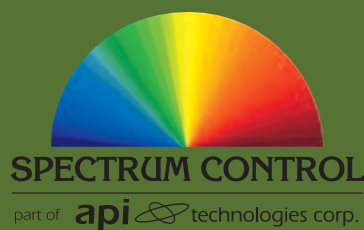


Spectrum Control Short Form Catalog



Spectrum Control

Spectrum Control was founded in 1968 as a designer and manufacturer of custom application-specific solutions to suppress or eliminate Electromagnetic Interference (EMI). Since that time we've become the world leader in EMI control and we have introduced many new products to help address the mechanical, electrical and/or power requirements of your next design. In addition to having the industry's most complete line of coaxial EMI components, power surface mount filters, filtered connectors, filtered arrays, power filters and EMC testing services, Spectrum also offers it's recently expanded lines of advanced ceramics, filtered and unfiltered interconnects, and film modules.

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Innovative Solutions from Components to Complex Assemblies

Understanding how and where potential EMI problems exist in an electronic system can be a daunting challenge. Uncovering the best way to address both conducted and radiated EMI by understanding all the mechanical, electrical and environmental concerns of your system can reduce costs and keep a project on budget and schedule. Our extensive library of standard components, which we frequently develop into custom assemblies, offers you a more complete, high performance solution... saving you time and money.

Industry's Broadest Line of Standard Products

We offer the flexibility to filter EMI at the power source, at the I/O connection, in a barrier wall or on the PCB. Our industry-leading line including inductors, glass and resin sealed filters, SMT filters, filter plates, filtered connectors, power entry and power line filters, and military/aerospace multisection filters, gives you a wide range of size, performance and packaging options, most available RoHS compliant. In addition, we've got over 800 standard MIL QPL products and DSCC part numbers.

Custom Application-Specific Solutions

This phrase serves as an excellent summary of what we produce for our customers, as well as defines what distinguishes our company from others in the electronics market. Rarely does a 100% off-the-shelf component completely satisfy the mechanical, electrical, and/or power requirements and constraints of a sophisticated OEM design. Whether modifying an existing component, working from a "clean sheet" approach, or integrating various technologies into a subassembly or system, the result will be a tailored Spectrum design for your exact application parameters, one that pushes the envelope of product performance.

As the world leader in EMI products and a market leader in microwave, power and sensor products, our customers rely on us to create and provide optimized solutions that improve their competitive advantage.

PDF Linking

The table of contents on page 2 and in each product section is linked to ease your navigation within this PDF. In addition, on each product page the Spectrum logo will return you to page 2 and the tab will return you to that section's table of contents.

Product Families

Advanced Ceramics

- Structural ceramics
- Capacitor arrays
- SMPS modular capacitors
- Planar capacitors
- Discoidal and tubular capacitors

Coaxial Filters & Interconnects

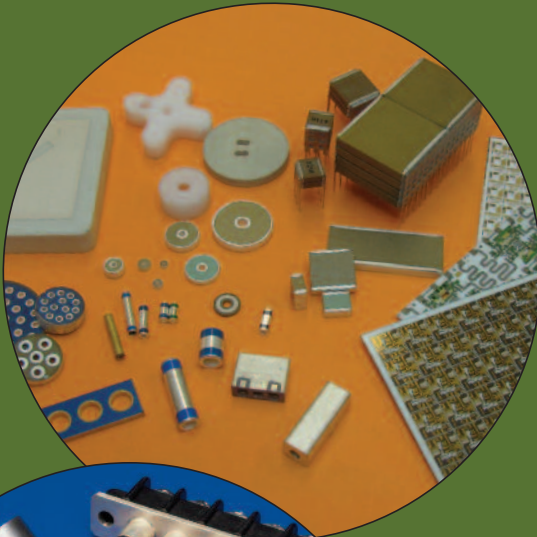
- Resin and hermetically sealed filters
- Motor-line feed-through filters (MLFT)
- High current/high voltage filters
- Miniature hermetically sealed and surface mount filters
- Filter plates and terminal blocks
- D-sub and combo filtered connectors
- Ribbon and datacomm connectors
- USB filtered and ESD protected connectors

Specialty Connectors & Harnessing

- Circular connectors
- Audio connectors
- Glass sealed connectors
- Value-added terminations, cables and harnesses

Power Filters & Film Modules

- Commercial power filters
- Military/aerospace power filters
- Power entry modules
- Film feed-through filters
- Film modules



Vertical Integration

Our business teams coordinate and share extensive in-house resources to support many of the problem-solving designs and value-added programs we create. Internal capabilities range from formulating and producing the ceramics used in many of our products to complete metal fabrication, which facilitates the mechanical/packaging requirements of our customers' designs. Specific technologies are sourced from multiple locations using expertise found throughout our organization, often crossing business segments to find the ideal production method, including use of our MIL-STD-790 and TS16949 certified factories.

Low Cost Manufacturing Centers

ISO9001:2000 certified Spectrum Control adheres to world class manufacturing techniques ensuring each customer receives the Six Sigma reliability they demand. In response to the realities of the marketplace, we have established low cost manufacturing facilities in China and Mexico. These new plants complement our North American production capacity and flexible manufacturing systems, allowing us to ramp-up production to meet fast-track delivery requirements.

Global Reach

Today, more than ever, it is imperative suppliers be prepared to support their customers around the world. Spectrum Control has created a network of sales and design centers, manufacturing plants and distribution facilities to support the world's major markets. From field sales specialists to engineering and manufacturing to logistics, we have moved our key program development personnel closer to our customers regardless of their location. We are committed to being a player in the global economy and ideal partner for our worldwide OEM customers.



An Engineering & Technology Leader

The heritage of our company, dating to its founding in 1968, is as an engineering driven, solutions provider. Through the years of expansion and acquisition, this basic premise remains a constant and driving force. Our teams of experienced application engineers use sophisticated simulation software to replicate real-world environments. Once product designs are complete, we conduct exhaustive in-house testing and verification to ensure function and compliance. Spectrum Control maintains a leadership position in many industries by applying the latest technology to design performance-enhancing products and systems.



R & D Commitment... Creating the Next Generation

The surest way to guarantee organic new product development is through investment in research personnel and equipment. Spectrum Control consistently commits the resources necessary to fund the innovation and creativity leading to technological advancements. We constantly are looking for ways to improve existing designs, as well as find entirely new approaches yielding unforeseen benefits. All of our business units have made significant new product introductions in recent years.

Optimized Designs

Defense

- Specialty Connectors
- QPL'd Coaxial Filters
- Military Custom Power Filters
- Advanced Ceramics

Communications

- Coaxial Interconnects
- Commercial Custom Power Filters
- Surface Mount Filters

Avionics

- Specialty Connectors
- Coaxial Filters and Interconnects
- Film Modules
- Custom Power Filters

*for a wide range of new
applications and markets*

Alternate Energy

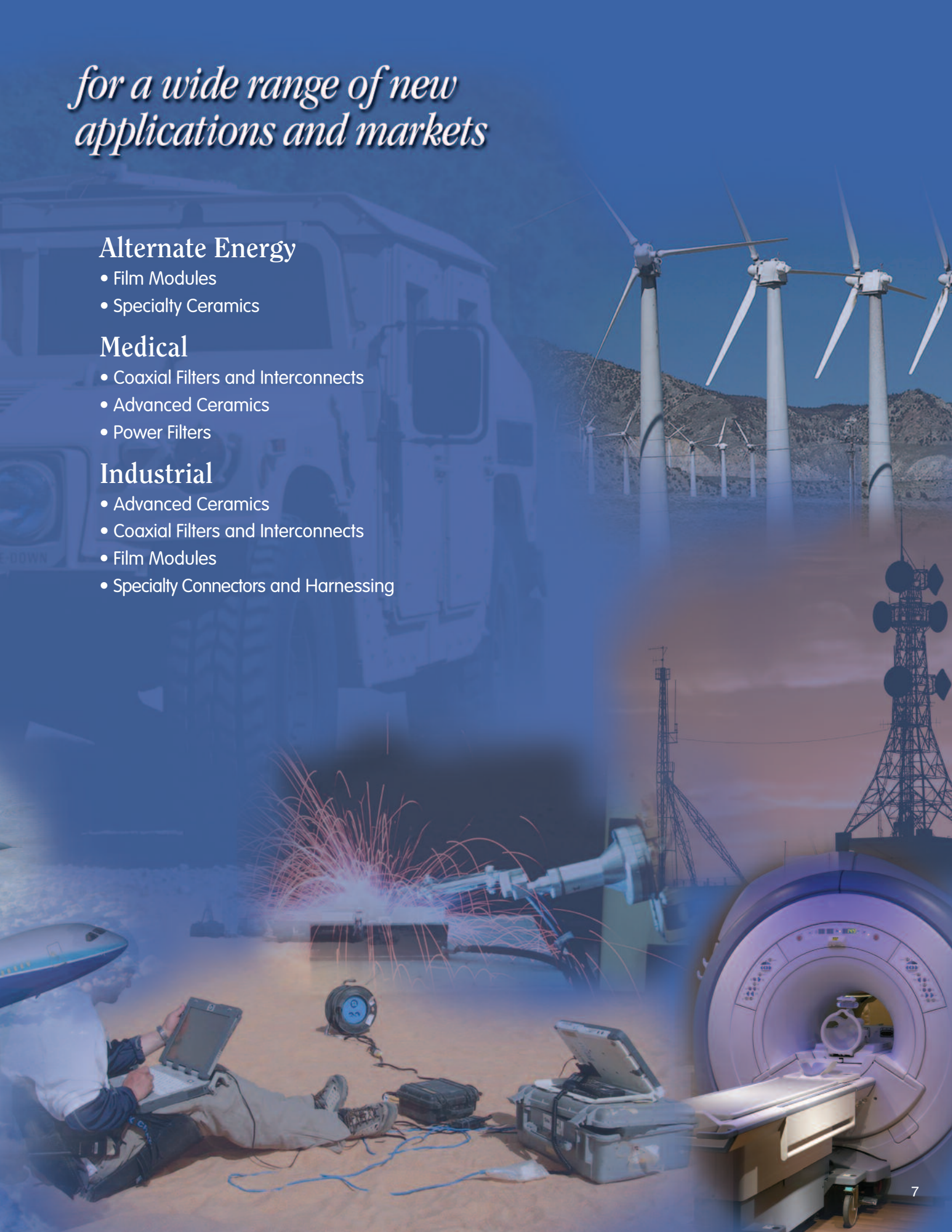
- Film Modules
- Specialty Ceramics

Medical

- Coaxial Filters and Interconnects
- Advanced Ceramics
- Power Filters

Industrial

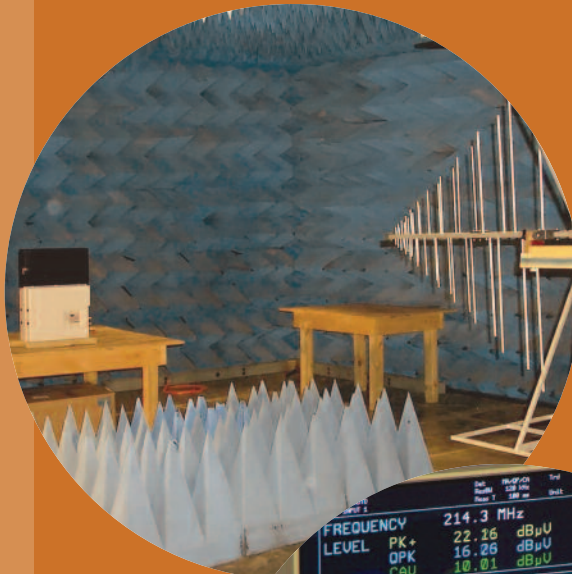
- Advanced Ceramics
- Coaxial Filters and Interconnects
- Film Modules
- Specialty Connectors and Harnessing



EMI Testing Services

Spectrum Control has the EMC expertise and in-house filter solutions you need to meet worldwide EMC standards.

