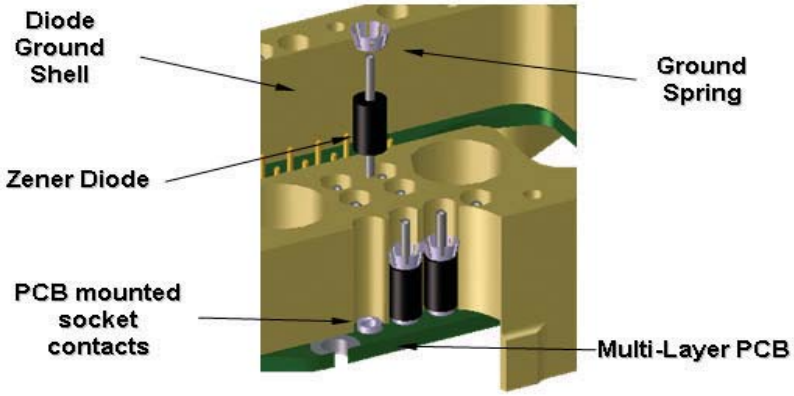
- √ Sabritec's filters connectors use monolithic capacitor arrays, the most reliable method of EMI/RFI filtering
- √ A single capacitor array can provide multiple capacitance values
- √ Most space efficient method of packaging EMI/RFI and EMP transient protection
- √ Connector shell protects the capacitor 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



EMP Filter Construction





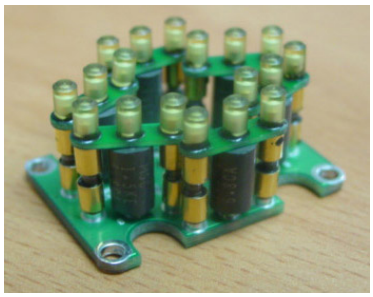
Advantages of Sabritec Filtered EMP Connectors with Transient Protection and EMI Suppression

- √ Transient protection can be combined with EMI filtering if required
- √ Standard "catalog" diodes are used instead of custom downsized low wattage chip diodes susceptible to failure
- √ 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

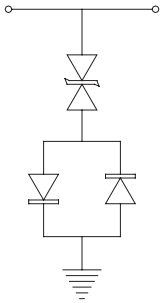
TRANSIENT PROTECTION

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 Protection (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.

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.

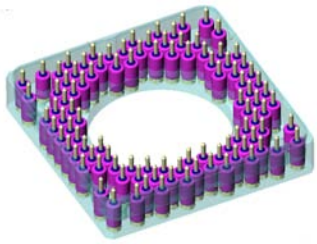


EMP Diode Module



Schematic High Speed EMP Protection

TVS diodes are mounted inside the connector around the periphery of the insert arrangement. Standard "catalog" diodes are utilized as opposed to custom or downsized diodes 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.



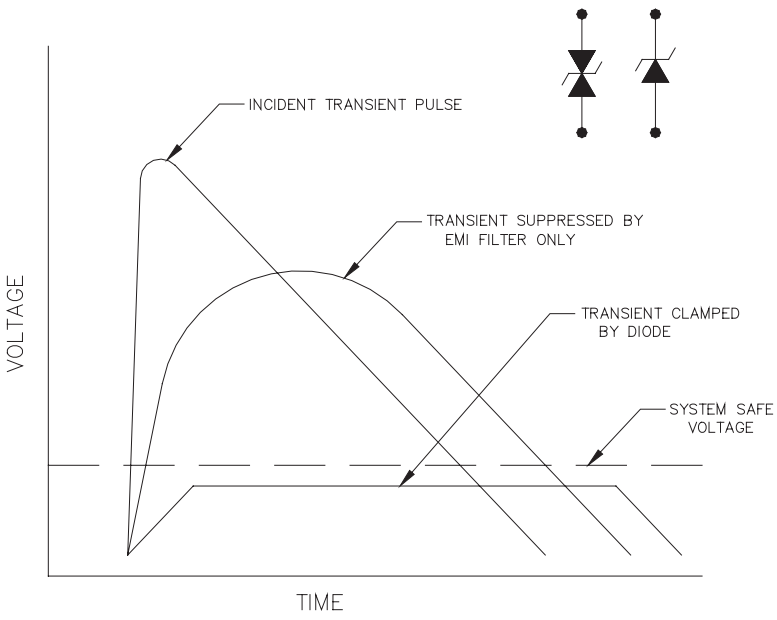
Diode Layout

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.

EMI Connector with Diodes

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. Individual diodes are also field replaceable/removable.

Transient Curves



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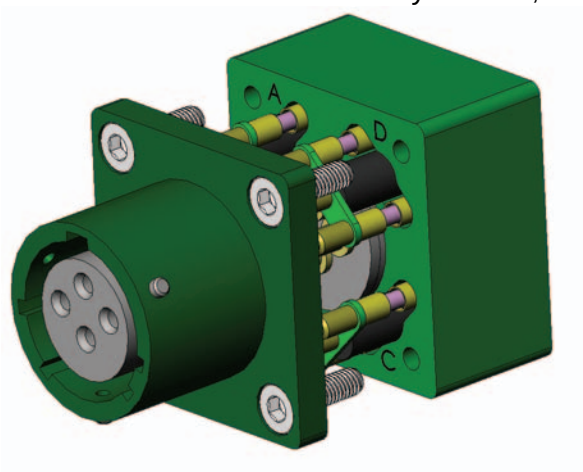
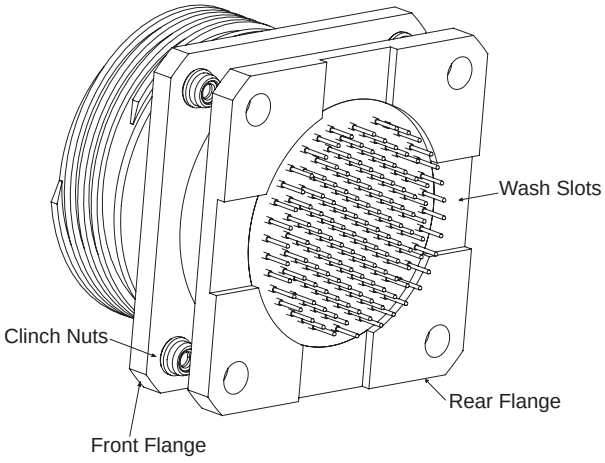
TRANSIENT PROTECTION

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.



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

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. Location 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.

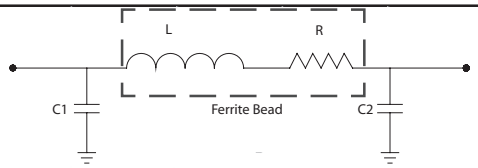
Pb

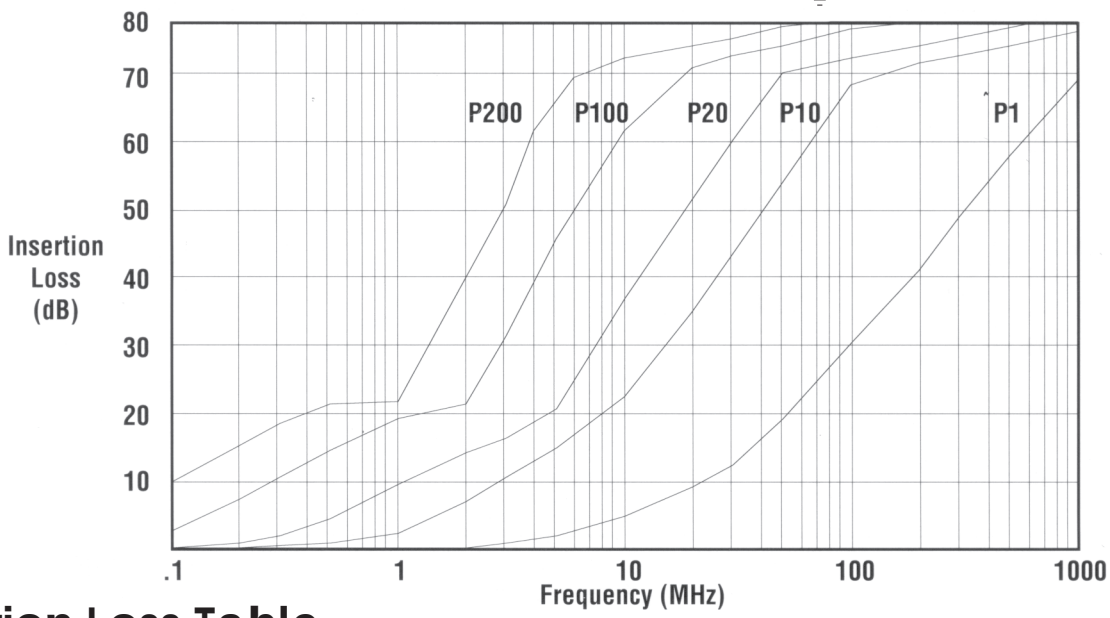
Sabritec is able to offer lead free filter connector solutions upon request. Consult factory for more details.

Electrical Characteristics - 'Pi' Section

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

'Pi' Section Curves





Insertion Loss Table

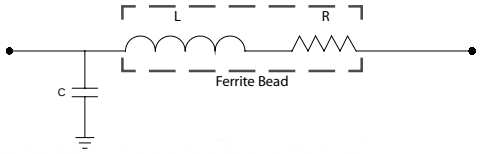
Filter Description	See Notes	P200	P100	P76	P38	P20	P10	P8	P4	P2	P1
Capacitance in Nanofarads		160	80	60	30	16	8	6.4	3.2	1.6	.8
at 1Khz, .1VRMS		240	120	91	46	24	12	9.2	4.8	2.4	1.2
Minimum No Load Insertion loss at 25°	Freq Mhz										
	.1	8	4.1	3	1	.3	.1	-	-	-	-
	1.0	22.2	19.6	18.2	13.3	8.2	3.9	2.9	.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+	78.0	65.8	61.9	49.6	37.3	25.6
	500-1k	85+	85+	85+	85+	85+	85+	80	75	64	52

Notes:

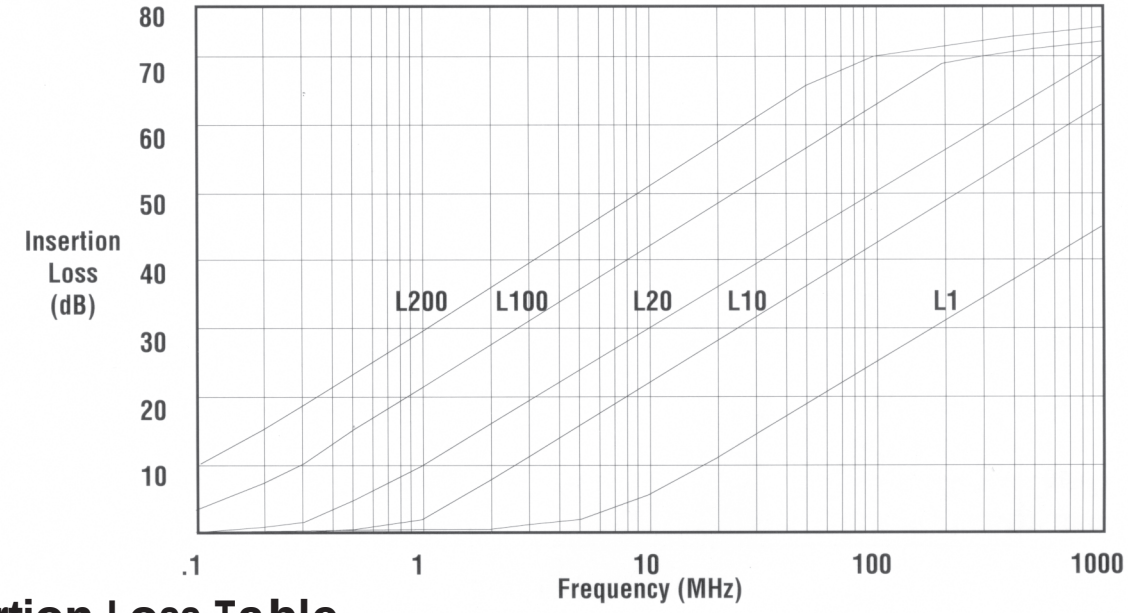
1. **P200 & P100 Capacitance Values for Size 20 Contact Arrangement & Larger**
2. **No Load Minimum Attenuation Values per MIL-STD-220**
3. **Capacitance in Nanofarads (Nominal Value)**
4. **Consult Factory for Higher Voltages & Capacitance Values**

Electrical Characteristics - 'L' Section

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



'L' Section Curves



Insertion Loss Table

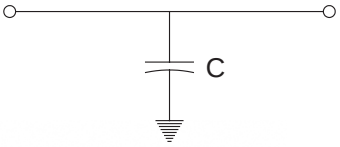
Filter Description	See Notes	L200	L100	L76	L38	L20	L10	L8	L4	L2	L1
Capacitance in Nanofarads at 1Khz, .1VRMS		160 240	80 120	60 91	30 46	16 24	8 12	6.4 9.2	3.2 4.8	1.6 2.4	.8 1.2
Minimum No Load Insertion loss at 25°	Freq Mhz										
	.1	8.6	4.1	3	1	.3	.1	-	-	-	-
	1.0	28	22	20.1	14.2	8.6	4	3	.9	.2	-
	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:

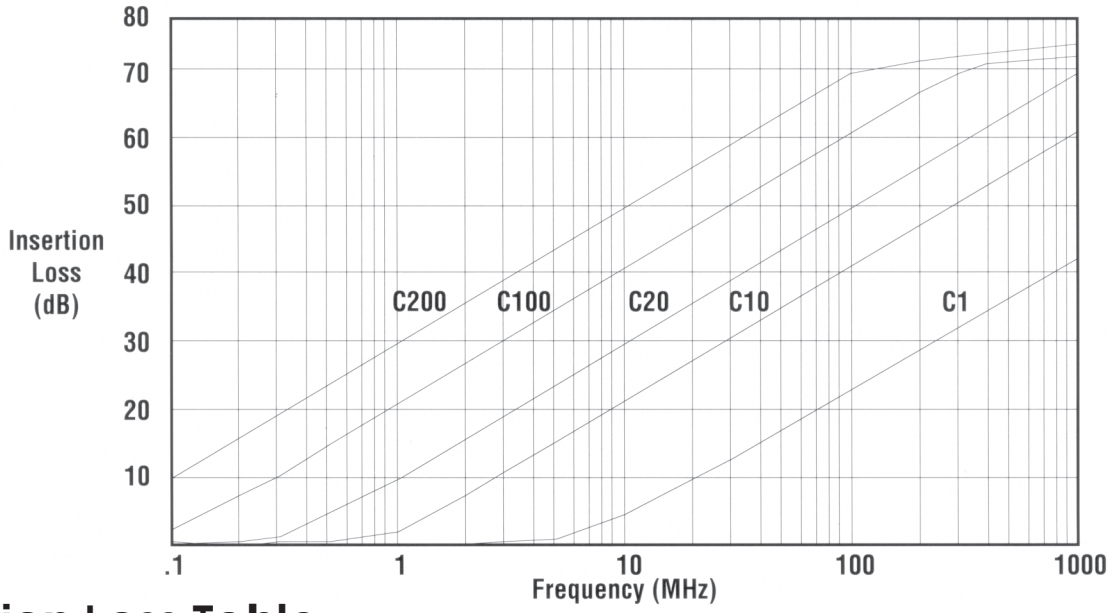
1. P200 & P100 Capacitance Values for Size 20 Contact Arrangement & Larger
2. No Load Minimum Attenuation Values per MIL-STD-220
3. Capacitance in Nanofarads (Nominal Value)
4. Consult Factory for Higher Voltages & Capacitance Values

Electrical Characteristics - 'C' Section

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



'C' Section Curves



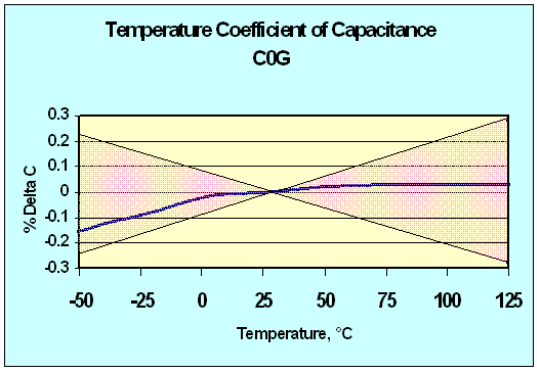
Insertion Loss Table

Filter Description	See Notes	C200	C100	C76	C38	C20	C10	C8	C4	C2	C1
Capacitance in Nanofarads		160	80	60	30	16	8	6.4	3.2	1.6	.8
at 1Khz, .1VRMS		240	120	91	46	24	12	9.2	4.8	2.4	1.2
Minimum No Load Insertion loss at 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

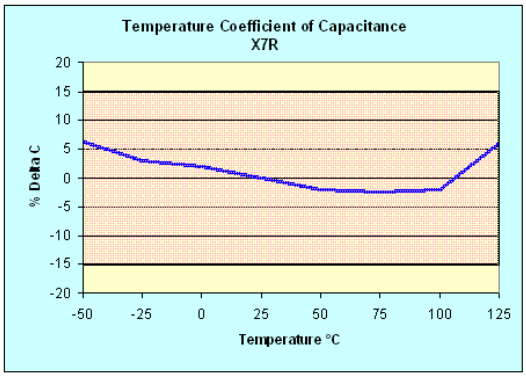
Notes:

1. 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

The heart of the filter connector is the capacitor array. The capacitor consists 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). 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.