Our EMC testing services offer you a flexible resource to assist in product development by identifying and correcting EMI susceptibility and/or emission problems. Spectrum has a fully equipped EMC testing laboratory and an experienced engineering staff ready to solve demanding EMC challenges. For a modest daily fee, we can test your equipment, determine state of compliance, and work with you in developing a viable solution. It is not uncommon for clients to leave our lab with a prototype in hand.



EMC Lab Highlights

- NARTE certified staff
- Semi-anechoic chamber
- Computer controlled instrumentation
- Graphical data presentation in multiple formats
- Fiber optic video monitoring system

Testing Capabilities

MILITARY

MIL-STD-461 A/B/C/D/E

MIL-STD-1399

AUTOMOTIVE

CISPR 25 Test Methods

COMMERCIAL

FCC-Part 15

RTCA/DO-160 A/B/C/D

GR-1089-CORE

INTERNATIONAL

EN55011/CISPR 11

EN55014/CISPR 14

EN55022/CISPR 22

EN61000-4-2 Electrostatic Discharge

EN61000-4-3 Radiated RF Immunity

EN61000-4-4 Electrical Fast Transient

EN61000-4-5 Surge

EN61000-4-6 Conducted RF Immunity



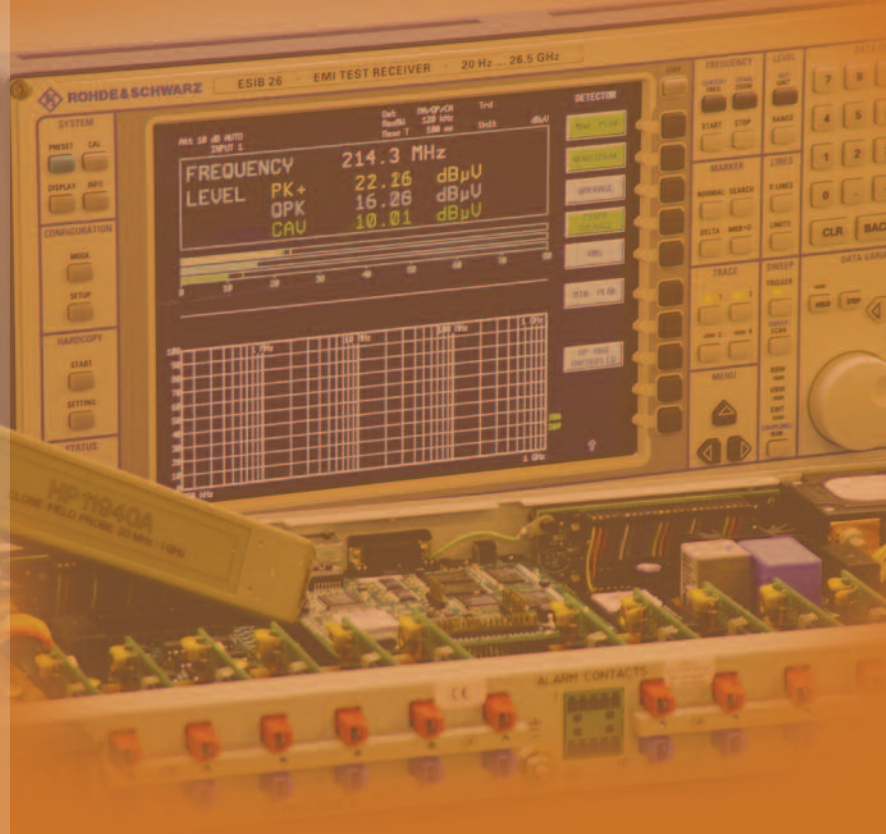
EMI/RFI Filter and Capacitor Performance Testing

Reliability Levels

Class B

Class B is outlined in MIL-PRF-28861 and is prescribed for most military/aerospace requirements. It is more stringent than MIL-PRF-15733, requiring 100% screening that includes thermal shock, voltage conditioning and x-ray.

Periodic Group B testing is performed on units selected at random from production lots.



Class B MIL-PRF-28861 Test Sequence Summary

| Inspection | Class B |
|---|---------|
| Group I | |
| AC voltage drop (when applicable) | X |
| Voltage and temperature limits of capacitance | X |
| Insertion loss (at temperature) | X |
| Barometric pressure (reduced) | X |
| Temperature rise | X |
| Current overload | X |
| Terminal strength | X |
| Thermal shock and immersion | X |
| Group II | |
| Subgroup 1 | |
| Life | X |
| Subgroup 2 | |
| Resistance to soldering heat | X |
| Salt spray (corrosion) | X |
| Radiographic inspection | X |
| Subgroup 3 | |
| Resistance to solvents | X |
| Group III | |
| Shock (specified pulse) | X |
| Vibration (high frequency) | X |
| Moisture resistance | X |
| Seal (when applicable) | X |
| Radiographic inspection | X |

"R" level testing

"R" level screening is performed by Spectrum Control's Hi-Rel Laboratory as detailed below. Customers requiring special tests may order to their own specifications or simply order to level R and then note additions or deviations.

"R" level test sequence

(100% testing unless otherwise specified)

- Thermal Shock: 5 cycles from -55°C to +125°C in accordance with MIL-STD-202, Method 107D, Condition A.
- Burn-in: 100 hours at 1.4x rated DC voltage, 125°C.
- Seal Test: MIL-STD-202, Method 112, Test Condition A. Hermetic sealed parts only.
- Capacitance and Dissipation Factor: MIL-STD-202, Method 305, frequency 1kHz.
- Dielectric Withstanding Voltage: 2.5 times the rated DC voltage for 5 ±1 second at 25°C, with 50 mA maximum charging current.
- Insulation Resistance: MIL-STD-202, Method 302, 125°C at rated DC voltage and room temperature (25°C). The 125°C requirement shall be 10% of the specified catalog IR at 25°C.
- DC Resistance: MIL-STD-202, Method 303.
- Insertion Loss Test: Sample per MIL-PRF-15733. At full rated load in accordance with MIL-STD-220. The minimum insertion loss shall be defined in the filter catalog.
- Visual and Mechanical: in accordance with MIL-PRF-15733.
- Marking: All filters which have successfully completed the test sequence shall be marked with an "R" in the second part of the number. For example, a standard SCI-2130-004 becomes SCI-R2130-004 and 9051-100-0000 becomes 9051-R100-0000, and 51-719-011 becomes 51-R719-011 after completion of the Hi-Rel Level "R" Test Sequence.

Advanced Ceramics

we offer performance and cost alternatives to meet varied voltage, capacitance, packaging and budgetary requirements



Spectrum Controls' Expertise

Inside every EMI filter is a ceramic feed-through capacitor. We have engineered a line of ceramic capacitors designed to provide solutions to a wide range of filtering applications. Our ceramic capacitors are ideal for EMI/RFI suppression filters, medical implantable devices, commercial and military applications, power supplies and converters.

Custom Ceramic Capacitors

We offer many variations of discoidal, tubular and array capacitors to fit your custom application:

- Various OD, ID, thickness and length configurations
- Pressed discoidals with surface printed terminals
- Multihole discoidal designs
- Miniature discoidals down to .080" OD

Discoidal Feed-Through Capacitors are ideal for by-pass and filtering applications with a low inductance construction suited for high frequency applications. Their low profile and rugged design is an excellent alternative to ceramic tubes... 11

Tubular Feed-Through Capacitors are small, lightweight with high dielectric strength and are impervious to moisture and contamination. Feed-through capacitors have a uniform insertion loss over a broad spectrum range and are ideal for multi-pin connector applications... 12

Tubular Pi Capacitors have similar characteristics to feed-through capacitors in addition to a narrower transition between the pass and stop bands, effectively stopping high frequency interference without affecting desired frequencies and providing filtering of noise content close to signal content ... 13

SMPS (Switch Mode Power Supply) Capacitors deliver lower equivalent series resistance, lower equivalent series inductance, lower ripple voltage and less self-heating when compared to other capacitor technologies... 14

Planar Capacitors offer a faster assembly time compared to stand-alone chips, discoidal or tubular capacitors. They also have a low profile and are capable of meeting various geometric and electrical configurations, making Spectrum's planar capacitors the new standard in EMI suppression applications... 15

Structural Ceramics include pressed, extrusion and tape casting types that can be produced in complex geometries. These ceramics deliver high wear, corrosion resistance, temperature stability, and superior thermal shock resistance... 16



- Arrays
- Custom style capability
- High voltage designs available
- High temperature designs available
- Square tubes for surface mount applications
- Lapped feed-through capacitors

Discoidal Capacitors

Ceramic discoidal feed-through capacitors are the building blocks of the EMI filter industry. Spectrum Control discoidal capacitors provide great versatility in meeting varied voltage, capacitance and dimensional requirements. Our nonpolar, multilayer capacitors are small, reliable and high in dielectric strength. Operational temperatures of -55°C to +125°C are achieved with no voltage de-rating.

The versatile nature of our discoidals makes them ideally suited for by-pass and filtering applications. Due to their low inductance construction, these capacitors perform extremely well in high frequency applications. The circular geometry of a discoidal feed-through capacitor offers many paths to ground, resulting in lower impedance and better filtering performance.

The low profile and rugged design of our discoidal capacitors offer an excellent alternative to ceramic tubes.

Features

- NPO, X7R and Z5U ceramics
- Excellent high frequency performance
- Low profile design
- Rugged construction
- Low impedance, many paths to ground
- Low inductance, nonpolar
- AC applications up to 240V
- DC applications up to 500V
- -55°C to +125°C operation

Discoidal Part Numbering System

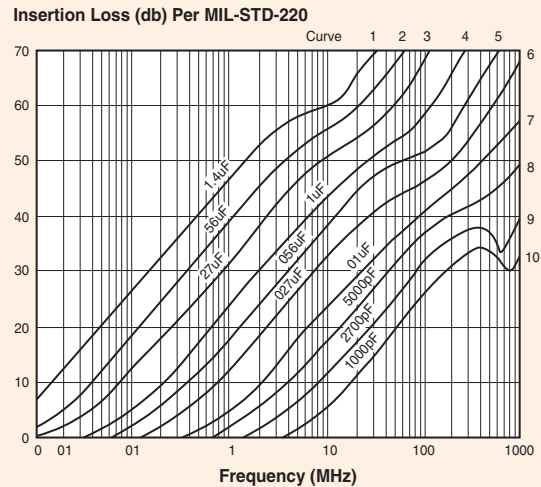
Example: **340055AX145P6B0**

The part number shown represents a discoidal with an O.D. of 0.340" and I.D. of 0.055", with a voltage rating of 50 VDC. The ceramic type will be X7R, capacitance value is 1,400,000 pF with a tolerance of +100, -0%. The termination will be silver and the parts will receive bulk packaging.

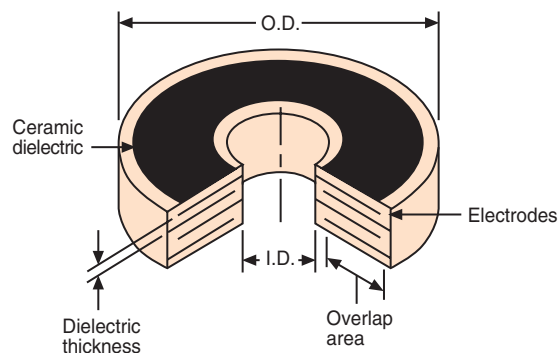
| 340 | 055 | A | X | 145 | P | 6 | B | 0 |
|-----------------------|-----------------------|---|----------------------------|-----------------------------|--|-------------|-----------|------------------------------------|
| Outer Diameter | Inner Diameter | Voltage Rating | Ceramic Code | EIA Cap Code | EIA Cap Tolerance | Termination | Packaging | Special Requirements |
| Example: 0.340" = 340 | Example: 0.055" = 055 | A: 50 VDC B: 100 VDC C: 200 VDC E: 500 VDC | N: NP0 X: X7R Z: Z5U | Example: 1,400,000 pF = 145 | K: ±10% M: ±20% P: +100 -0% Z: +80 -20% | 6: Silver | B: Bulk | 0: None D: Class B G: Custom |



Typical Insertion Loss - FT Capacitors



Multilayer Discoidal



Tubular Feed-Through (FT) and Pi Capacitors

Spectrum Control manufactures a wide variety of tubular feed-through (FT) and Pi (π) ceramic capacitors, which are small in size, lightweight, nonpolar and offer high dielectric strength. Operating temperatures of -55°C to $+125^{\circ}\text{C}$ are achieved with no voltage de-rating. All capacitors are fired to produce true monolithic structures, which are impervious to moisture and contamination. Outer terminations feature a nickel barrier and a final metal layer, typically silver.

Features

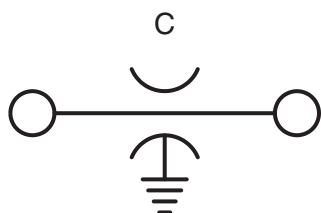
- Provide filtering of noise content close to signal content
- Low cost solution for general purpose filtering
- Ideal for multipin connector applications
- High ratio of capacitance to volume
- Low inductance, nonpolar
- Impervious to moisture and contamination
- -55°C to $+125^{\circ}\text{C}$ operation

Tubular FT Capacitors

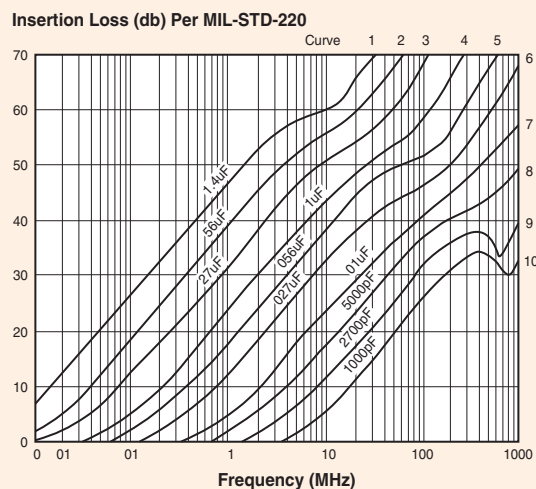
Feed-through tubular capacitors are ideally suited for by-pass and filtering applications. Due to the cylindrical design, the capacitors will have uniform insertion loss over a broad frequency range. This structure yields a low inductance when compared to conventional wound capacitors.

Solid FT capacitors have no internal electrodes and find their primary usage in low cost applications. Multilayered FT capacitors have a higher capacitance to volume ratio and are ideally suited for greater filtering at lower frequencies. Multilayered FT capacitors are also designed for applications where source impedances are high and sharp attenuation rise is critical.

Feed-Through Circuit

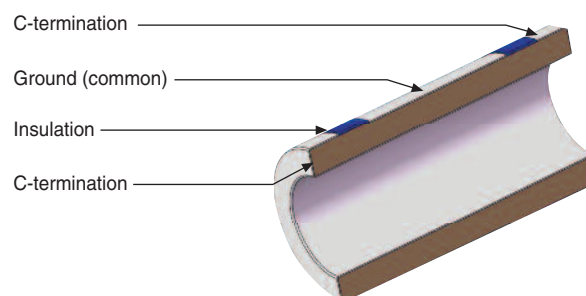


Typical Insertion Loss

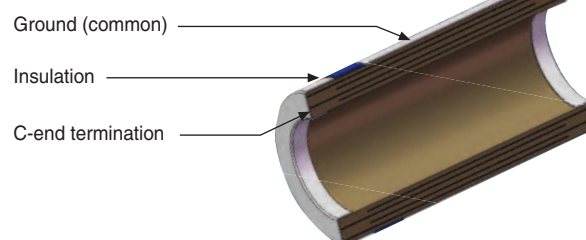


Feed-Through Construction

Solid



Multi Layered



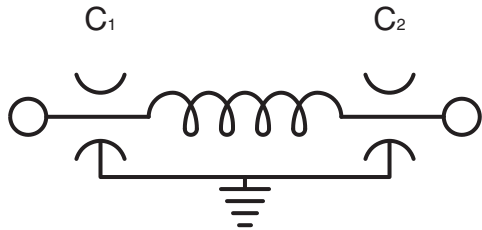
Tubular Feed-Through (FT) and Pi Capacitors

Tubular Pi Capacitors

Compared to feed-through tubular capacitors, Pi tubular capacitors have a much narrower transition between the pass and stop bands. Pi capacitors are effective in stopping high frequency interference without affecting necessary frequencies immediately below the stop band.

Similar to feed-through tubular capacitors, Pi tubular capacitors can be designed with a solid or multilayered configuration. Solid Pi tubular capacitors are more cost effective, but limited in capacitance values. Multilayered Pi tubular capacitors can cover a wider range of capacitance, while still maintaining the mechanical strength of a solid Pi tubular capacitor in a similar case size.

Pi Circuit



$$C_1 + C_2 = C_{\text{Total}}$$

Inductive element not included.

Tubular Part Numbering System

Example: I8150173X7R471M

The part number shown represents a Pi tubular capacitor with an O.D. of 0.081" and I.D. of 0.050", with a voltage of 200 VDC. The ceramic type will be X7R, capacitance value is 470 pF with a tolerance of $\pm 20\%$. The termination will be silver and the parts will receive bulk packaging.

I

Voltage Rating

A: FT, 50 VDC
C: FT, 100 VDC
E: FT, 200 VDC
G: Pi, 50 VDC
H: Pi, 100 VDC
I: Pi, 200 VDC

81

Outer Diameter

Example:
0.081" = 81

50

Inner Diameter

Example:
0.050" = 50

173

Length

Example:
0.173" = 173

X7R

Ceramic Code

NP0
X7R
Y5V

471

EIA Cap Code

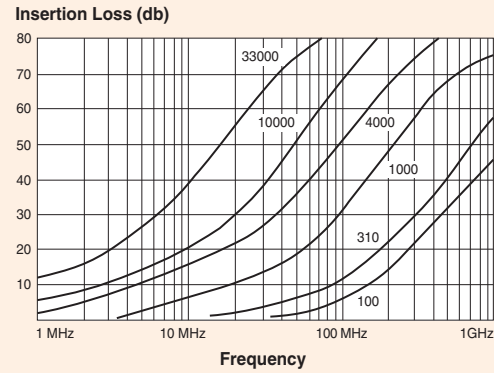
Example:
470 pF = 471

M

EIA Cap Tolerance

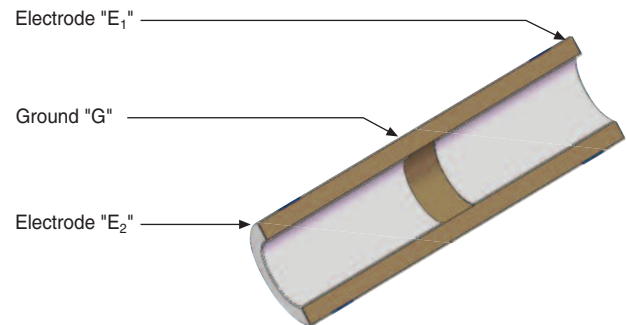
M: $\pm 20\%$
N: $\pm 30\%$
P: +100 -0%
Z: +80 -20%

Typical Insertion Loss - Pi Capacitors

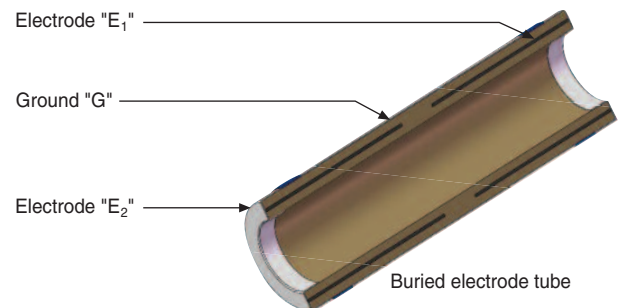


Pi Construction

Solid



MultiLayered Tube



SMPS Capacitor Assemblies

Spectrum Control offers a line of Switch Mode Power Supply capacitors designed to provide superior performance in high frequency switching applications. These capacitors are ideal for high energy density products found in both military and commercial markets.