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.

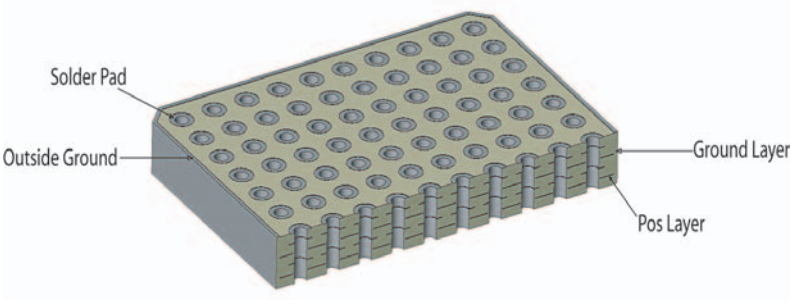


X7R is an EIA designation for a class II mid K dielectric material that has a maximum temperature coefficient of ±15% over the temperature range from -55°C to 125°C.

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.

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 Multilayer Capacitors

Tubular Capacitors/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.

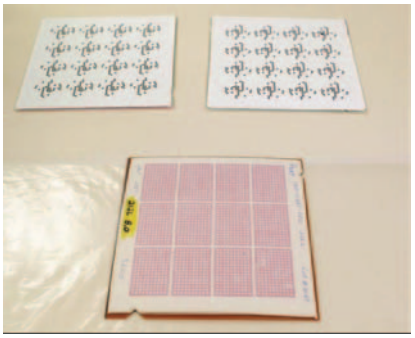
This new technology incorporated the monolithic chip capacitor technology and adapted it to a multi line configuration. This gave both the ability to achieve higher capacitance per line as well as higher dielectric withstanding voltages. The two technologies are vastly different in their design and capabilities. 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. The chip capacitor does not have a circumferential ground and radiated emissions may not be captured by this solution.



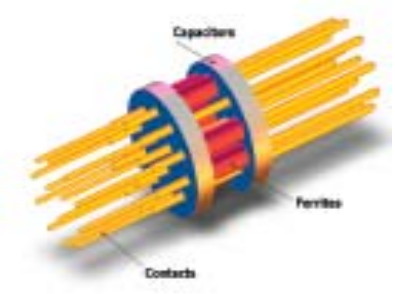
Planar Array Technology

The heart of the filter connector is the capacitor array. 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 ceramic tape, Sabritec is capable of achieving capacitance values from 100pF to 100nF on the same array.

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

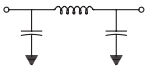
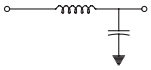
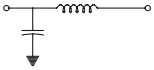
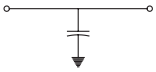
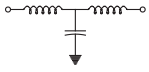
Our extensive in house capability allows for unique applications and arrangements not engineered elsewhere in the connector world. This may include mixed contact sizes, new insert arrangements, or high voltage applications up to 2000 VDC Dielectric Withstand Voltages (DWV).

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. This allows 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 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. Thermal stress from the connector shell is not transferred to the capacitor arrays due to a gap between the outside diameter of the ground plane 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.*

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.

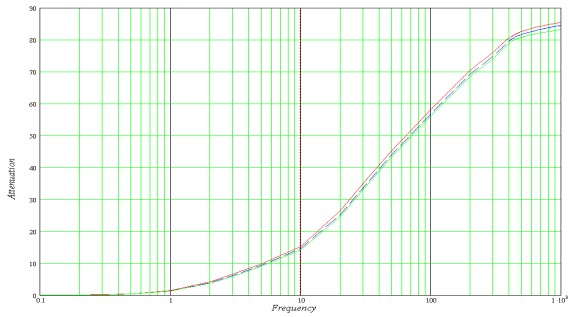
Insulation resistance (IR) is generally measured at the capacitor or connectors working voltage. This ensures that when utilized at these voltages, there is sufficient resistance between contacts and from a contact to ground, so as not to cause electrical shorts. Typical values are approximately 5000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

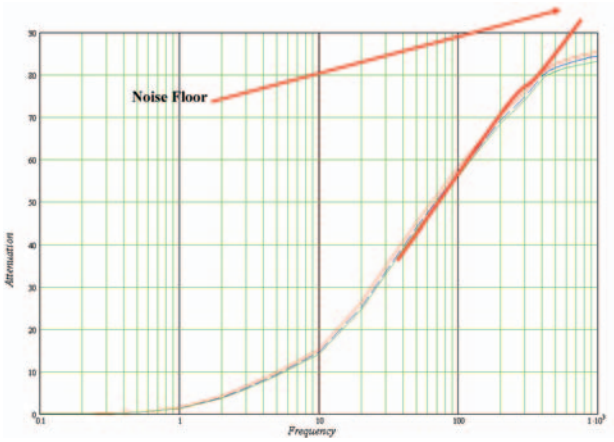
Capacitance is a product of the overlap between ground planes and electrodes, and the dielectric utilized (The dielectric constant of the ceramic k). Capacitance plays a key role in the filter performance. Capacitors impedance lowers as frequency increases. The greater the frequency, the greater the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

Attenuation Curve for Low Pass Filters





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.

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.

Materials and Finishes

Shell & Jam Nut:	Aluminum Alloy Electroless Nickel per MIL-C-26074
Pin Contacts:	Brass per ASTM B16, Gold Plate Per MIL-G-45204
Socket Contacts:	Copper Alloy Gold Plate Per MIL-G-45204
Insulators:	High Grade Plastic/Epoxy
Seals and Grommets:	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

Qualification Data

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

MIL-DTL-38999	MIL-C-26482
MIL-DTL-83723	MIL-DTL-26500
MIL-DTL-24308	MIL-DTL-83733
MIL-DTL-83513	MIL-C-81511
MIL-DTL-83527	ARINC 600

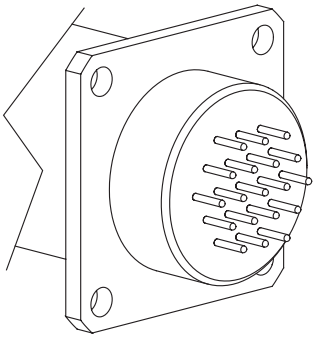
ARINC 404 (MIL-C-81659)

Sabritec connectors have successfully completed qualification to the applicable requirements of MIL-DTL-38999, MIL-C-26482, ARINC 404 (MIL-C-81659), and ARINC 600. Because of our extensive array of test equipment, we are able to complete most qualification requirements in house including all S-level space grade qualification and acceptance lot testing.

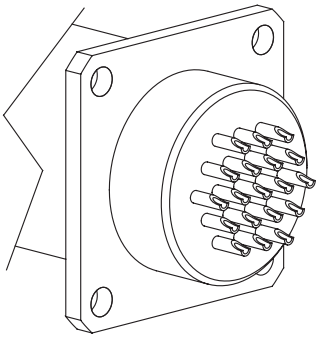
Sabritec does not offer standard QPL slash sheet part #'s for multipin circular and rack & panel connectors. Our connectors are fully intermateable with all slash sheet part #'s.

Contact Termination

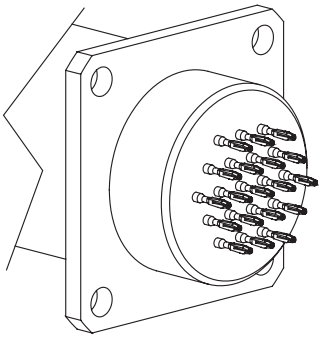
PC TAIL

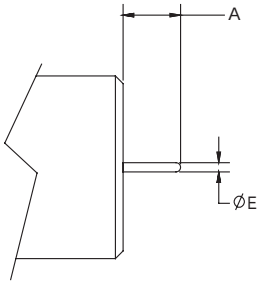


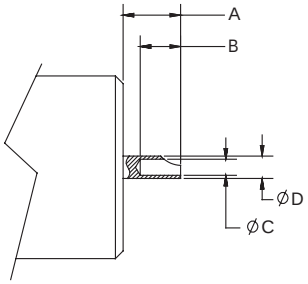
SOLDER CUP

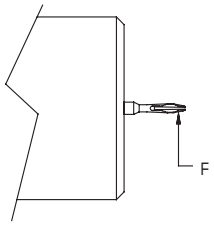


COMPLIANT PRESS-FIT
(SOLDERLESS)



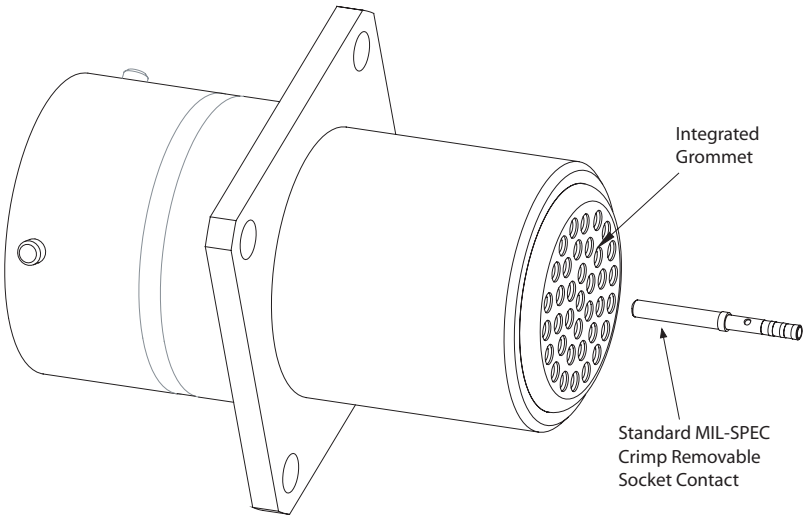






DIMENSIONS						
Contact Size	**A** ± .025	**B**	**C**	**D**	**E** ± **.003**	**F**
22	0.175	.125 .094	.040 .035	.055 .051	.020	PCB Finished Hole Ø.026 ± .002
20		.156 .125	.048 .042	.088 .061	.030	Consult Factory for Alternate Sizes
16		.172 .141	.082 .069	.103 .097	.050	
12			.120 .112	.142 .136	.065	

Crimp / Removable*



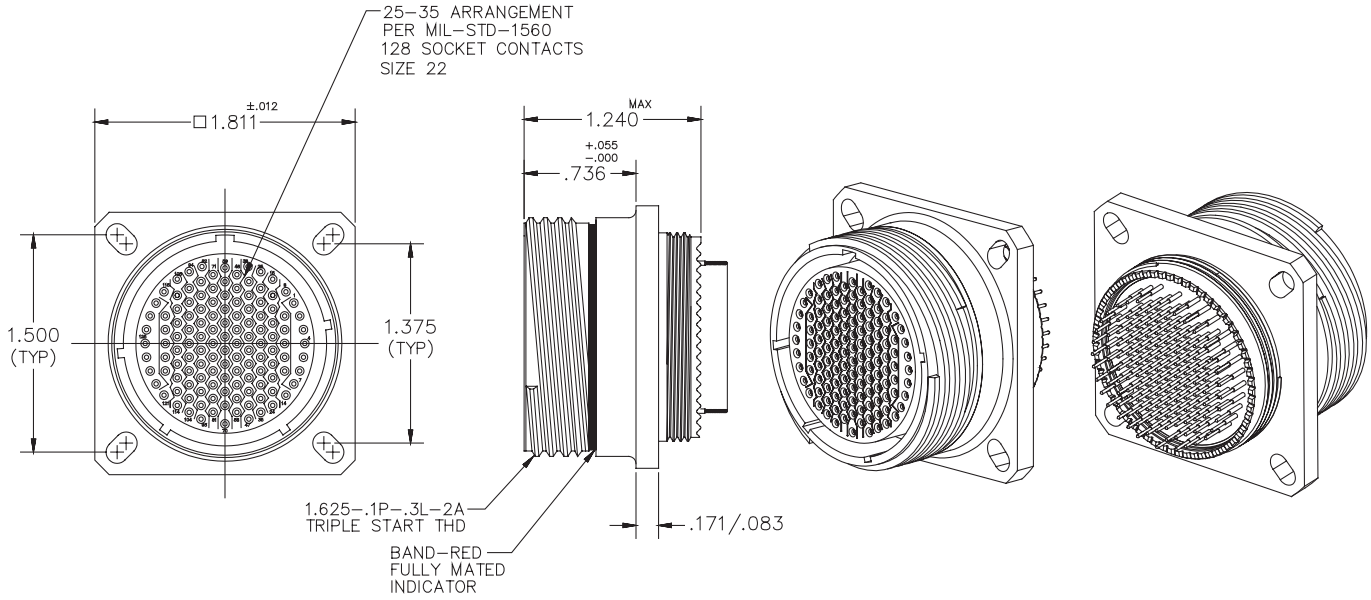
*** Add 0.700" to overall length for crimp removable connector with integrated grommet.**

ESD 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.

Materials and Finishes

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



MIL-DTL-38999 Series III Receptacle (ESD)

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. Available in nickel and cadmium plated versions. 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.

- 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

MIL-DTL-38999

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.