- MIL-PRF-49470 Qualified, DSCC 87106 and custom products available
- Leaded parts safeguard against thermal and mechanical stresses

Spectrum's High-speed SMPS capacitors have the following characteristics when compared to other capacitive elements:

- Lower Equivalent Series Resistance (ESR)
- Lower Equivalent Series Inductance (ESL)
- Lower ripple voltage and less self heating

Dielectric Characteristics

Spectrum offers SMPS capacitors in two basic dielectric classes, with individual designs tailored to meet specific performance characteristics.

| Dielectric Type | Stability Class | Description |
|-----------------------|-------------------------|--|
| BP (NPO and COG) | Ultra Stable Class I | Effects on electrical properties are minimal with variations in operating temperature, voltage, frequency or time. Used in applications which require stable performance. |
| BQ, BR, BX and X7R | Stable Class II | Class II dielectrics will exhibit a predictable shift in performance characteristics when exposed to variations in temperature, voltage, frequency or time. Selected for applications where blocking, coupling, by-passing and frequency discriminating elements are used. Offers higher capacitance than Class I (COG). |

Additional package size, capacitance values and higher voltage ratings available, please contact factory.

SMPS Part Numbering System

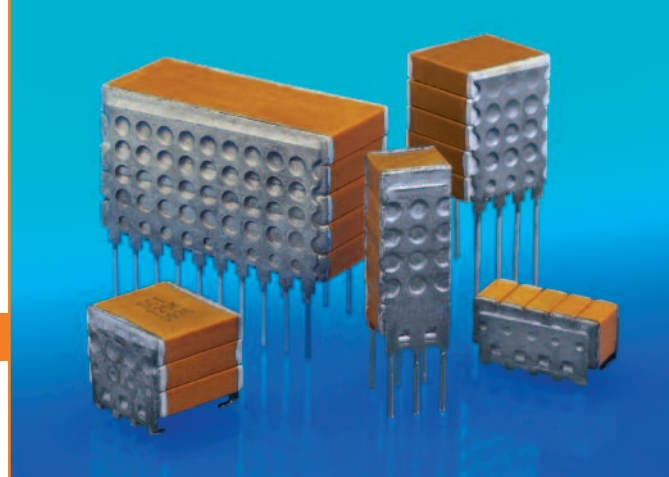
Example: **SMP3X124KENMB00**

The part number shown represents a size 3 SMPS capacitor. The ceramic type will be BX, capacitance value is 120,000 pF, with a tolerance of $\pm 10\%$.

| SMP3 | X | 124 | K | E | N | M | B | 00 |
|----------------------|--|------------------------|--|--|--|--------------------------|---------------------------|---|
| Case Size | Ceramic Code | EIA Cap Code | EIA Cap Tolerance | Voltage Rating | Termination | Marking | Packaging | Special Requirements |
| SMP3 SMP4 SMP5 | B: X7R P: BP Q: BQ R: BR X: BX | Example: 120,000 pF | J: $\pm 5\%$ K: $\pm 10\%$ M: $\pm 20\%$ | Z: 25 VDC A: 50 VDC B: 100 VDC C: 200 VDC E: 500 VDC | J: Leads in L: Leads out N: Leads straight | M: Marked U: Unmarked | B: Bulk T: Tape & Reel | 00: Standard XX: Custom HR: Hi-Rel* |

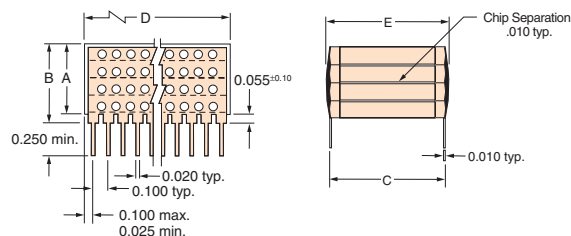
* HR: Hi-Rel designation reflects MIL-PRF-49470, level B, QPL approval

For complete specs and drawings, visit www.SpecEMC.com/smps

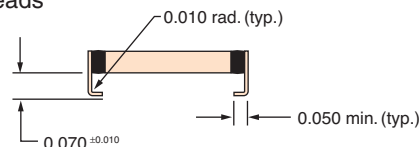


| Style/Size | Dimensions | | | | | |
|--------------------|----------------|----------------|----------------|----------------|----------------|------------|
| | A max | B max | C $\pm 0.025"$ | D $\pm 0.025"$ | E max | Leads/Side |
| SMP-3 (in) (mm) | 0.650 16.50 | 0.715 18.16 | 0.450 11.42 | 1.050 26.65 | 0.500 12.69 | 10 |
| SMP-4 (in) (mm) | 0.650 16.50 | 0.715 18.16 | 0.400 10.15 | 0.400 10.15 | 0.440 11.17 | 4 |
| SMP-5 (in) (mm) | 0.650 16.50 | 0.715 18.16 | 0.250 6.35 | 0.250 6.35 | 0.300 7.62 | 3 |

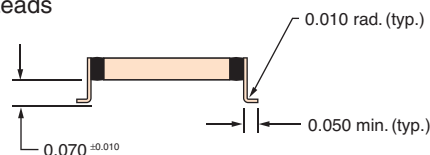
"N" Style Leads



"J" Style Leads



"L" Style Leads



* Dimensions in inches

The voltage rating is 500 VDC, termination will be "N" style leads and the parts will receive marking/ bulk packaging.

Planar Capacitors

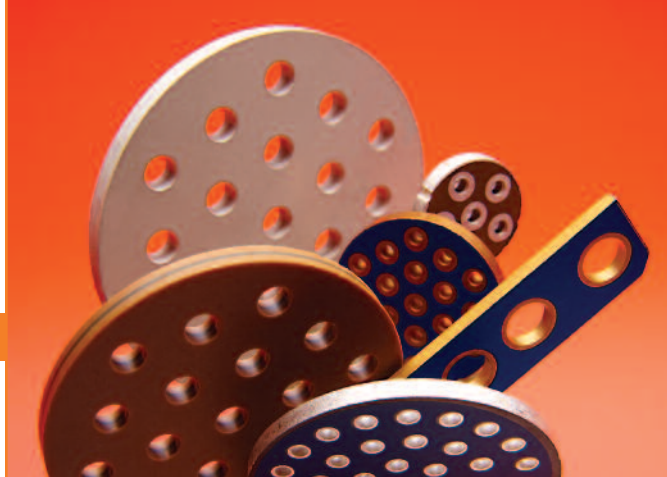
Spectrum Control designs and manufactures a wide range of planar capacitor arrays. Using over 25 years expertise in multilayer ceramic capacitor manufacturing, planar capacitors offer many advantages over stand-alone chip, discoidal or tubular capacitors: low profile, compact, quick assembly time. Various custom and industry standard geometries are available and our designs can incorporate multiple capacitance values, feed-through holes and ground holes. With a combination of versatility and function, Spectrum's planar capacitors are quickly becoming the new standard in filtered connectors used in EMI suppression applications.

Features

- Unparalleled electrical performance and reliability
- Fast prototyping and short lead times
- 100% electrical and dimensional testing of critical parameters
- Custom packaging to suit end user needs
- Custom and standard designs available
- Multiple capacitance values up to 400:1 ratio
- Multiple voltage ratings available
- Hole ground resistance to a specified maximum
- Conformal coat available for high voltage designs

Mechanical Specifications

| | |
|---------------------------|---|
| <i>Dielectrics:</i> | EIA Codes: NP0 (COG), X7R, Z5U |
| <i>Termination:</i> | Nickel barrier/Gold or Fired-on silver, Palladium silver or Platinum silver |
| <i>Surface:</i> | Lapped, termination bandwidth and insulative coating options |
| <i>Geometry:</i> | Military circulars, D-Sub, ARINC, Micro-D, custom configurations |
| <i>Thickness:</i> | Up to 0.150" |
| <i>Camber:</i> | Within ± 0.004 " per inch |

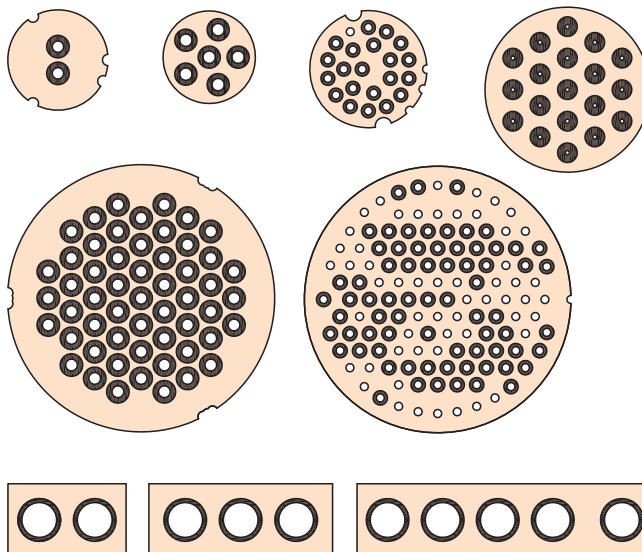


Electrical Specifications

| | |
|--|--|
| <i>Operating Temperature</i> | -55°C - 125°C |
| <i>Capacitance</i> | Up to 1 μ F |
| <i>Capacitance Tolerance</i> | $\pm 10\%$, $\pm 20\%$, $+100\%$ |
| <i>Voltage Rating</i> | Up to 1500VDC AC Rating available – contact factory |
| <i>Dielectric Withstanding Voltage</i> | Up to 3000VDC |
| <i>Insertion Loss</i> | 60 dB Min, typical hole to hole |

The electrical properties listed above are typical, and can be exceeded based on customer requirements and mechanical configuration. Since many variables affect the design, it is best to contact us directly for a detailed assessment of your planar capacitor needs.

Typical Design Layouts





Structural Ceramics

Spectrum combines sophisticated test facilities and equipment with proven expertise in formulating and manufacturing ceramic components. Design processing for our structural ceramics includes SolidWorks, Pro/E and AutoCad. We have the ability to produce complex geometries via additional machining for ceramic body types that can meet all your mechanical and electrical product requirements.