Materials 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 Assignment

P200 – 38999 – A – B – R – C – 25 – 61 – P – C – N

Filter Type
Pi, L, C

Prefix

Series
A – I
B – II
C – III
D- IV

Shell Style
J – Jam Nut
B – Box Mount
W- Wall Mount

Mounting
F- Front
R - Rear

Material/Plating
C- Aluminum Alloy/Cadmium Over Nickel
N- Aluminum Alloy/Electroless Nickel
S- Stainless Steel CRES 303/Electroless Nickel
CC-Composite/Cadmium Over Nickel (Olive Drab)
CN-Composite/Electroless Nickel
SP-Stainless Steel CRES 303/Passivated
**Consult Factory for alternate plating options*

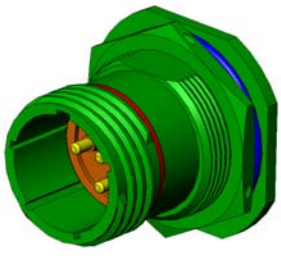
Shell Size
9 thru 25: Series I, III, IV
8 thru 24: Series II
11 thru 25: Series V

Insert Arrangment

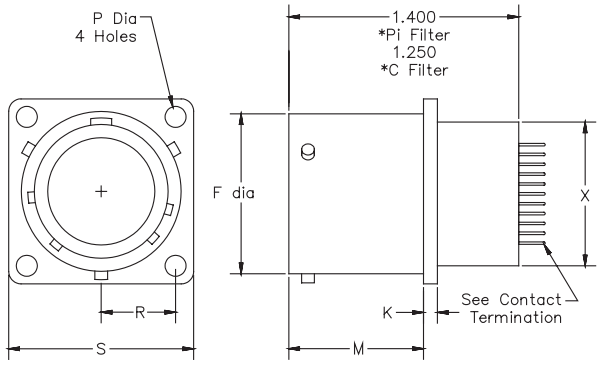
Contact Type
P – Pin
S- Socket

Contact Termination
S- Solder Cup
P- PC Tail
C- Crimp

Polarization
N, A, B, C, D, E

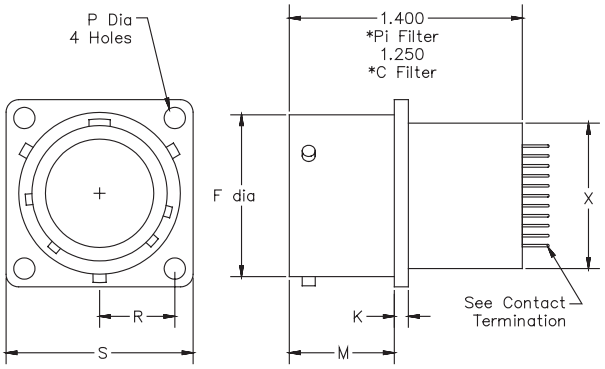


MS27505 Square Flange Receptacle
Rear Mount



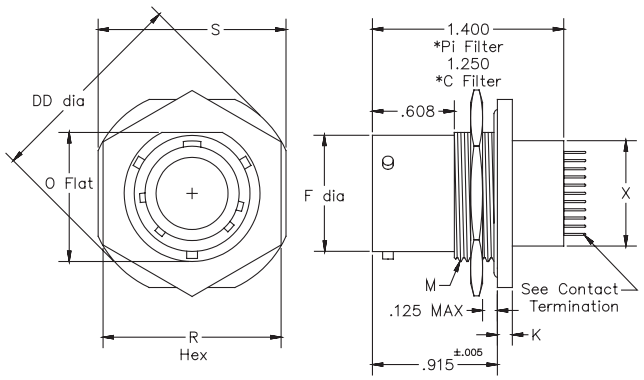
DIMENSIONS							
Shell Size	**F** +.001 -.005	**K** +.015 -.000	**M** +.000 -.005	**P Dia** +.010 -.005	**R** BSC	**S** + .020	**X** Max Dia
9	0.572	0.085	0.820	0.128	0.3595	0.938	.500
11	.700				0.406	1.031	.620
13	.850				0.453	1.125	.740
15	.975				0.4845	1.219	.890
17	1.100				0.531	1.312	1.000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

MS27466 Square Flange Receptacle
Front Mount



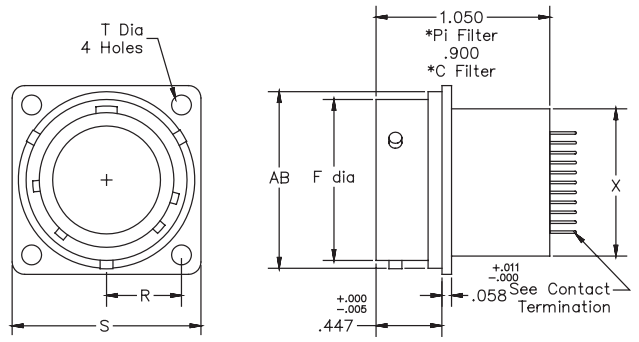
DIMENSIONS							
Shell Size	**F** +.001 -.005	**K** +.015 -.000	**M** +.000 -.005	**P Dia** +.010 -.005	**R** BSC	**S** + .020	**X** Max Dia
9	0.572	0.085	.632	0.128	0.3595	0.938	.500
11	.700				0.406	1.031	.620
13	0.85				0.453	1.125	.740
15	0.975				0.4845	1.219	.890
17	1.100				0.531	1.312	1.000
19	1.207	0.115	.602	0.147	0.578	1.438	1.120
21	1.332				0.625	1.562	1.250
23	1.457				0.6875	1.688	1.390
25	1.582				.750	1.812	1.500

MS27468 Jam Nut Receptacle



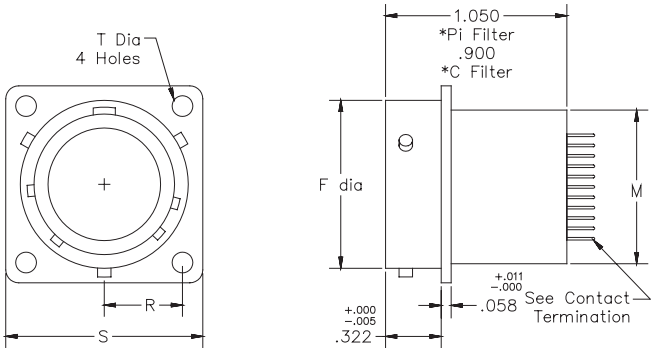
DIMENSIONS								
Shell Size	**F** +.001 -.005	**K** +.015 -.000	**M** Thread	**O Flat** +.000 -.010	**R Hex** +.017 -.016	**S** ± .016	**X** Max Dia	**DD** ± .016
9	.572	0.085	.6875-24	.655	.875	1.062	.500	1.188
11	.700		.8125-20	.755	1.000	1.250	.620	1.375
13	0.85		1.000-20	.942	1.188	1.375	.740	1.5
15	0.975		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



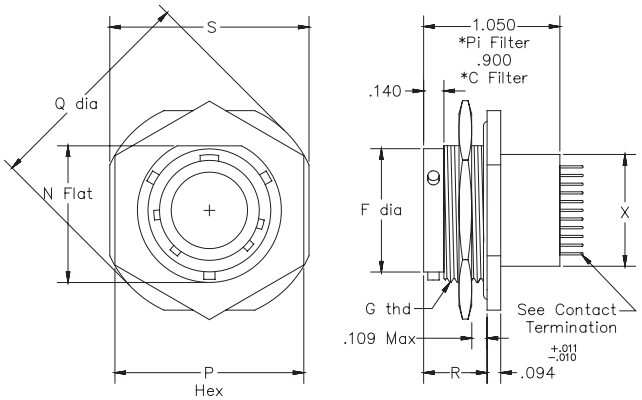
Dimensions					
Shell Size	**F** + .001 - .005	**T** +.010 -.005	**R** BSC	**S** Max	**M** Max
8	0.473	0.12	0.297	0.828	0.5
10	0.59		0.3595	0.954	0.62
12	0.75		0.406	1.047	0.74
14	0.875		0.453	1.141	0.89
16	1.000		0.4845	1.234	1
18	1.125		0.531	1.328	1.12
20	1.25		0.578	1.453	1.25
22	1.375		0.625	1.578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

MS27499 Square Flange Receptacle
Front Mount



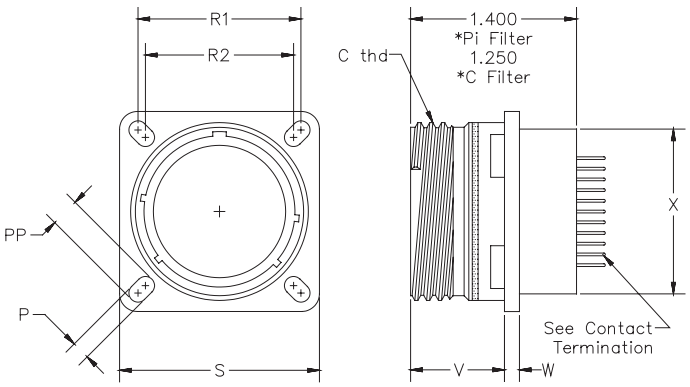
Dimensions						
Shell Size	**F** + .001 - .005	**T** +.010 -.005	**R** BSC	**S** Max	**X** Max	**AB** Max
8	0.473	0.120	0.297	0.828	0.500	0.547
10	0.590		0.360	0.954	0.620	0.672
12	0.750		0.406	1.047	0.740	0.844
14	0.875		0.453	1.141	0.890	0.969
16	1.000		0.485	1.234	1.000	1.094
18	1.125		0.531	1.328	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



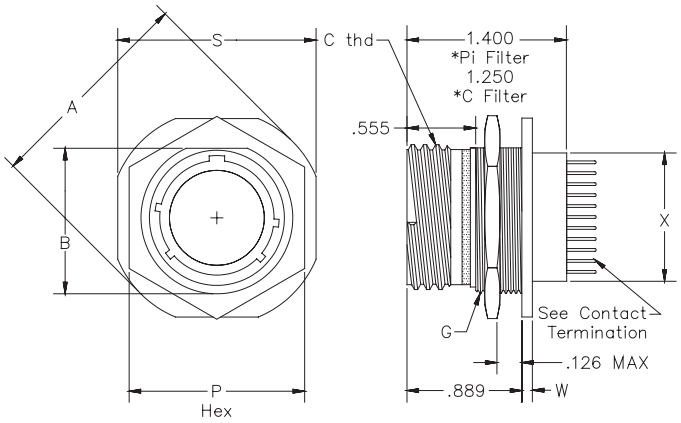
DIMENSIONS								
Shell Size	**F +.001 -.005**	**N +.001 -.006**	**G Thread**	**P Hex +.017 -.016**	**Q + .016**	**S + .016**	**X Max Dia**	**R ±.005**
8	.473	.817	.875-20	1.062	1.375	1.250	.500	0.438
10	.590	.941	1.000-20	1.188	1.5	1.375	.620	
12	.750	1.065	1.125-18	1.312	1.625	1.500	.740	
14	.875	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



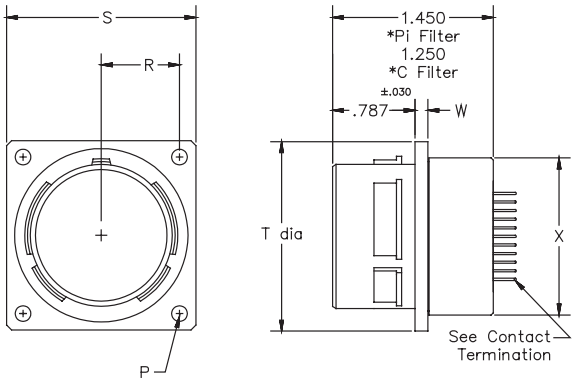
DIMENSIONS									
Shell Size	**C** Thread .1 Pitch .3 Lead	**P** ±.008	**R1** BSC	**R2** BSC	**V** Max	**W** Max	**X** Max	**PP** Max ±.008	**S** + .012
9	0.625	0.128	.719	.564	.820	.098	.500	.194	.937
11	0.750		.812	.719			.620		1.031
13	0.875		.906	.812			.740		1.126
15	1.000		.969	.906			.890		1.220
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



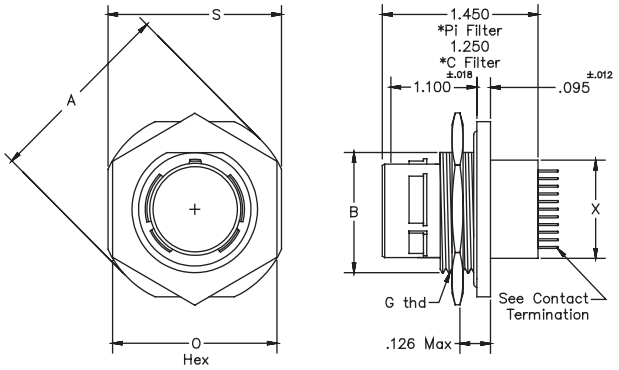
Dimensions								
Shell Size	**A** ±.012	**B** +.004 -.006	**C** Thread .1 Pitch .3 Lead	**G** Thread 6g .10R	**P** Hex	**S** ± .015	**W** +.028 - .004	**X** Max
9	1.189	.651	.625	M17x1	.945 .912	1.063	.087	.500
11	1.374	.751	.750	M20x1	1.062 .0983	1.252		.620
13	1.500	.938	.875	M25x1	1.260 1.234	1.374		.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



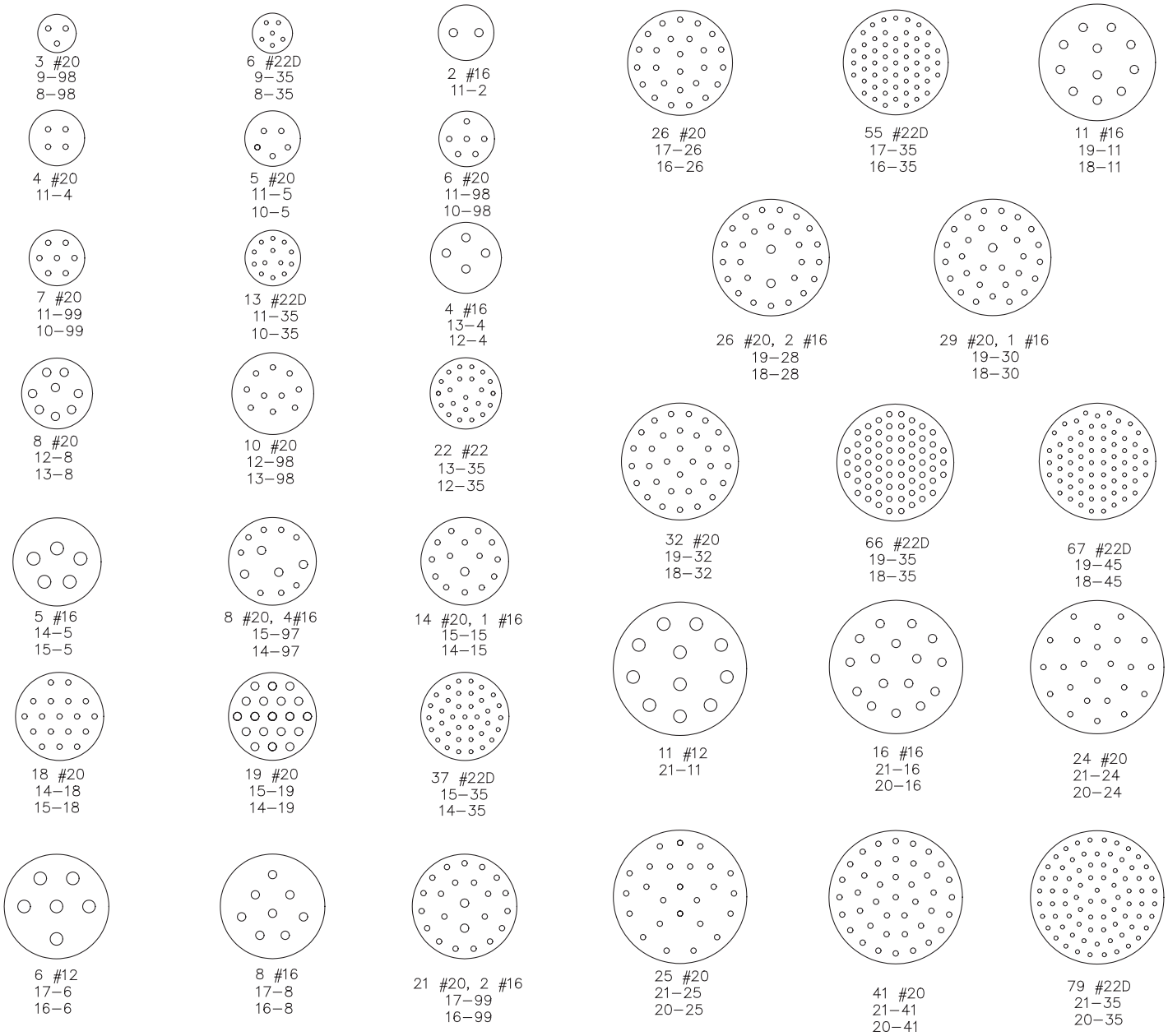
DIMENSIONS						
Shell Size	**T** ± .008	**W** ± .010	**P** ± .008	**R** BSC	**S** ± .021	**X** Max
11	0.786	0.093	0.139	0.406	1.029	0.620
13	0.912			0.453	1.124	0.740
15	1.036			0.485	1.218	0.890
17	1.162			0.531	1.312	1.000
19	1.286			0.578	1.439	1.120
21	1.412	0.124		0.625	1.561	1.250
23	1.536		0.150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