Features

- High wear and corrosion resistance
- Temperature stability and strength
- Superior thermal shock resistance
- Custom solutions available
- Low thermal expansion rates
- Excellent electrical and thermal resistive properties



Mechanical Specifications

Pressing up to 3" diameter and 2 1/2" thickness fired

Extrusion up to 1.2" diameter at varying lengths fired

Casting/Lamination up to 1/4" thickness fired

Process Capabilities

Forming Methods Pressing, extrusion, tape casting, injecting molding, thick film

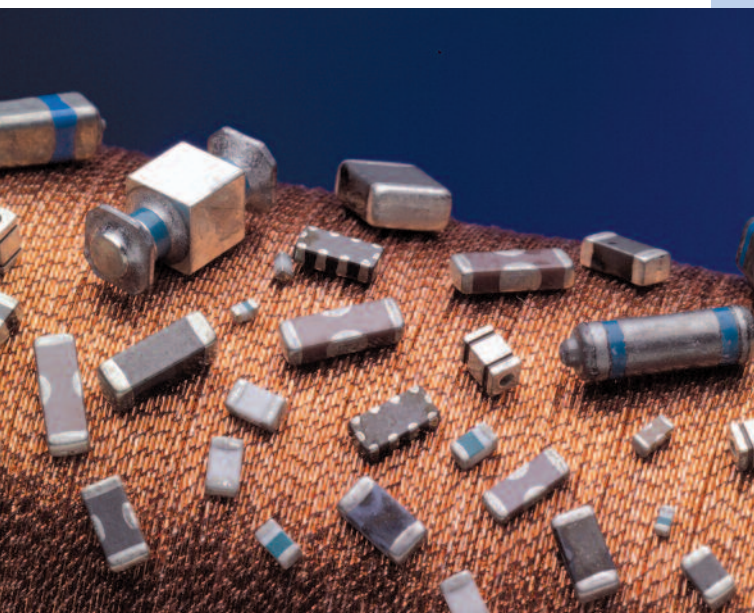
Materials Steatite, cordierite, alumina, titinate ceramic

Finishing Methods Glazing, tumbling, plating, metallization, resistive films, ceramic to metal seals

Fine Shaping Methods . . . Green/fired machining, drilling laser cutting

Surface Mount EMI Filters

our family of surface mount filters is designed to provide a range of high performance EMI filtering options with a minimal PCB footprint



Three Terminal Chips offer superior ability to withstand transient voltages and surges, and deliver excellent filtering performance in high current applications while providing exceptional solderability and resistance to solder heat... **18**

SA Series Arrays incorporate four lines in one compact footprint. These arrays are nonpolar and designed to minimize residual inductance, thereby ensuring large insertion loss in a wide band and better cross talk control... **19**

MSM Mini-Surface Mount offers a multilayer electrode structure, high temperature construction and 10 Amps current ratings. The filter chips provide extreme elimination of residual inductance and the self-resonant frequency extends to the microwave band... **20**

SSM Square Surface Mount square mechanical geometry enhances SMT soldering in applications up to 10 Amps. These filters come in a Pi circuit configuration and are designed to address EMI/RFI on crowded printed circuit boards... **20-21**

PSM Power Surface Mount are the first high temperature surface mount filter designed to effectively filter EMI/RFI at currents up to 20 Amps. These filters come in either a Feed-through or Pi circuit configuration and offer superior high frequency noise suppression... **21**



Advantages of a Surface Mount Filter

With many years of experience in the design and manufacture of filters, Spectrum Control has a unique perspective on EMI and how to control it. We provide an integrated approach to EMC problems with services such as customer consulting, diagnostic testing, design and manufacturing. By offering a variety of custom assemblies, we are able to unite your specific requirements with our high performance filters.

Spectrum Control surface mount EMI filters are ideal for a wide range of PCB applications, including: automotive electronics, digital A/V equipment, computers, peripherals, telecommunications, switching power supplies and high current buss lines.

Three Terminal Chips

Features

- Excellent performance in high current applications
- Nonpolar, surface mountable
- Superior filtering characteristics
- Superb ability to withstand transient voltages and surge
- Offers exceptional solderability and resistance to solder heat
- Available in 0603, 0805, 1205 and 1806 body size
- Two amp current rating available
- Available lead free/RoHS compliant

Applications

- Cellular telephones and base stations
- Telecommunication equipment
- Industrial electronic interface or programmable controllers
- Electronic automotive equipment
- Computer and peripheral equipment

Ordering Information

Example: **SF0805C221SBNCT**

This part number represents a three terminal chip with a body size of 0805 with a COG (NPO) dielectric. The capacitance is 220 pF with a capacitance tolerance of +50%/-20%. Voltage rating is 50 Volts DC. It has nickel barrier, solder plated terminations and a current rating of 0.4 Amp, (400 milliamps). The parts are taped and reeled.

| SF | 0805 | C | 221 | S | B | N | C | T |
|-------|------------------------------|-------------------------------|--|--------------------------------|-----------------------------|-------------------------------|--|-----------------------------|
| Style | Size | Ceramic | Capacitance Code | Capacitance Tolerance | Rated Voltage (Vdc) | Termination | Current Rating | Packaging |
| SF | 0603 0805 1205 1806 | C - COG X - X7R Y - Y5V | First two numbers are significant, the third number refers to number of zeroes | S - +50%/-20% Z - +80%/-20% | A - 25 B - 50 D - 100 | N - Ni Barrier, Solder Plated | B - 0.3 A C - 0.4 A D - 1 A E - 2 A F - 3 A G - 4 A H - 5 A I - 6 A | T - Tape & Reel B - Bulk |



Electrical Characteristics

Capacitance Range COG (NPO) 22 pF to 470 pF
X7R 470 pF to 47,000 pF
Y5V 100,000 pF and 220,000 pF

Capacitance Tolerance COG (NPO) +50/-20%
X7R +50/-20%
Y5V +80/-20%

Temperature Coefficient COG (NPO) 0 \pm 30 ppm/ $^{\circ}$ C,
-55 to +125 $^{\circ}$ C
X7R +/-15%,
-55 to +125 $^{\circ}$ C
Y5V +30/-80%,
-25 to +85 $^{\circ}$ C

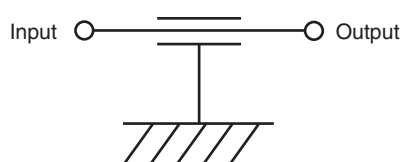
Insulation Resistance up to 22,000 pF 10,000 M Ω
@ +25 $^{\circ}$ C 47,000 pF 5000 M Ω
100,000 pF 1000 M Ω

DC Resistance 0.4 Amp or less 0.3 Ω max.
1 Amp 0.08 Ω max.
2 Amp 0.04 Ω max.

Rated Voltage up to 100 VDC

Rated Current up to 2 Amps

Circuit Schematic



SA Series Arrays

Features

- The filters structure minimizes residual inductance with a high self-resonant frequency, ensuring large insertion loss in a wide band.
- The common ground electrode built into the chip ensures complete grounding of all lines at the ground on both ends. The filter is designed to minimize cross talk.
- An optimum constant can be selected from the capacity range of 22-22,000 pF to best suit the frequency.
- Solder plated nickel barrier terminations offer good solderability and resistance to soldering heat.
- Available lead free/RoHs compliant

Applications

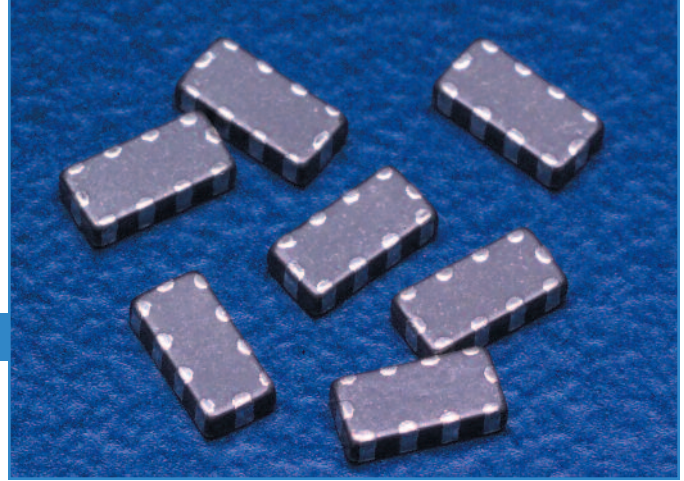
- Noise reduction for DC lines on computers
- Computer peripheral equipment
- Digital TV and VTR
- Cellular telephones
- Automotive electronics

Ordering Information

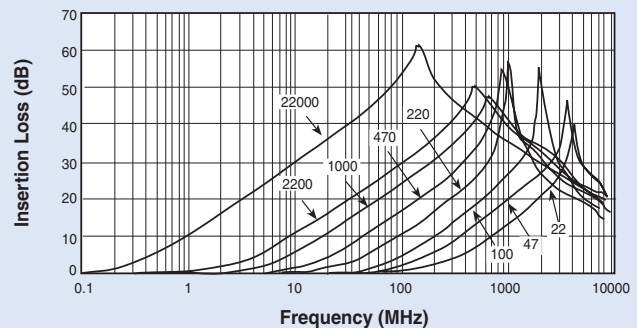
Example: **SA1206C220MBNB**

The part number represents a 4-capacitor array with a body size of 1206 with a COG (NPO) dielectric. The capacitance is 22 pF with a capacitance tolerance of $\pm 20\%$. Voltage rating is 50 VDC. It has nickel barrier, solder plated terminations, and the parts are bulk-packaged.

| SA | 1206 | C | 220 | M | B | N | B |
|-----------|------|---|---|-----------------------|---------------------|------------------------------|--|
| Style | Size | Temperature Characteristics | Capacitance | Capacitance tolerance | Rated Voltage (Vdc) | Termination | Packaging |
| SA Series | 1206 | C +/- 30 ppm/°C R +/- 15% U -750 +/- 120 ppm/°C | 22 pF 47 pF 100 pF 220 pF 470 pF 1,000 pF 2,200 pF 22,000 pF | M = $\pm 20\%$ | A = 25 B = 50 | N = Ni Barrier Solder Plated | T - Tape and reel 4,000 pc/reel B - Bulk pack 1,000 pcs/bag |



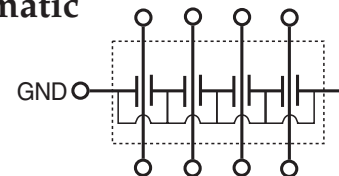
Typical Insertion Loss



Electrical Characteristics

Rated Voltage 25 VDC to 50 VDC
 Rated Current 0.3 Amps
 IR. 10,000 M Ω Min.
 DC Resistance. 0.3 Ω Max.
 Temperature Range -55°C to +125°C
 Capacitance Range 22 pF to 22,000 pF
 Capacitance Tolerance $\pm 20\%$

Circuit Schematic



MSM, SSM & PSM Series Filters

MSM - Miniature Surface Mount Chip Capacitors

The MSM series filters feature high temperature construction and have current ratings up to 10 Amps. The filter chips exhibit very low levels of residual inductance and the self-resonant frequency extends to the microwave band. Applications include telecommunication equipment, computer and peripheral equipment and digital AV equipment, medical equipment, and DC power supply lines.