D38999/44 Jam Nut Receptacle



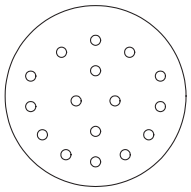
DIMENSIONS						
Shell Size	**B** Flat ± .004	**G** THD 6g 0.1R	**A** Dia. ± .020	**O** Hex ± .013	**S** ± .020	**X**
11	0.938	M25x1	1.500	1.250	1.374	0.620
13	1.062	M28x1	1.622	1.405	1.5	0.740
15	1.1875	M31x1	1.749	1.600	1.622	0.890
17	1.318	M34x1	1.937		1.78	1.000
19	1.4375	M38x1	2.015	1.796	1.89	1.120
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

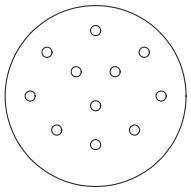


* Odd Numbered Shell Sizes Series I, III & IV, Even Numbered Shell Sizes Series II

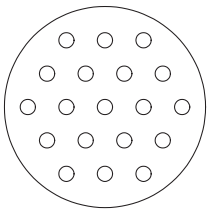
MIL-DTL-38999 Insert Arrangements



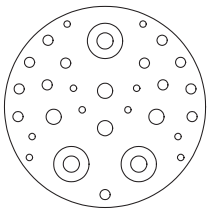
16 #16
23–97
22–97



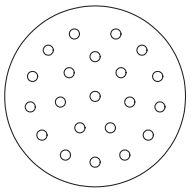
11 #16
23–99
22–99



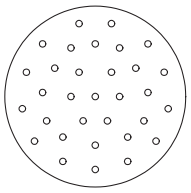
19 #12
25–19



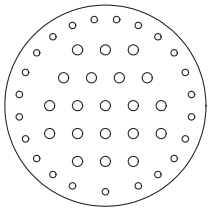
10 #20, 13 #16, 4 #12
3 #8 TWINAX
25–20



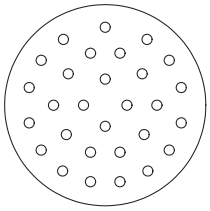
21 #16
23–21
22–21



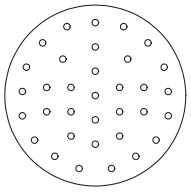
32 #20
23–32
22–32



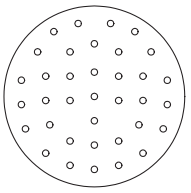
23 #20, 20 #16
25–43



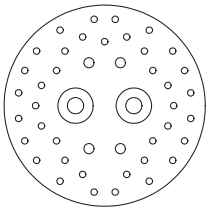
29 #16
25–29
24–29



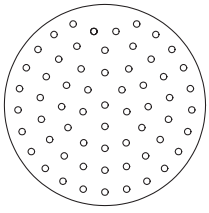
34 #20
23–34
22–34



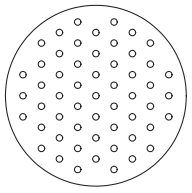
36 #20
23–36
22–36



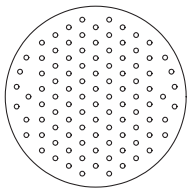
40 #20, 4 #16
2 #8 COAX
25–46



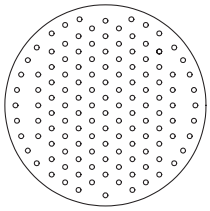
61 #20
25–61
24–61



55 #20
23–55
22–55



100 #22D
23–35
22–35



128 #22D
25–35
24–35

Custom Layout*
XX–XX

* Consult Factory For Additional or Custom Layouts

Type B

Type T

MIL-DTL-83723 III

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.

Materials and Finishes

Shell	Aluminum alloy
Insulator	High grade plastic/epoxy
Contacts	Copper alloy, gold plate
Grommet and Seal	Silicon base elastomer
Jam Nut	Aluminum alloy
Ground Plane	Brass, silver plate
Capacitor	Barium titanate
Inductor	Ferrite bead

Part Number Assignment

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 Arrangements

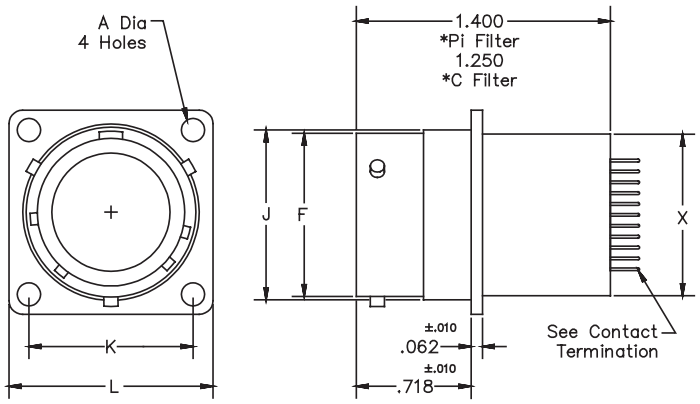
Polarization
N,6, 7, 8, 9

Plating
C- Olive Drab Cadmium Over Nickel
N- Electroless Nickel

Contact Termination
S- Solder Cup
P- PC Tail
C- Crimp

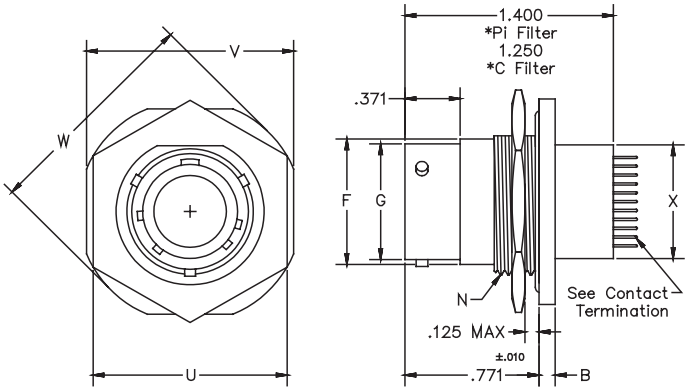
Contact Type
P – Pin
S- Socket

Square Flange Receptacle
Type B



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

Jam Nut Receptacle
Type B



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

Note: Type B (Bayonet Coupling) Shown. Type T (Threaded) Available. Consult factory for more information.

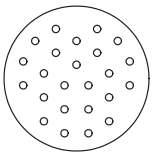
MIL-DTL-83723 Series III / MIL-DTL-26500

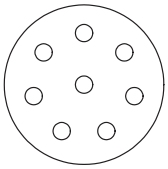
Insert Arrangements


2 #20
8–2


3 #20
8–3


3 #20
8–98

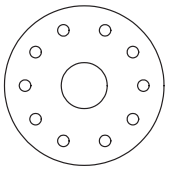

24 #20
16–24

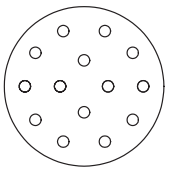

8 #12
18–8


2 #20
10–2

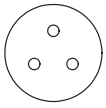

5 #20
10–5

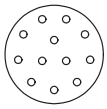

6 #20
10–6

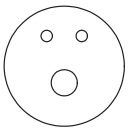

10 #16, 1 #8 COAX
18–11

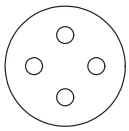

14 #16
18–14

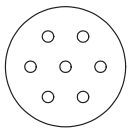

2 #16
10–20

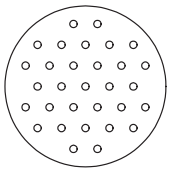

3 #16
12–3

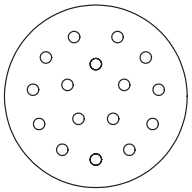

12 #20
12–12

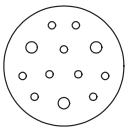

2 #16, 1 #8 COAX
14–3

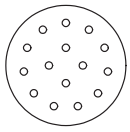

4 #12
14–4

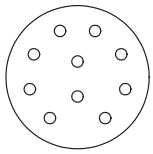

7 #16
14–7

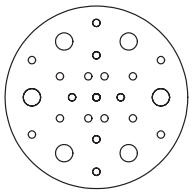

31 #20
18–31

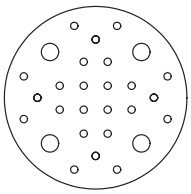

16 #16
20–16


9 #20, 3 #16
14–12


15 #20
14–15

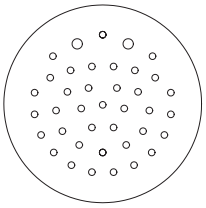

10 #16
16–10


19 #20, 6 #12
20–25

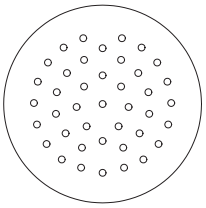

24 #20, 4 #12
20–28

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

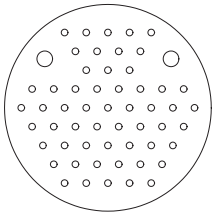
Insert Arrangements



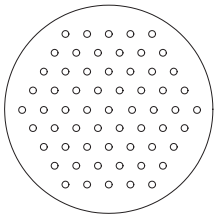
37 #20, 2 #16
20–39



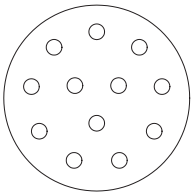
41 #20
20–41



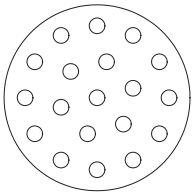
55 #20, 2 #12
24–57



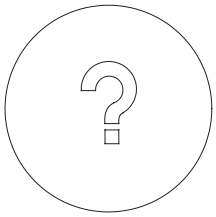
61 #20
24–61



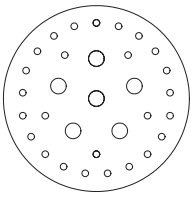
12 #12
22–12



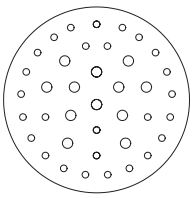
19 #16
22–19



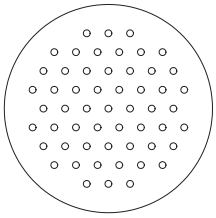
Custom Layout*
XX–XX



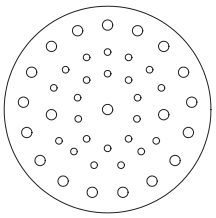
26 #20, 6 #12
22–32



27 #20, 12 #16
22–39



55 #20
22–55



23 #20, 20 #16
24–43

* Consult Factory For Additional or Custom Layouts

MIL-C-26482 II

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.

Materials and Finishes

Shell	Aluminum alloy
Insulator	High grade plastic/epoxy
Contacts	Copper alloy, gold plate
Grommet and Seal	Silicon base elastomer
Jam Nut	Aluminum alloy
Ground Plane	Brass, silver plate
Capacitor	Barium titanate
Inductor	Ferrite bead

Part Number Assignment

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 Arrangements

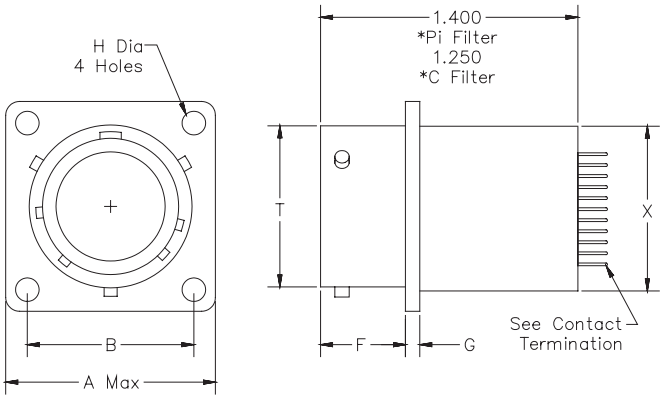
Polarization
N,W, X, Y, Z

Plating
C- Olive Drab Cadmium Over Nickel
N- Electroless Nickel

Contact Termination
S- Solder Cup
P- PC Tail
C- Crimp

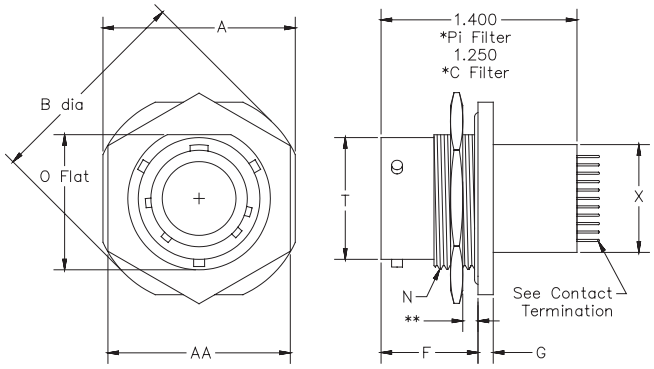
Contact Type
P – Pin
S- Socket

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



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

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

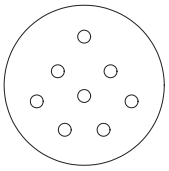
MIL-C-26482 / MIL-DTL-83723

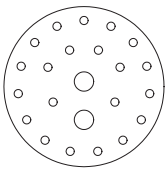
Insert Arrangements


2 #20
8–2


3 #20
8–3


3 #20
8–33

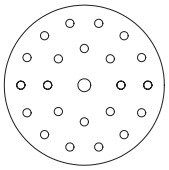

8 #16
16–8

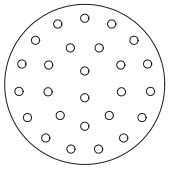

21 #20, 2 #16
16–99


3 #20
8–98

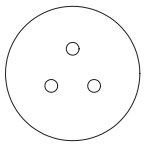

4 #20
8–4

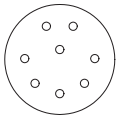

6 #20
10–98

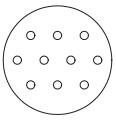

22 #20, 1 #16
16–23

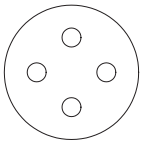

26 #20
16–26

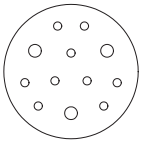

6 #20
10–6

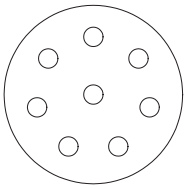

3 #16
12–3

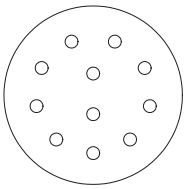

8 #20
12–8

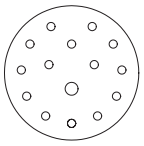

10 #20
12–10

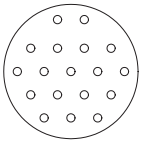

4 #12
14–4

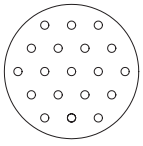

8 #20, 4 #16
14–12

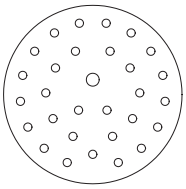

8 #12
18–8

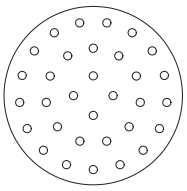

11 #16
18–11


14 #20, 1 #16
14–15


18 #20
14–18

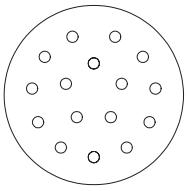

19 #20
14–19


29 #20, 1 #16
18–30

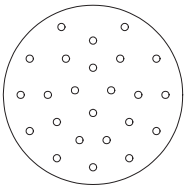

32 #20
18–32

MIL-C-26482 / MIL-DTL-83723

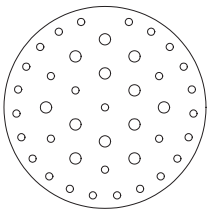
Insert Arrangements



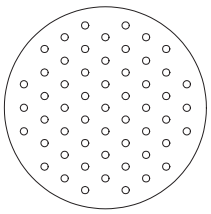
16 #16
20–16



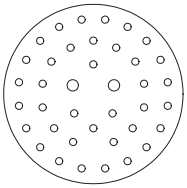
24 #20
20–24



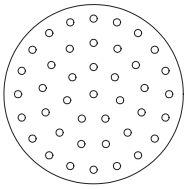
27 #20, 14 #16
22–41



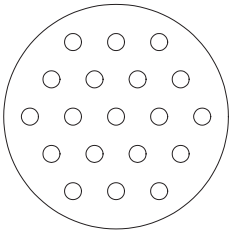
55 #20
22–55



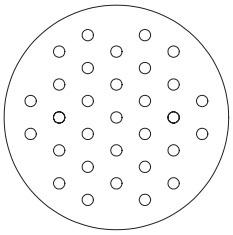
37 #20, 2 #16
20–39



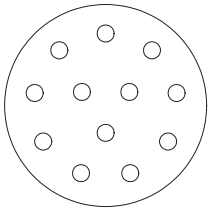
41 #20
20–41



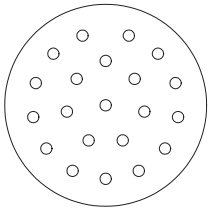
19 #12
24–19



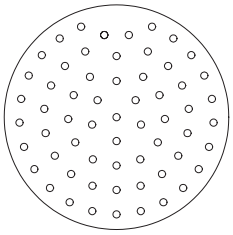
31 #16
24–31



12 #12
22–12

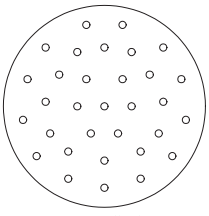


21 #16
22–21

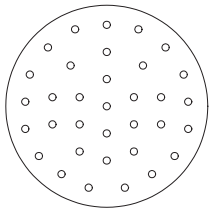


61 #20
24–61

Custom Layout*
XX–XX



32 #20
22–32



34 #20
22–34

* Consult Factory For Additional or Custom Layouts

ARINC 404

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

Materials and Finishes

Shell	Aluminum alloy
Insulator	High grade plastic/epoxy
Contacts	Copper alloy, gold plate
Grommet and Seal	Silicon base elastomer
Ground Plane	Beryllium copper, silver plate
Capacitor	Barium titanate
Inductor	Ferrite bead