Features

- Miniature footprint helps in dense circuit configuration
- Rated at 10 Amps
- Packaged in tape and reel or bulk form
- Operating temperature ranges of -25°C to +85°C and -55°C to +125°C
- Available lead free/RoHs compliant

MSM Ordering Information

MSM

Style

MSM
(Miniature)

4

Circuit
Configuration

4 - Feed-Through

T

Temperature
Characteristics

R - +/-15%
T - +22/-33%
V - +22/-82%

470M

Capacitance

| Code | Value | Tolerance |
|-------|---------|-----------|
| 470 M | 47 pF | +50/- 20% |
| 151 M | 150 pF | +50/- 20% |
| 271 M | 270 pF | +50/- 20% |
| 102 M | 1000 pF | +50/- 20% |

10

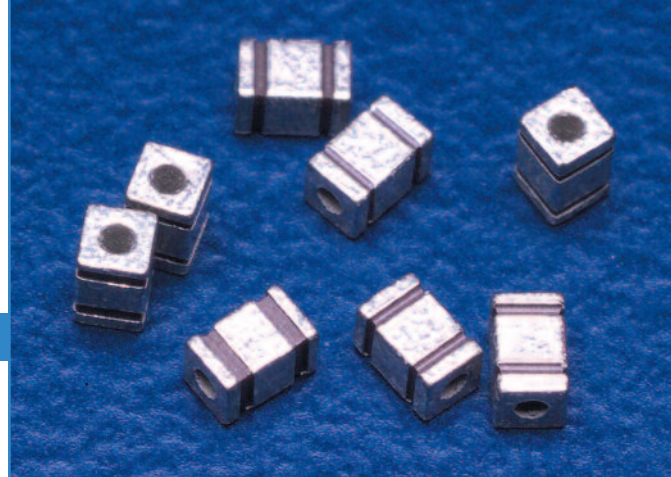
Current
Rating

10 Amps

T

Packaging

T - Tape and Reel
2,000 pcs/reel
B - Bulk pack
1,000pcs/reel



Electrical Characteristics

Working Voltage 50 VDC

Test Voltage..... 150 VDC

Current Rating 10 Amps max.

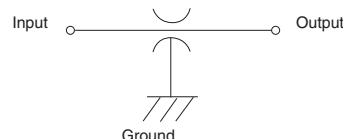
Insulation Resistance 1.0 MΩ

Terminations Ni-Barrier, solderable finish

Soldering Conditions Max. 250°C -5 sec.

MSM

Feed-Through



SSM - Square Surface Mount Filters

The SSM series filters feature high temperature construction and have current ratings up to 10 Amps. The filter chip series are nonpolar and surface mountable with excellent performance characteristics and come in a Pi circuit configuration. Applications include telecommunication equipment, computer and peripheral equipment, digital AV equipment, power amplifiers, power supplies and high current bus lines.

Features

- Square mechanical geometry enhances SMT soldering
- Rated to 10 Amps
- Packaged in tape and reel or bulk form
- Operating temperature range of -55°C to +125°C
- Available lead free/RoHs compliant





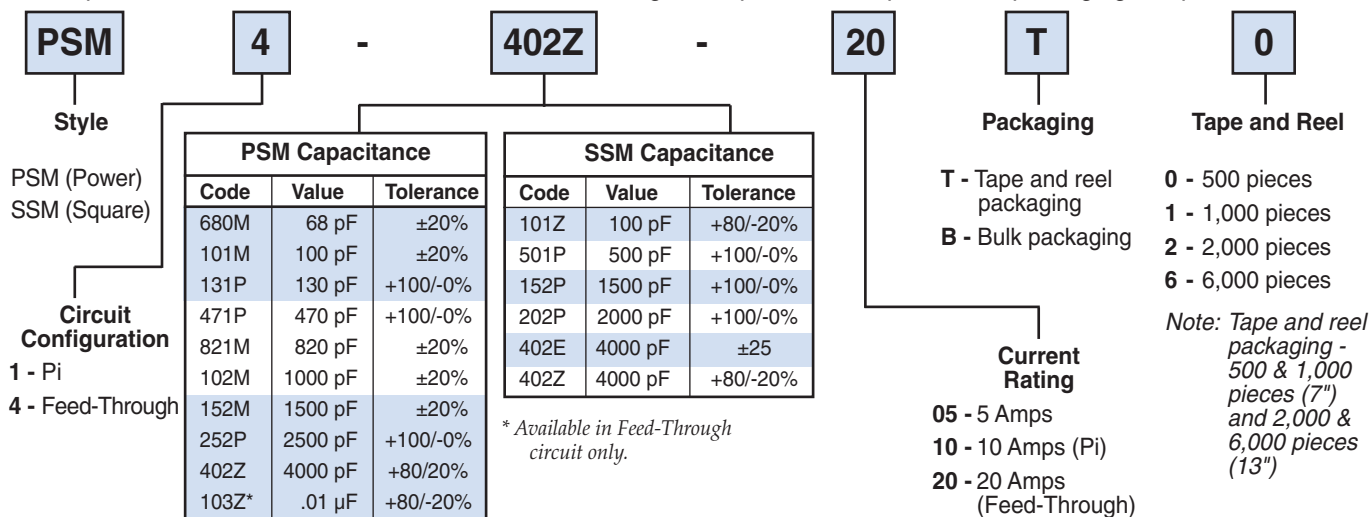
| | |
|---------------------------------|-------------------------|
| Working Voltage | 100 VDC |
| Test Voltage | 250 VDC |
| Current | Max. 10 Amps |
| Insulation Resistance | Min. 10 ⁴ MΩ |
| Terminations | Silver plated |
| Soldering Conditions | Max. 250°C -5 sec. |
| Marking | None |

The PSM series filters feature high temperature construction and have current ratings up to 20 Amps. This filter series is nonpolar and surface mountable with excellent performance characteristics and comes in either a Feed-through or Pi circuit configuration. Applications include telecommunication equipment, computer and peripheral equipment, digital AV equipment, power amplifiers, power supplies and high current bus lines.

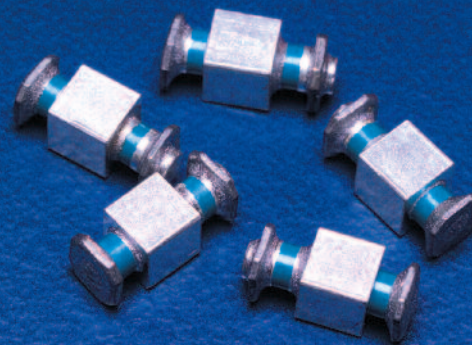
- Provides time and costs savings compared to through-hole filters
- Superior high frequency filtering capability
- Rated to 20 Amps
- Packaged in tape and reel or bulk form
- Operating temperature range of -55°C to $+125^{\circ}\text{C}$
- Available lead free/RoHs compliant

Example: **PSM4-402Z-20T0**

The part number shown represents a power surface mount feed-through filter with a capacitance value of 4000 pF and capacitance tolerance of +80/-20%. The current rating of the part is 20 Amps and the packaging is tape and reel.



For complete specs and drawings, visit www.SpecEMC.com/msmssmspm



PSM Filters

| | |
|--|--|
| <i>Voltage Rating DC</i> | 200 VDC @ -55°C to +125°C |
| | AC Rating available – consult factory |
| <i>DWV</i> | 700 VDC |
| <i>Current Rating</i> | 20 Amps (Feed-through) max. 10 Amps (Pi) max. |
| <i>Insulation Resistance</i> | 1.0 GΩ @ 25°C |
| <i>Dissipation Factor</i> | 4.0% maximum |
| <i>D.C.R.</i> | Max. .0005Ω, typ. .0002Ω |
| <i>Terminations</i> | Solderable finish |

PSM Feed-Through & Pi Circuits



Low Pass EMI Filters

the industry's most complete line of EMI filters gives you more style, size, IL performance and cost alternatives



Low Pass EMI Advantages

Spectrum Control was founded in 1968 as a designer and manufacturer of Electromagnetic Interference (EMI) filters. Today, Spectrum continues that work, combining knowledge with excellence. These many years of experience have yielded an engineering-driven team that understands how and where potential EMI problems exist in an electronic system and how to best eliminate them. With an extensive library of standard products and a willingness to develop an application-specific custom solution, our customers count on us to help them satisfy global EMC standards while meeting demanding design parameters.

Motor Line Feed-Through (MLFT) Filters are high capacitance filters specifically designed for DC motor and other lower voltage applications. This one-component solution addresses EMI noise issues and eliminates the need for multiple components and electrical connections... **23**

Solder-In Filters offer an ideal solution for applications in critical areas where space does not allow for use of mounting tools or hardware. Available in C, Pi and standard L circuit configurations and primarily used in filtering signal/data lines and AC power lines... **24**

9925 Series Filters have a knurled design allowing them to be pressed into place creating a reliable mechanical bond making them an excellent choice for applications where soldering is undesirable... **25**

Spec Spin Filters are an excellent choice for applications that require many lines to be filtered in close proximity to each other due to their space saving #2-56 threaded miniature EMI spanner design. These filters are designed without a hex and do not require soldering for installation... **25**