Part Number Assignment

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

Filter Type
Pi, L, C

Prefix

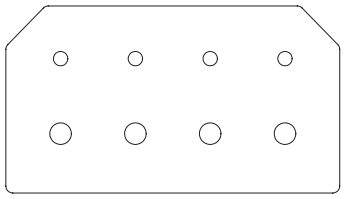
Shell Size
1, 2, 3, 4

Plating
C- Cadmium (Yellow Chromate)
N- Electroless Nickel

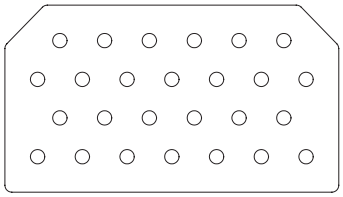
Contact Termination
S- Solder Cup
P- PC Tail
C- Crimp

Insert Arrangements
Cavity A , B, C, D

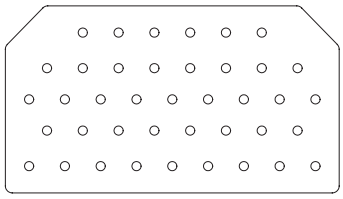
Contact Type
P – Pin
S- Socket



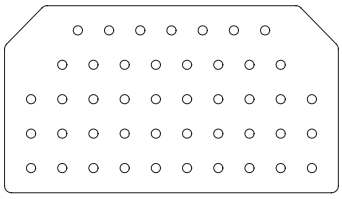
4 #16, 4 #12
D8



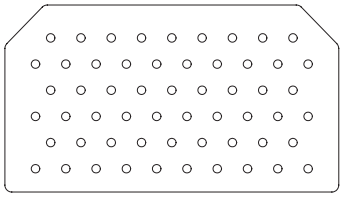
26 #16
26



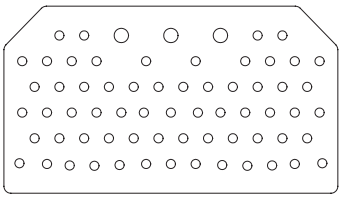
40 #20
40



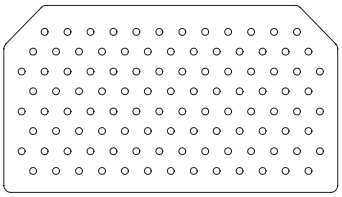
45 #20
45



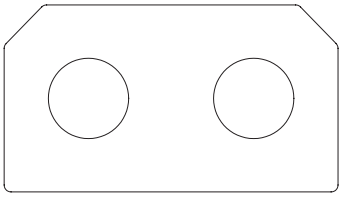
57 #20
57



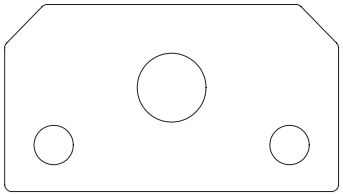
64 #20, 3 #16
67



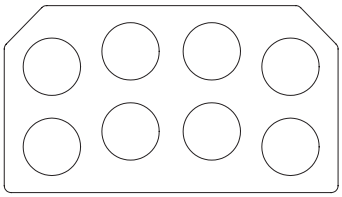
106 #22
106



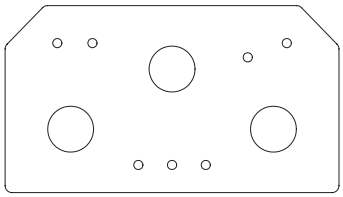
2 #1 Coax
C2



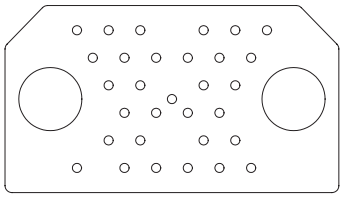
2 #7 Coax, 1 #3 Coax
C3



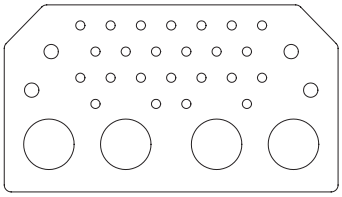
8 #9 Coax
C8



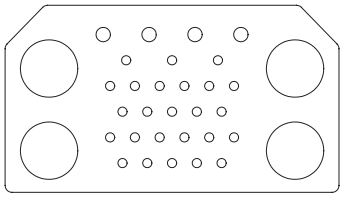
7 #20, 3 #11 Coax
10C3



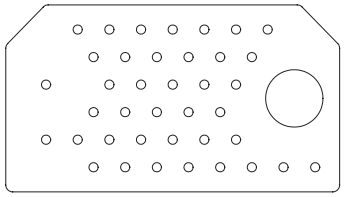
30 #20, 2 #5 Coax
32C2



24 #20, 4 #16,
4 #9 Coax
32C4



25 #20, 4 #16,
4 #5 Coax
33C4

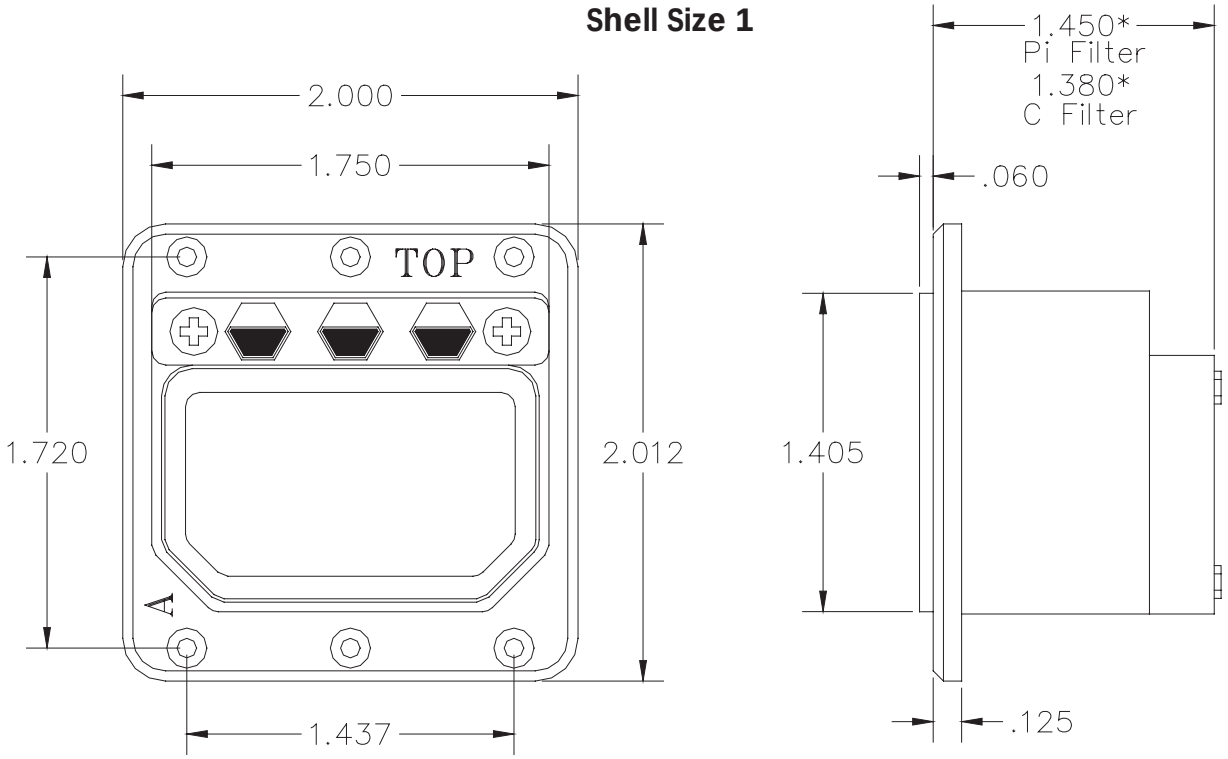


39 #20, 1 #5 Coax
40C1

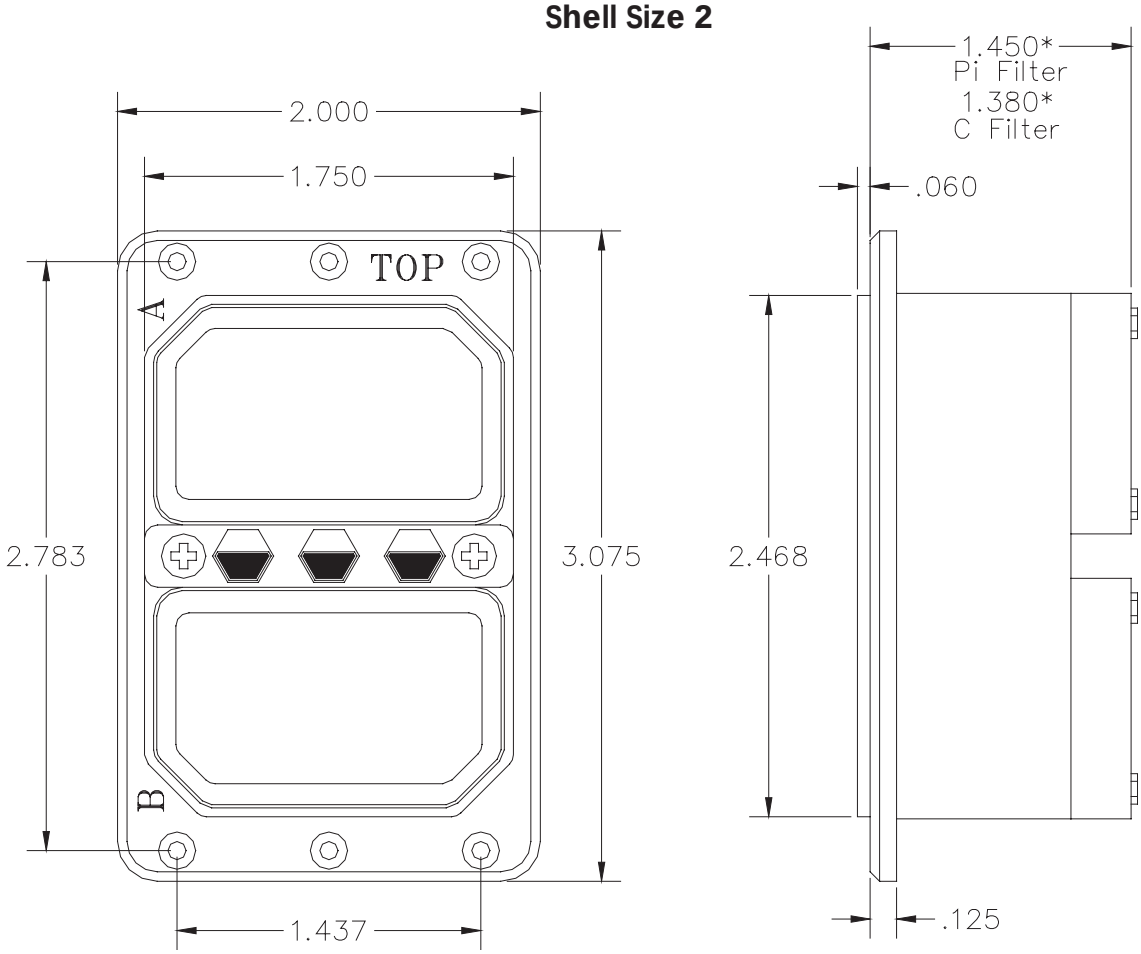
ARINC 404

MIL-C-81659

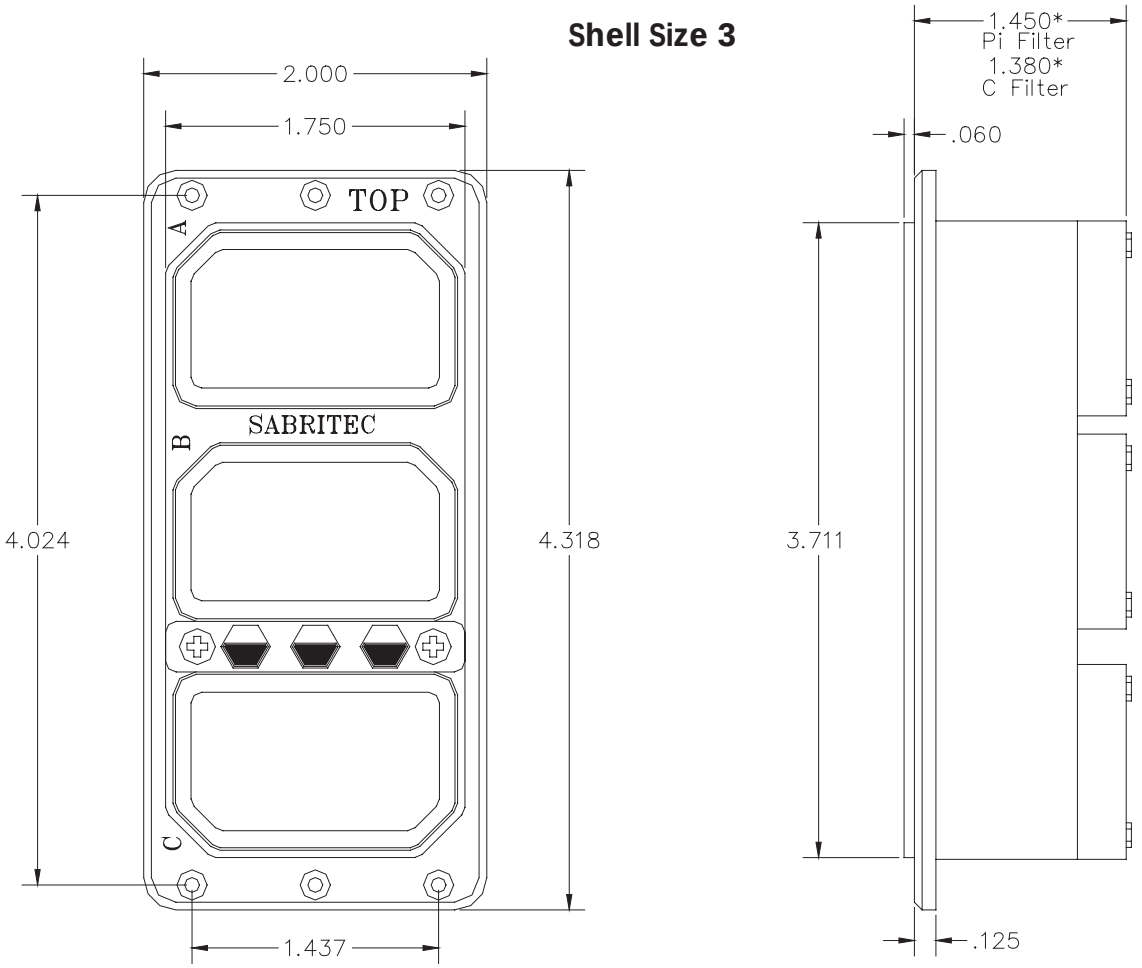
Shell Size 1



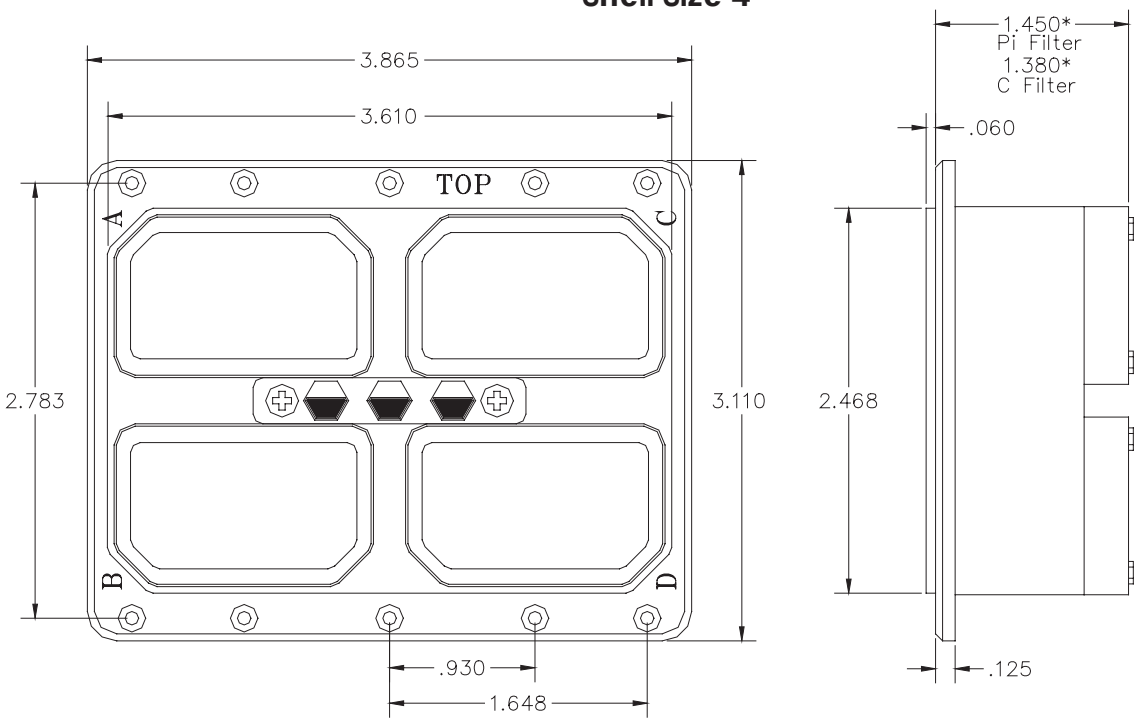
Shell Size 2

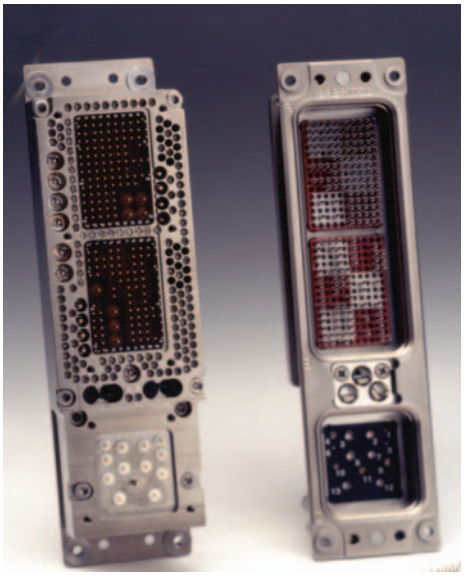


Shell Size 3



Shell Size 4





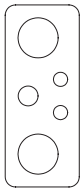
ARINC 600

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

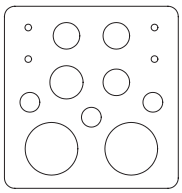
Materials and Finishes

Shell	Aluminum alloy
Insulator	High grade plastic/epoxy
Contacts	Copper alloy, gold plate
Grommet and Seal	Silicon base elastomer
Ground Plane	Brass, silver plate
Capacitor	Barium titanate
Inductor	Ferrite bead

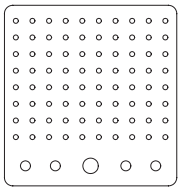
Insert Arrangements



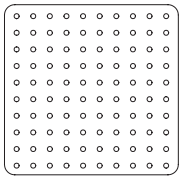
1 #12, 2 #16,
2 #5 Coax
5C2



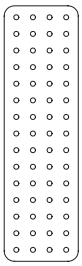
4 #20, 4 #12, 3 #16,
2 #5 Coax
13C2



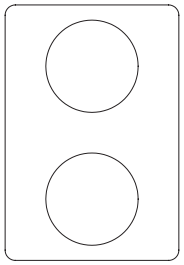
85 #22, 4 #20, 1 #16
85



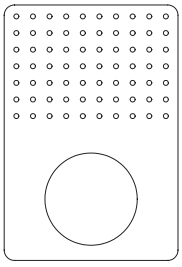
100 #22
100



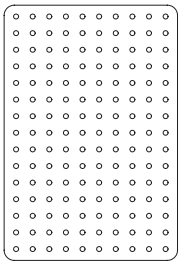
60 #22
60



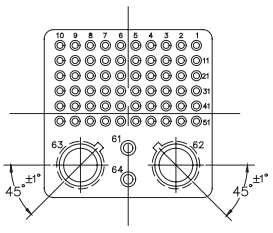
2 #1 Coax
C2



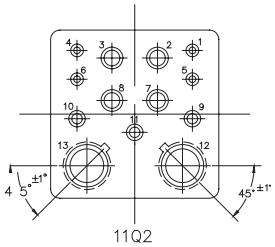
70 #22, 1 #1 Coax
71C1



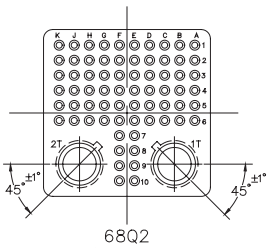
150 #22
150



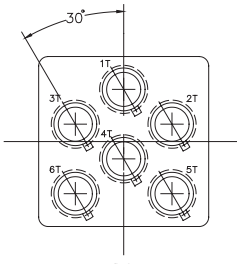
62Q2
60 SIZE 22
2 SIZE 16
2 SIZE 8



11Q2
4 SIZE 20
3 SIZE 16
4 SIZE 12
2 SIZE 8



68Q2
68 SIZE 22
2 SIZE 8



Q6
6 SIZE 8
METALLIC INSERT

Part Number Assignment

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

Filter Type
Pi, L, C

Prefix

Shell Size
1,2, 3

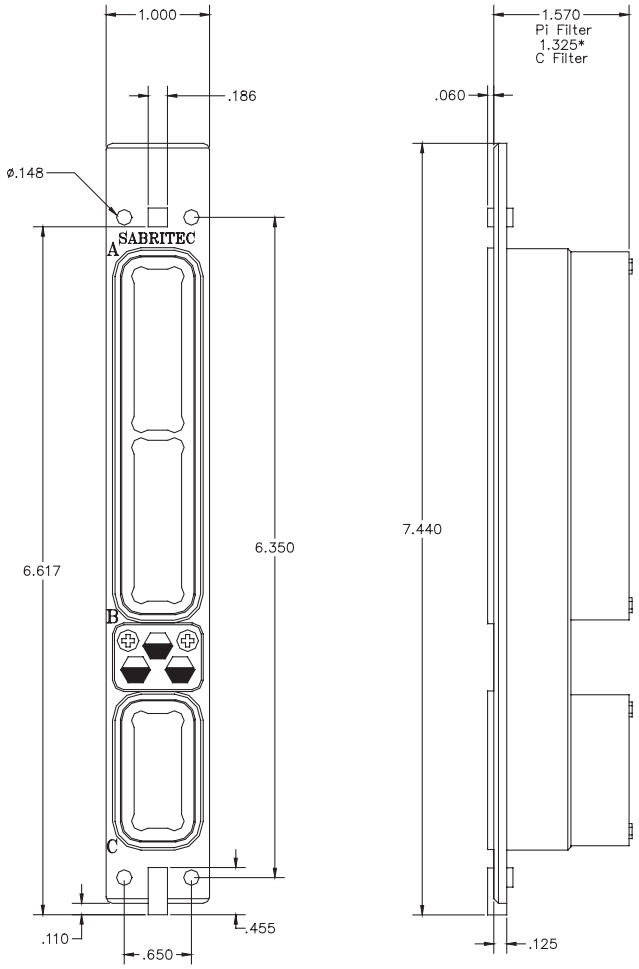
Plating
C- Cadmium (Clear Chromate)
N- Electroless Nickel

Contact Termination
S- Solder Cup
P- PC Tail
C- Crimp

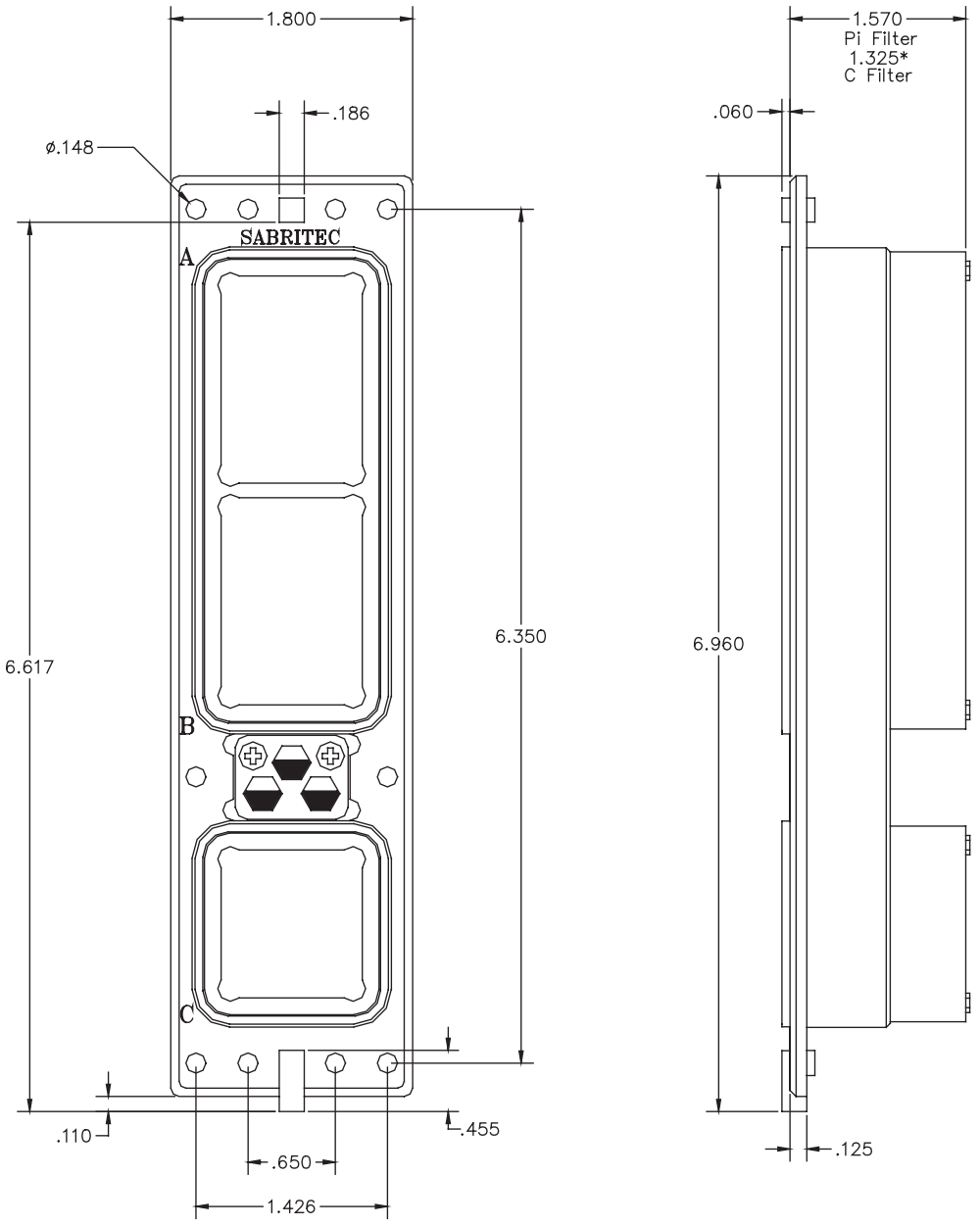
Insert Arrangements
Cavity A, B, C, D, E, F

Contact Type
P – Pin
S- Socket

Shell Size 1



Shell Size 2



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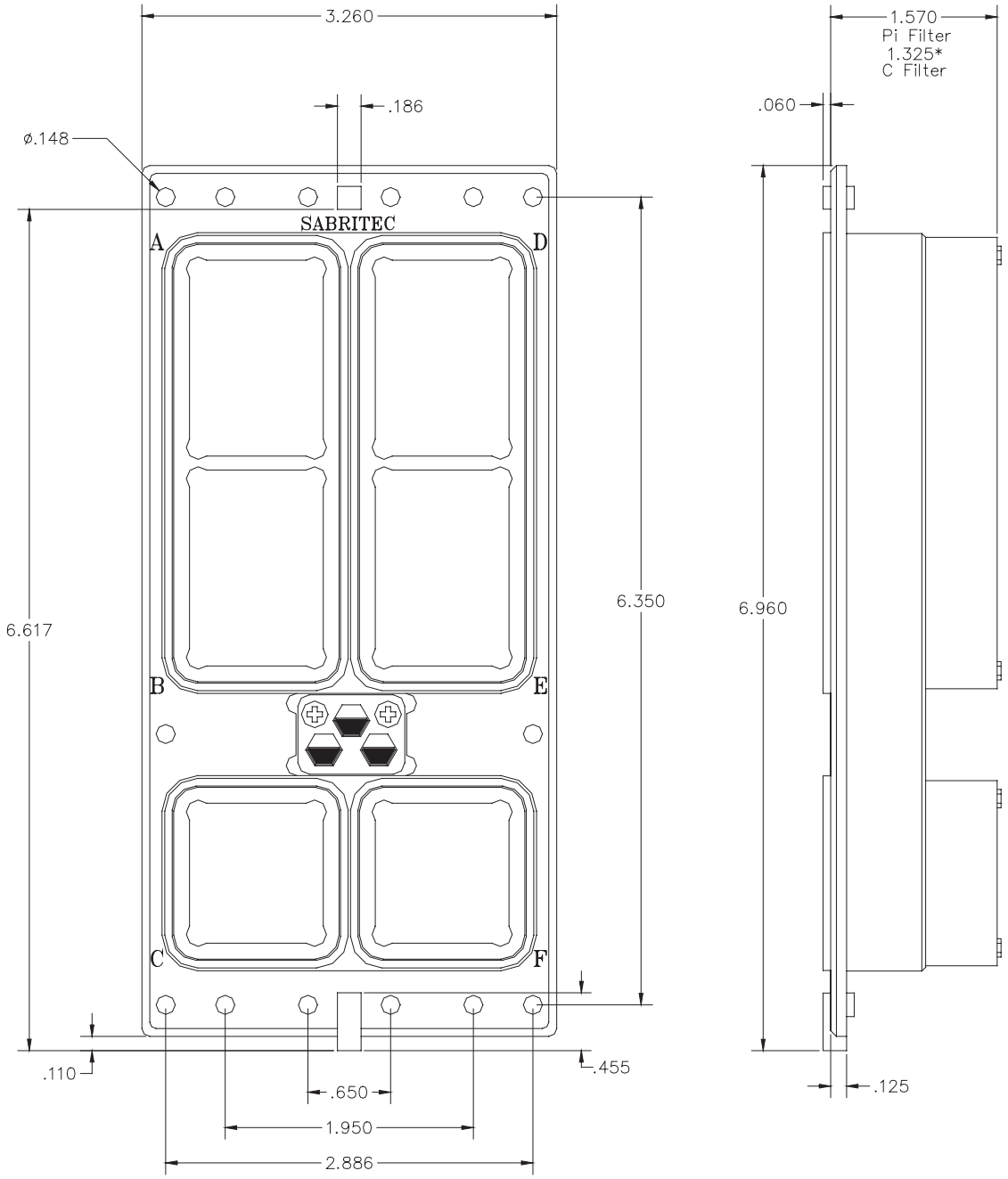
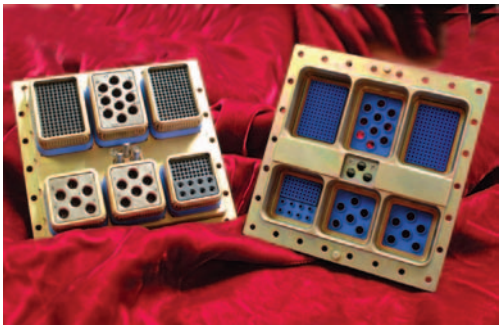
Shell Size 3


3.260
.186
ø.148
SABRITEC
A
D
B
E
C
F
6.617
6.350
.110
.455
.650
1.950
2.886
1.570
Pi Filter
1.325*
C Filter
.060
6.960
.125

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. The filter connectors are intermateable and interchangeable with the standard non-filtered MIL-DTL-83527 connectors.