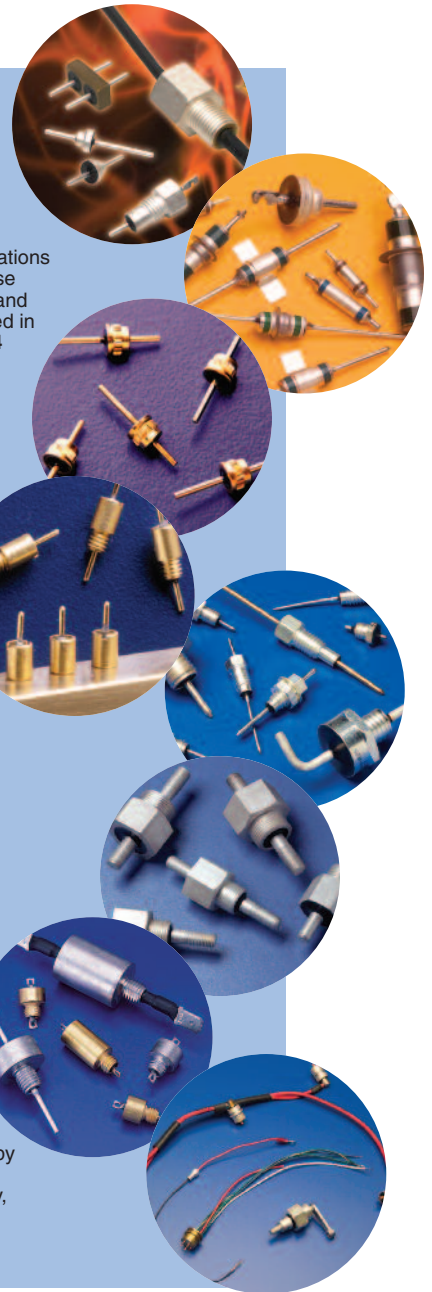
Resin Sealed Filters provide excellent environmental protection in a rugged case that is resin sealed at both ends and easily mounted with a tapped hole or through hole. These filters are provided in C, L and Pi configurations with metric threading available... **26**

High Current Resin Sealed Filters are ideal for use in high current 5 volt logic busses, as well as ± 48 VDC telephone rack buss, high current switch mode power supplies and DC charging systems. These filters feature rugged bolt-in style for easy installation... **27**

Hermetically Sealed Filters feature hermetic glass seals and high EMI filtering performance making them highly reliable in the toughest environmental conditions. These filters are available with C, L, Pi, T and double T configurations with MIL-F-15733 and MIL-F-28861 QPL filters available... **28**

Value Added Assemblies offer flexible solutions by allowing you to add connectors, modify terminations or add wire harnesses, thereby lowering your cost of acquisition and assembly, reducing your production time/costs and inventory, all while giving you a filter assembly that meets your unique design challenges... **29**

- Wide range of package sizes, mounting options and circuit configurations offering maximum design flexibility
- Develop custom application-specific solutions addressing your mechanical and electrical requirements
- High reliability construction... built in accordance to MIL-PRF-15733 or MIL-PRF-28861
- Over 800 standard QPL products and DSCC part numbers
- Effective filtering up to 18 GHz
- Reliability testing available for customer specific requirements



Motor Line Feed-Through (MLFT) Filters (Patent Pending)

Spectrum Control, the established world leader in EMC, has developed a new family of high capacitance filters specifically designed for DC motor and other lower voltage applications. The Motor Line Feed-Through (MLFT) filter is a one-component solution that eliminates the need for multiple capacitors, inductive coils, leads and PCB assemblies requiring numerous electrical connections and large amounts of space. MLFT filters (patent pending) are engineered to provide the required EMI filtering and mechanical interface at a reduced cost.

MLFT filters offer significant insertion loss to pass global conductive and radiated EMC tests, such as CISPR 25. Our standard line of filters can be designed into mechanical packages for easy retrofit into existing designs or as custom assemblies to simplify installation during production. These filters are available in stamped or threaded housings, with single or dual lines, and round leads or Faston terminals for applications to 100 volts.

Benefits

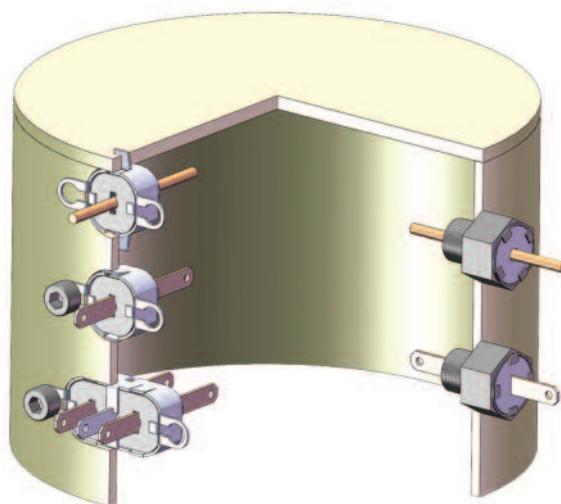
- Easy installation, provides a connector interface
- Excellent EMI filtering through GHz range
- Competitive cost
- Space saving EMI solution
- Fewer electrical connections
- Failsafe DC open circuit for safety concerns
- Standard and custom filtering and mechanical packages
- Transient voltage and surge protection available

Ordering Information

Example: **MLFT2-001-TFCAC**

The part number shown represents a single line, threaded MLFT Filter with Faston Terminals, a capacitance rating of 0.20 μF and a voltage rating of 100V.

| MLFT2 | - | 001 | - | T | F | CA | C |
|--------------------------------|---|-----|---|--|--|--|----------------|
| Motor Line Feed-Through Filter | | | | Style | Terminal | Capacitance | Voltage Rating |
| | | | | T = Single line threaded S = Single line stamped D = Dual line stamped | F = .110 Faston R = .062 round lead | CA = .20 μF CC = 2000 pF CD = 20 pF | C = 100V |



Low Pass EMI Filters

Solder-In Filters

Solder-in filters are ideal for use in critical areas where space does not allow use of mounting tools or hardware. The solder-in feature also allows installation in unison with other board mounted components. Primarily used in filtering signal/data lines and DC power lines.

Features

- Small size to allow effective use of space
- Voltage ratings to 750 VDC
- Multiple circuit configurations: C, L and Pi available
- High temperature construction to prevent reflow during installation
- MIL-F-15733 QPL versions available

Series 9900

Miniature Solder-In Filters

These filters are ideal for microwave applications such as attenuators and oscillators, and perform well in high impedance circuits where large capacitance values are not practical.

Features

- Miniature size to allow effective use of space
- Standard capacitance values from 5pF to .033μF
- Voltage ratings to 200 VDC/115 VAC 0 – 400 Hz
- Hermetically sealed on one end allows for through-hole sealing between compartments
- High temperature construction meets MIL-F-28861 solderability and resistance to soldering heat requirements
- Available in MIL-C-11015 versions
- Gold plating compatible with gold bonding techniques

** Large Diameter High Temp Solder-In Filters are also available – please contact factory



Electrical Specifications

C Circuit

Capacitance 100 pF to 0.30 μF

Voltage Rating 50 to 750 VDC

Current Rating 10 – 25 Amps

Pi Circuit

Capacitance 1500 pF to 0.022 μF

Voltage Rating 50 to 500 VDC
90 to 350 VAC

Current Rating 10 – 25 Amps



Electrical Specifications

C Circuit

Capacitance 10 pF to 0.030 μF

Voltage Rating 50 to 200 VDC
115 VAC

Current Rating 5 Amps

L Circuit

Capacitance 5 pF to 0.033 μF

Voltage Rating 50 to 200 VDC

Current Rating 10 Amps



Series 9925 Mini-Press Filters

This new knurled filter is designed to be pressed into place and creates a reliable mechanical bond. This feature makes it an excellent selection for applications where soldering is undesirable. Suitable plating is available that allows gold bonding to the terminals.

These filters are ideal for microwave and RF applications such as attenuators, synthesizers and oscillators. They perform well in high impedance circuits where large capacitance values are not practical.

Electrical Specifications

Capacitance 10 pF to 0.030 μ F

Voltage Rating 50 to 200 VDC

Current Rating 5 Amps

Series 54-874-XXX Spec Spin Filters

Spectrum Control introduces the new space saving #2-56 threaded miniature EMI spanner filter. This new threaded filter is designed without a hex and does not require soldering for installation. These features make it an excellent selection for applications that require many lines to be filtered in close proximity. The easy swap out also allows for flexibility in filter replacement and capacitance substitution. Easy filter substitution also allows for flexibility in filter placement. Custom design queries are always welcome.

Spectrum Control's spanner filter offers superior insertion loss over a broad frequency range when compared to surface mount components. The filter is available in capacitance values up to 10,000 pF, and is featured in a microcircuit package used in microwave applications such as frequency synthesizers, power amplifiers, MMW radio, and is ideal for commercial and high-reliability applications.

Electrical Specifications

Capacitance 10 pF to 0.010 μ F

Voltage Rating 50 VDC

Current Rating 5 Amps



Mechanical Specifications

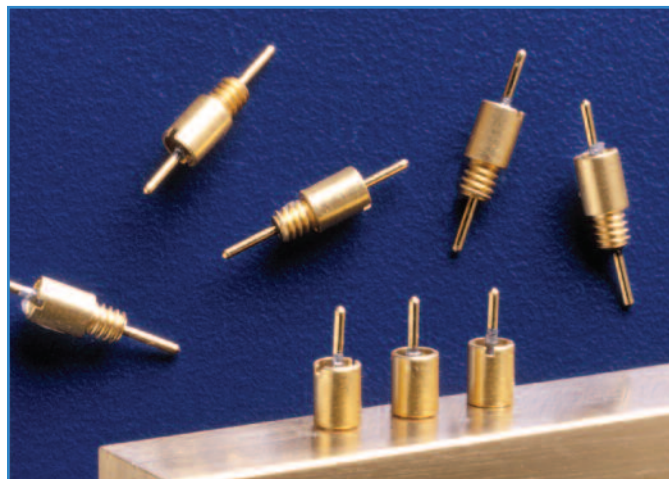
Installation Press-in

Plating Gold

Seal Glass sealed on one end,
resin sealed on the other end

Termination Options . . . Plating suitable for gold bonding

Operating Temperature . . -55°C to +125°C



Mechanical Specifications

Center Spacing 0.110"

Lead Finish Gold

Bushing Finish Gold

Tightening Torque 16 oz-in (± 2) (0.11 Nm)

Insertion Tool





Resin Sealed Bolt-In Filters

These filters are easily mounted in a tapped hole or through-hole with supplied nut and lock-washer. The rugged case with resin seals at both ends provides excellent environmental protection. Primarily used in filtering signal/data lines and DC power lines.