Part Number Assignment

P200 - 83527 – 4A N – 150 – P – 150 – P – 13C2 – P – S

Filter Type
Pi, L, C

Prefix

Shell Size
2A, 3A, 4A

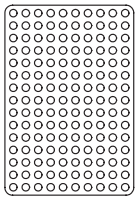
Plating
C- Cadmium (Yellow Chromate)
N- Electroless Nickel

Contact Termination
S- Solder Cup
P- PC Tail
C- Crimp

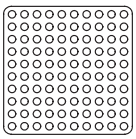
Insert Arrangements
Cavity A, B, C, D, E, F

Contact Type
P – Pin
S- Socket

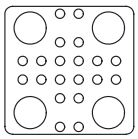
MIL-DTL-83527 INSERT ARRANGEMENTS



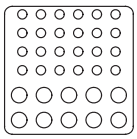
Insert 1
150 Size #22 Contacts



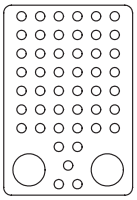
Insert 2
100 Size #22 Contacts



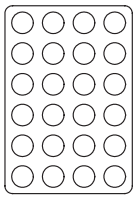
Insert 3
20 Size #22 Contacts
4 Size #8 T/C



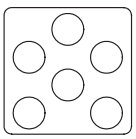
Insert 4
24 Size #20 Contacts
10 Size #16 Contacts



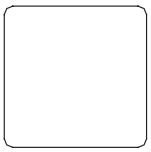
Insert 5
47 Size #20 Contacts
2 Size #8 T/C



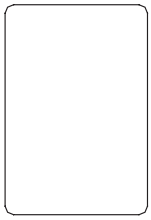
Insert 6
24 Size #12 Contacts



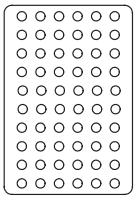
Insert 7
6 Size #8 T/C



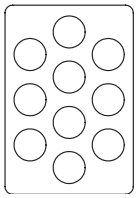
Insert 8
Blank



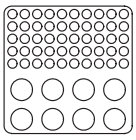
Insert9
Blank



Insert 10
60 Size #20 Contacts



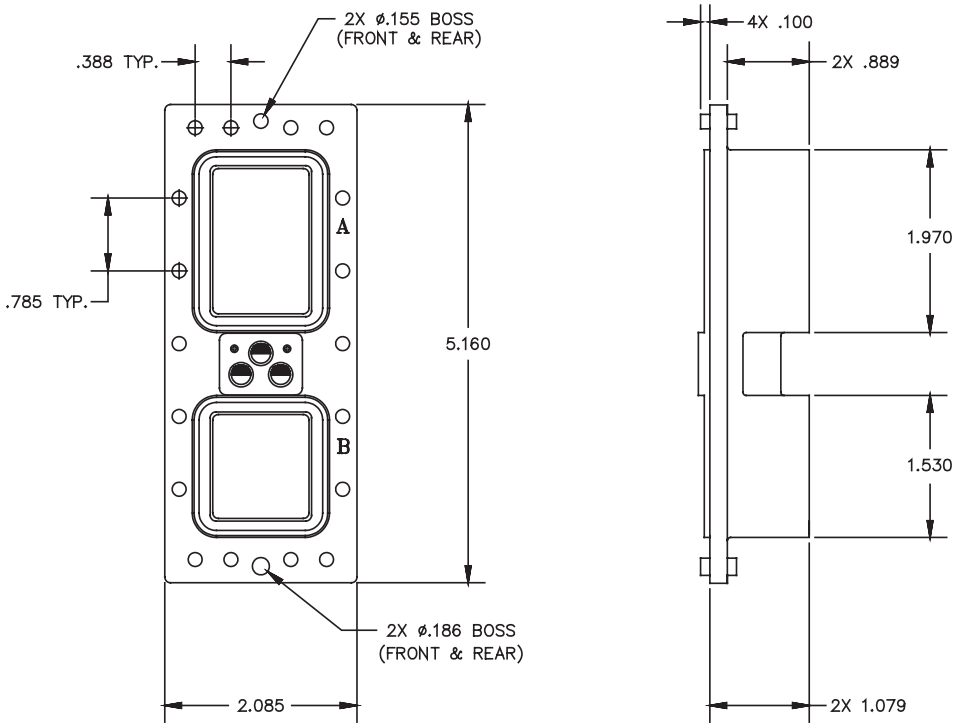
Insert 11
10 Size #8 T/C



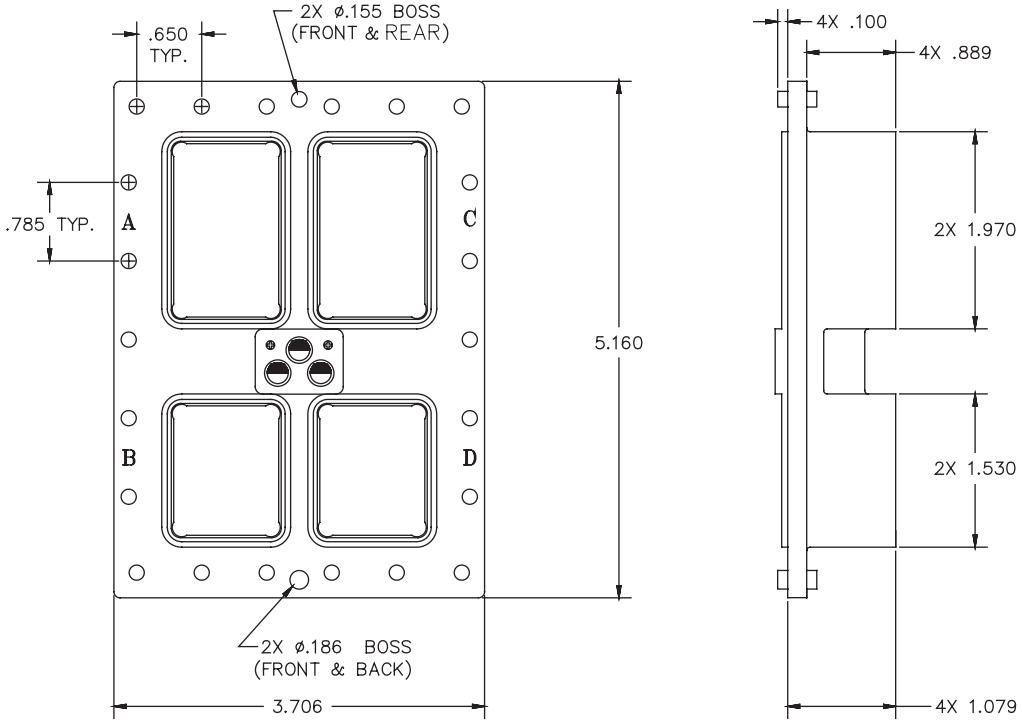
Insert 12
50 Size #22 Contacts
8 Size #12 Contacts

Specify
T = Twinaxial Cavity (Anti-Rotational)
C= Coaxial/Triaxial Cavity
For Inserts 3, 5, 7, 11 Size 8 Cavity
Only, as suffix to Insert Identification
Part Number

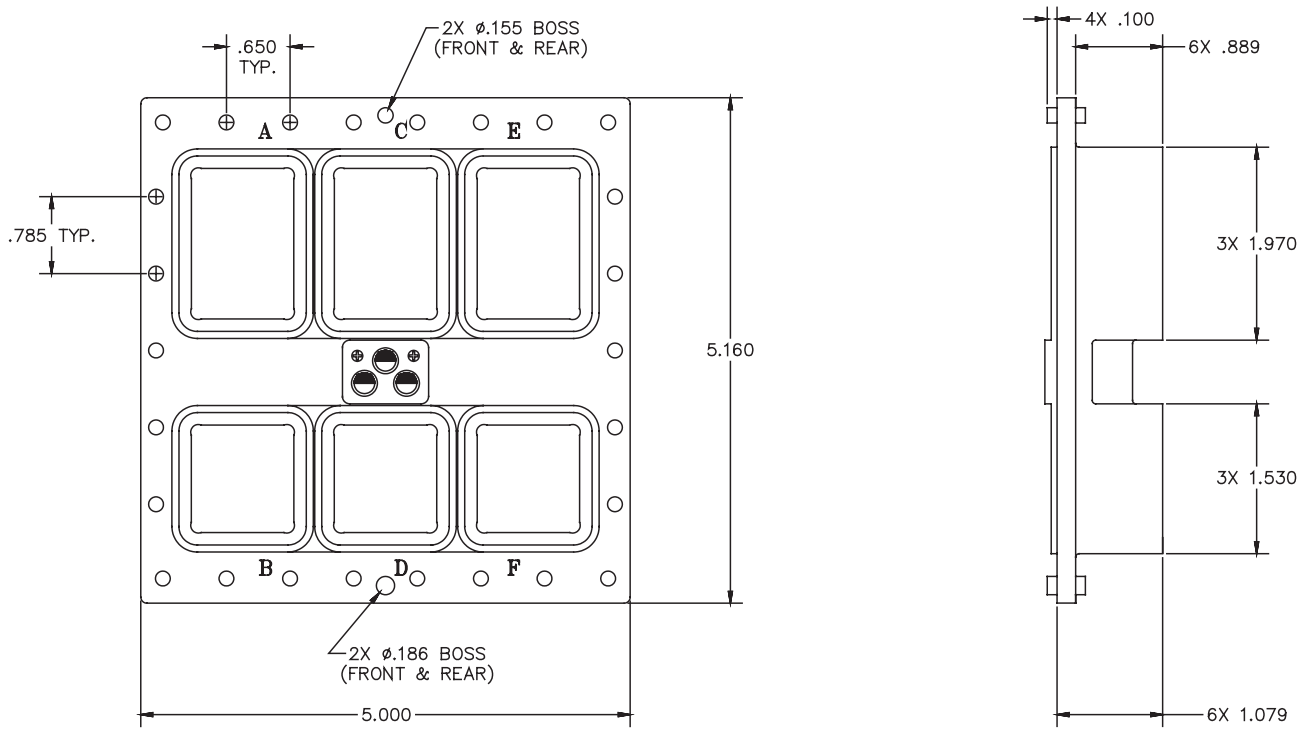
Shell Size 2



Shell Size 3



Shell Size 4

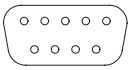

.650
TYP.
2X ø.155 BOSS
(FRONT & REAR)
A
C
E
.785 TYP.
5.160
B
D
F
2X ø.186 BOSS
(FRONT & REAR)
5.000
4X .100
6X .889
3X 1.970
3X 1.530
6X 1.079

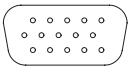
MIL-DTL-24308

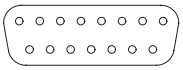
MIL-DTL-24308 D-Subminiature filter connectors are designed to meet or exceed all applicable requirements of the military specification. The filter connectors are intermateable and interchangeable with the standard non-filtered connectors. Sabritec also offers combo d-sub arrangements for power coaxial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

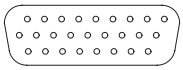
Materials and Finishes	
Shell	Aluminum alloy
Insulator	High grade plastic/epoxy
Contacts	Copper alloy, gold plate
Grommet and Seal	Silicon base elastomer
Capacitor	Barium titanate
Inductor	Ferrite bead

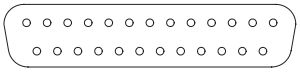
Insert Arrangements

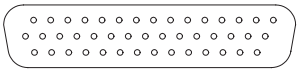

9 #20

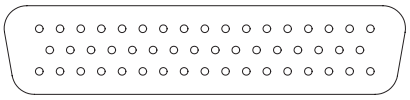

15 #22

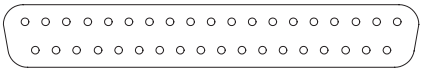

15 #20

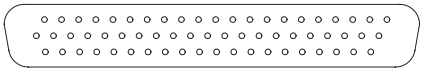

26 #22

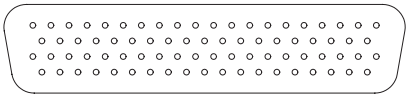

25 #20


44 #22


50 #20


37 #20


62 #22


78 #22

Consult Factory for Combo D-Sub Arrangements.

Part Number Assignment

P200 – 24308 – 25 – S – P – N

Filter Type
Pi, L, C

Prefix

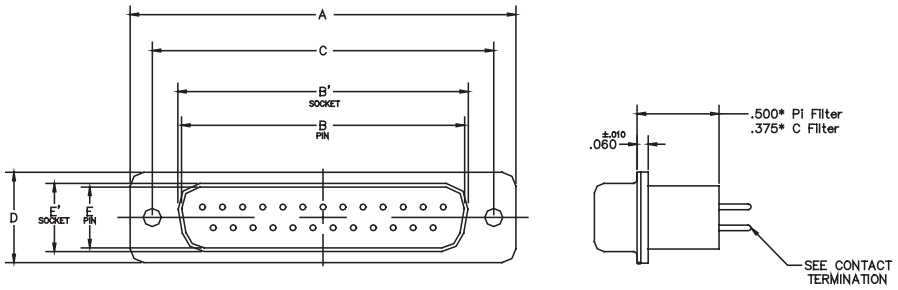
Contact Arrangement
Low Density
9, 15, 25, 37, 50
High Density
15HD, 26HD, 44HD, 62HD, 78HD

Plating
C- Cadmium (Yellow Chromate)
N- Electroless Nickel

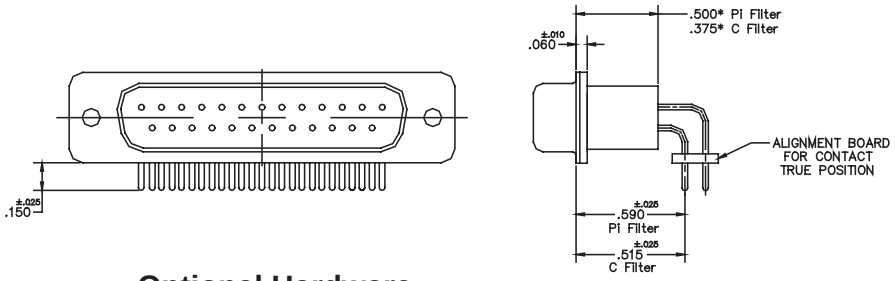
Contact Termination
S - Solder Cup
P – PC Tail
C - Crimp

Contact Type
P – Pin
S- Socket

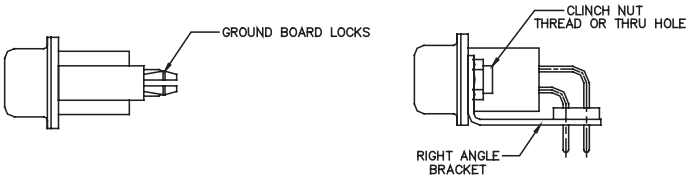
Straight D-Subminiature



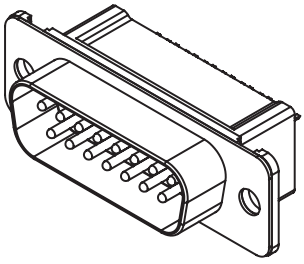
Right Angle D-Subminiature

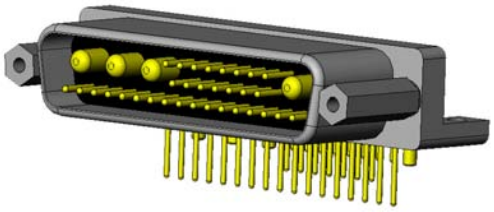


Optional Hardware

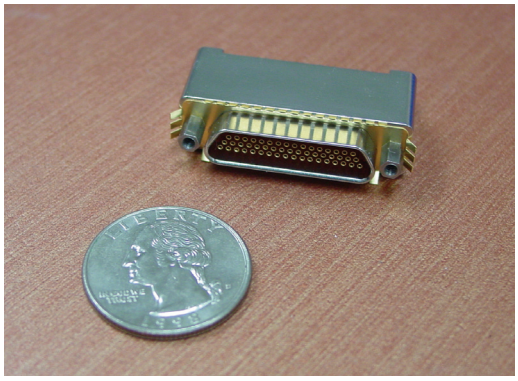


Straight Right Angle





Dimensions									
SHELL SIZE	STANDARD LAYOUT SIZE 20	HIGH DENSITY LAYOUT SIZE 22	A ±.015	B (PIN) ±.005	B' (SOCKET) ±.005	C BASIC	D ±.010	E (PIN) ±.005	E' (SOCKET) ±.005
E	9 CONTACT	15 CONTACT	1.213	.667	.642	.984	.494	.330	.310
A	15 CONTACT	26 CONTACT	1.541	.995	.970	1.312	.494	.330	.310
B	25 CONTACT	44 CONTACT	2.088	1.535	1.510	1.852	.494	.330	.310
C	37 CONTACT	62 CONTACT	2.729	2.183	2.158	2.500	.494	.330	.310
D	50 CONTACT	78 CONTACT	2.635	2.081	2.063	2.406	.605	.437	.422



MIL-DTL-83513

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

Materials and Finishes

Shell	Aluminum alloy
Insulator	High grade plastic/epoxy
Contacts	Copper alloy, gold plate
Grommet and Seal	Silicon base elastomer
Capacitor	Barium titanate
Inductor	Ferrite bead

Part Number Assignment

P200 – 83513 – 25 – S – P – N

Filter Type
Pi, L, C

Prefix

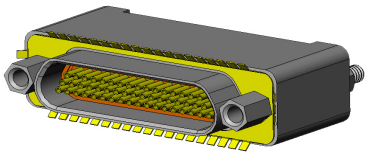
Contact Arrangement
9, 15, 21, 25, 31, 37, 51,100

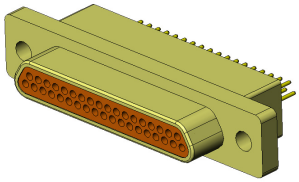
Plating
C- Cadmium (Yellow Chromate)
N- Electroless Nickel

Contact Termination
S - Solder Cup
P – PC Tail
F - Flying Leads
R - Right Angle*

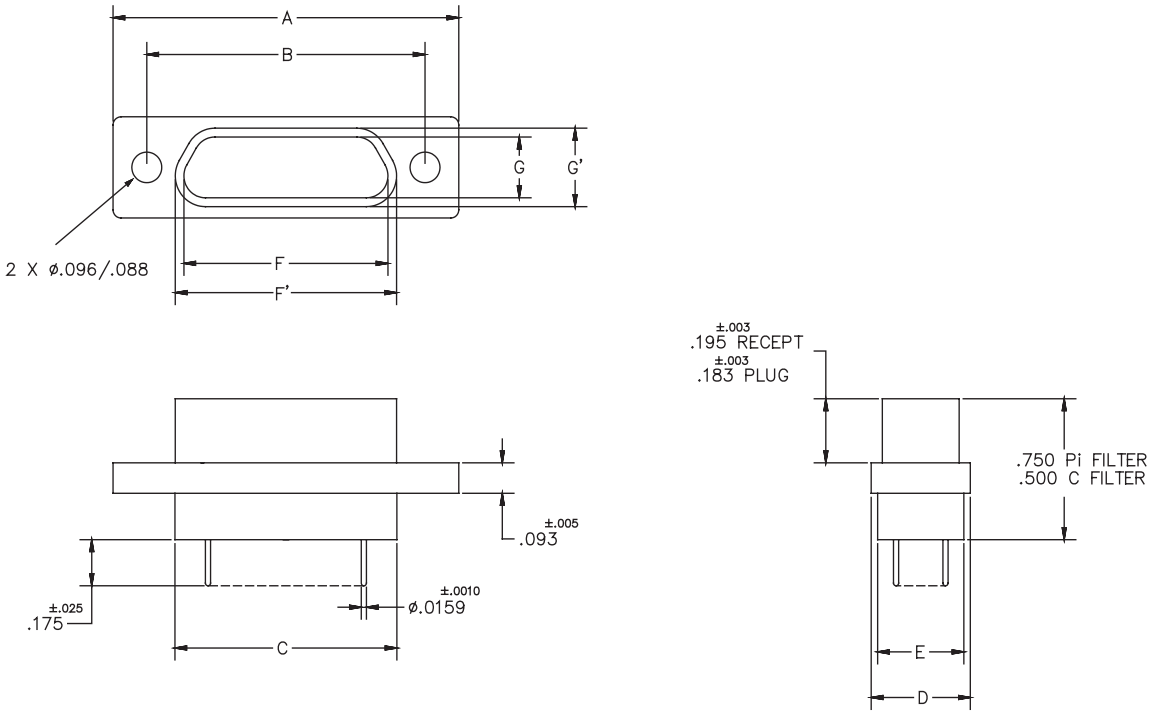
Contact Type
P – Pin
S- Socket

* Consult factory for footprint dimensions



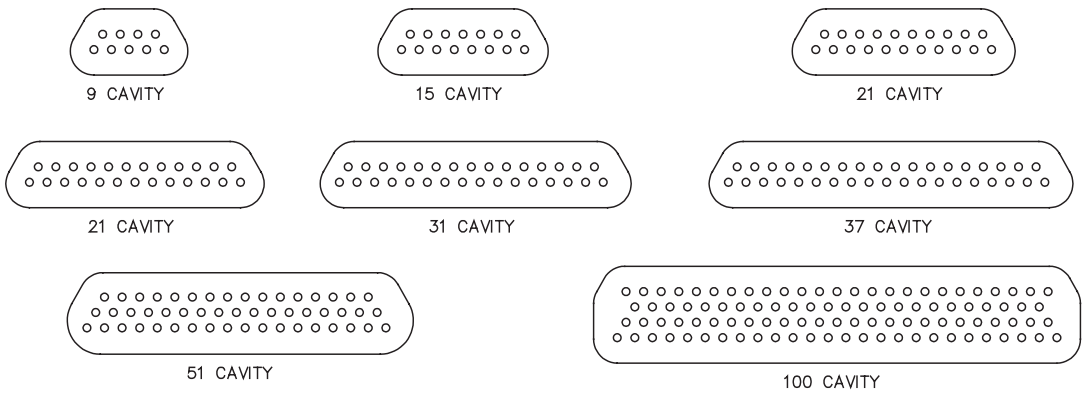


MIL-DTL-83513 MICROMINIATURE D



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	.3338	.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	.965	.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	.1425	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



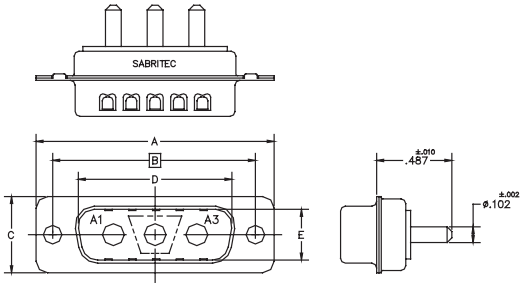
* Consult Factory For Additional or Custom Layouts

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

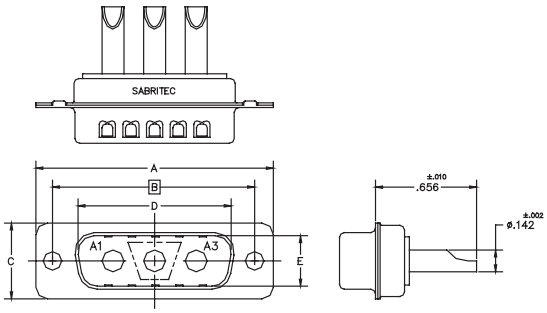
High Power Filter Combo D-Subminiature Connectors

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-Subminiature 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.

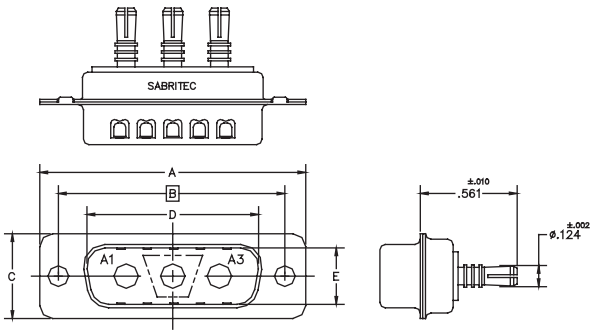
PC Tail



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

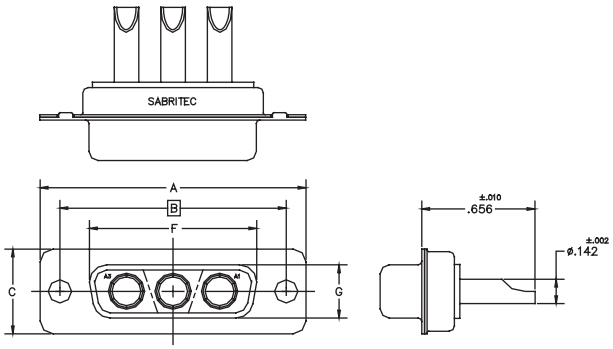
Sabritec Part Number	EMI Filter		Voltage Rating
	Cap Value	Layout	
310031-2000	1 nF	3W3	400 VDC
310032-2001	1 nF	3WK3	400 VDC
310031-2002	5 nF	3W3	400 VDC
310032-2003	5 nF	3WK3	400 VDC
310031-2004	47 nF	3W3	400 VDC
310032-2005	47 nF	3WK3	400 VDC

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

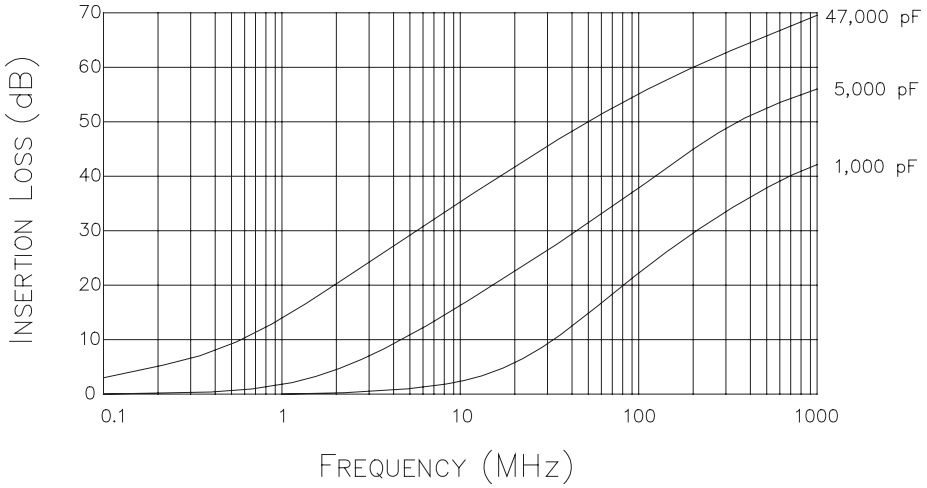
Solder Cup



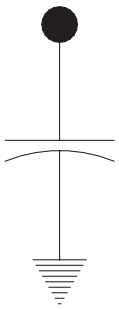
D-Sub High Power Receptacles

Sabritec Part Number	EMI Filter		oltage Ratir
	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

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

Electrical Characteristics

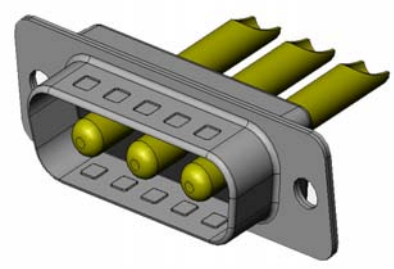
Operating Temperature Range	-55°C to +125°C
Voltage	1,000 VDC DWV 400 VDC Working
DC Current Rating	30 Amps max per contact
Surge Voltage	1,000 Volts, 1.2 X 50µ's Waveform (12 ohms) 1,000 Volts, 8 x 20µ's Waveform (2 ohms)
Insulation Resistance	5,000 M ohms @ 400 VDC
Capacitance	1 nF, 5 nF, 47 nF, (±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

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

Terminations

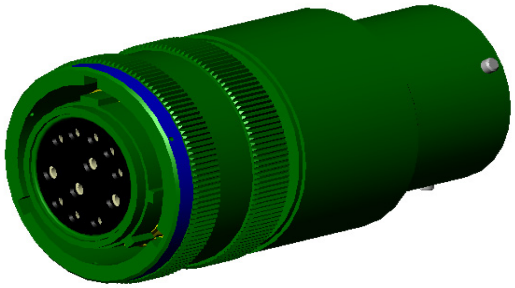
PC Tail
Solder Cup
Press Fit



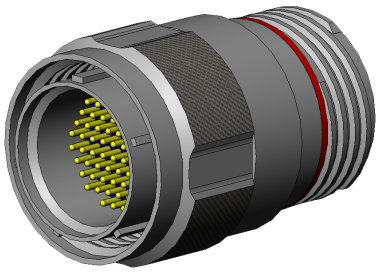
Filtered Adapters

Non–filter applications can easily be upgraded to EMI/Transient protection without modification to the system through Sabritec In–Line Filter Adapters. Adapters also 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.

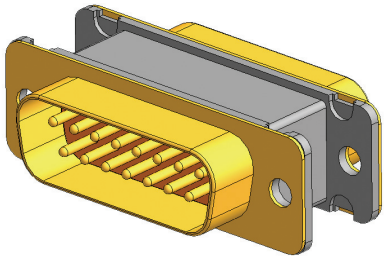
MIL-DTL-38999 Series I Adapter



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 filter connectors have been 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.

Heat Sinks: 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.

Hand Soldering: For solder cup arrays it is strongly recommended that the contacts be soldered in a "criss-cross" 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.

Cleaning/Handling

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.

Exceptions: If immersion or "auto-wash" cleaning using an aqueous pressure jet system is required, please contact Sabritec for further information on what precautions need to be taken.

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.