Features

- MIL-PRF-15733 QPL filters available
- Metric threaded filters available, consult factory
- RoHS compliancy available

Lead Options Available

- Straight
- Turret (nail head)
- Hooked
- Bends
- Flattened
- Flattened and notched
- Value added wires
- Many custom options

Lead Finish

- Silver
- Tin/lead
- Gold - suitable for gold bonding



Electrical Specifications

C Circuit

Capacitance 10 pF to 1.0 μ F

Voltage Rating 50 to 500 VDC
115 VAC

Current Rating 3 – 25 Amps

L Circuit

Capacitance 10 pF to 1.0 μ F

Voltage Rating 50 to 500 VDC
115 VAC

Current Rating 3 – 25 Amps

Pi Circuit

Capacitance 65 pF to 0.15 μ F

Voltage Rating 50 to 700 VDC
350 VAC

Current Rating 3 – 25 Amps

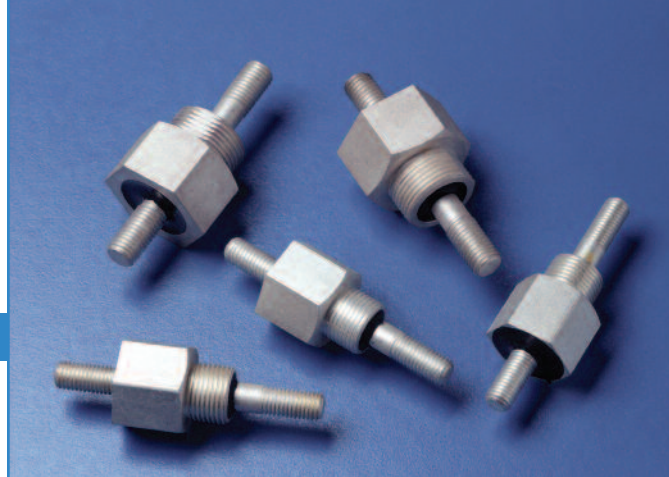
| Thread Sizes | Circuits |
|--------------|-----------|
| 4 - 40 | C, L & Pi |
| 6 - 32 | C, L & Pi |
| 6 - 40 | Pi |
| 8 - 32 | C, L & Pi |
| 10 - 32 | C & Pi |
| 12 - 28 | C & Pi |
| 12 - 32 | C & Pi |
| 5/16 - 24 | C & Pi |
| 5/16 - 32 | C & Pi |

High Current/High Voltage Resin Sealed Filters

High current filters are ideal for use in high current 5 volt logic buss, but also can be used for ± 48 VDC telephone rack buss, high current switch mode power supplies and DC charging systems. High voltage filters find use in high voltage power supplies and applications requiring U.L. Hi-Pot.

Features

- Current ratings up to 100 Amps
- Continuous voltage ratings up to 1250 VDC/ 240 VAC (400Hz)
- U.L. 1459 recognized and CSA C22.2 approved versions available
- Rugged bolt-in style for easy installation
- Available in C and Pi circuits



Installation Notes

1. Mounting installation torque
Method A: Mounting in full threaded through hole
Maximum torque: 96 in-lbs

Method B: Mounting w/hardware
Maximum torque: 84 in-lbs
2. Terminal installation torque
Maximum torque: 20 in-lbs

Note: Use two-wrench method to install terminal hardware.

Ordering Information

| Part Number | Rated Voltage 125°C | | I Amp | CKT | Min Cap | Minimum Insertion Loss (dB) | | | | | | | |
|--------------|------------------------|-------|----------|-----|------------------------|-----------------------------|----------|-----------|-----------|------------|------------|----------|-----------|
| | DC | AC*** | | | | 1 MHz | 3 MHz | 10 MHz | 30 MHz | 100 MHz | 300 MHz | 1 GHz | 10 GHz |
| 54-848-005* | 60 | — | 50 | C | 0.22 μ F | 20 | 30 | 40 | 50 | 50 | 50 | 50 | 50 |
| 54-853-001* | 60 | — | 50 | C | 0.22 μ F | 20 | 30 | 40 | 50 | 50 | 50 | 50 | 50 |
| 54-853-004 € | 200 | 140 | 100 | C | 0.22 μ F | 20 | 30 | 40 | 50 | 50 | 50 | 50 | 50 |
| 54-848-008 | 200 | 140 | 100 | C | 0.22 μ F | 20 | 30 | 40 | 50 | 50 | 50 | 50 | 50 |
| 54-844-001** | 600 | 240 | 25 | C | 4700 pF \pm 20% | — | — | 12 | 20 | 30 | 33 | 50 | 50 |
| 54-844-002** | 600 | 240 | 25 | C | 0.01 μ F \pm 20% | 3 | 7 | 20 | 25 | 35 | 40 | 57 | 57 |
| 54-763-008 | 750 | — | 25 | C | 1000 pF | — | — | — | 10 | 20 | 28 | 28 | 28 |
| 54-763-009 | 750 | — | 25 | C | 4000 pF | — | — | 10 | 22 | 32 | 35 | 35 | 40 |
| 54-789-003 | 1250 | — | 25 | C | 4000 pF | — | — | 6 | 20 | 30 | 35 | 35 | 35 |
| † 1280-060 € | 2500 | — | 25 | Pi | 1500 pF | — | — | 5 | 15 | 50 | 50 | 50 | 50 |

† Also available through Spectrum Control's authorized distributors.

€ Also available through Spectrum Control's authorized European distributors/agents.

* Denotes parts that are UL recognized to UL 1459 and certified to CSA C22.2

** Denotes parts that meet 1500 VAC Dielectric Withstanding Voltage per UL 1283 and CSA C22.2

*** AC Voltage to be 400Hz



Hermetically Sealed Threaded Case Filters

This series of filters features hermetic glass seals and high EMI filtering performance. They are excellent for critical applications that demand high reliability in the toughest environmental conditions and provide broad band high performance EMI filtering from 1 KHz up to 10 GHz.

Features

- MIL-PRF-15733 and MIL-PRF-28861, DSCC 84084 QPL filters available
- Popular .375", .410" and .690" case diameters
- Voltage ratings from 50 V to 400 VDC/240 AC, 400 Hz
- Impervious to high moisture environments, solvents and severe environmental conditions
- High temperature terminal construction
- D-slotted bushings
- High reliability testing available
- Metric threads available – consult factory

Electrical Specifications

C Circuit

Capacitance 0.015 μ F to 4.0 μ F
 Voltage Rating 50 to 400 VDC
 125 – 240 VAC
 Current Rating 10 – 25 Amps

L Circuit

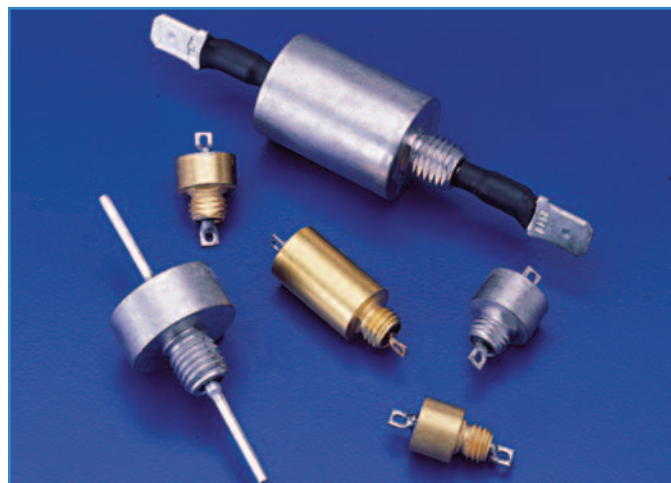
Capacitance 0.015 μ F to 4.0 μ F
 Voltage Rating 50 to 400 VDC
 125 to 240 VAC
 Current Rating 0.08 – 25 Amps

Pi Circuit

Capacitance 0.2 μ F to 5.2 μ F
 Voltage Rating 50 to 400 VDC
 125 VAC, 240 VAC
 0 – 60 Hz
 Current Rating 0.25 – 20 Amps

Transient Suppression Pi

Capacitance 1.4 μ F
 Voltage Rating 5 to 50 VDC
 115 VAC, 240 VAC
 Current Rating 0.5 – 10 Amps



T Circuit

Capacitance 0.15 μ F to 1.4 μ F
 Voltage Rating 50 to 400 VDC
 115 VAC, 240 VAC
 Current Rating 0.25 – 20 Amps

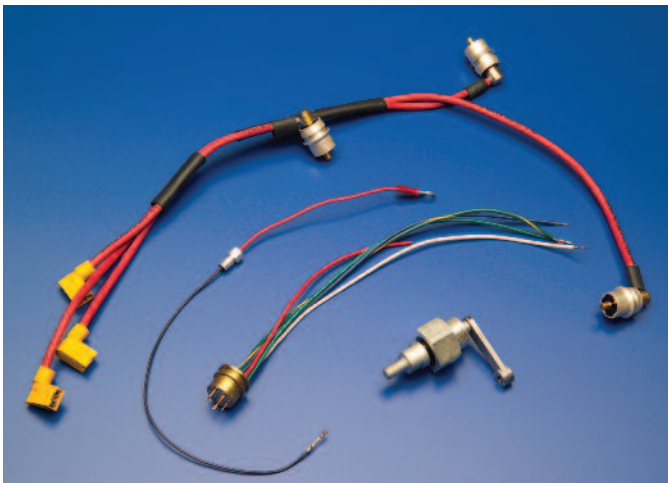
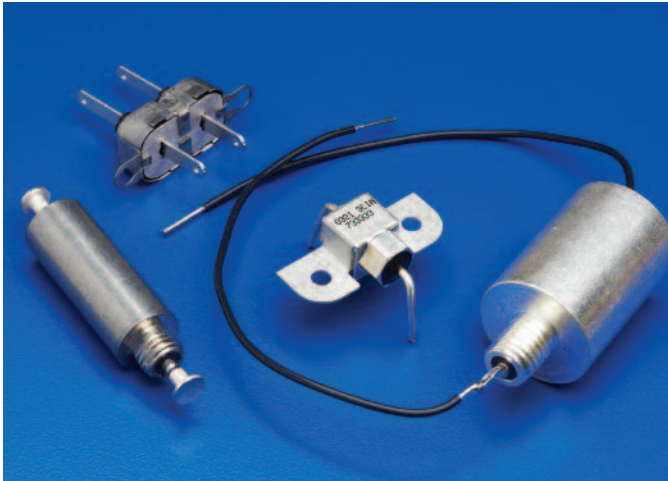
TT Circuit

Capacitance 0.5 μ F to 1.5 μ F
 Voltage Rating 50 to 300 VDC
 125 VAC
 Current Rating 0.25 – 10 Amps

Value-Added Low Pass Filter Assemblies

Spectrum Control's value-added low pass filters provide flexible solutions to meet your unique design challenges. Our manufacturing process allows you to add connectors, modify terminations or add wire harnesses without adding much cost or drastically increasing lead times.

For custom requirements and exceptional needs, contact our design/manufacturing team.



Our value-added services:

- Allow you to stream-line your bill of materials.
- Reduce inventory/production costs.
- Offer custom application-specific low pass filter assemblies.



Incorporate specific terminations, connectors or wire harnesses to accommodate your application.



Lower the cost of acquisition and assembly.



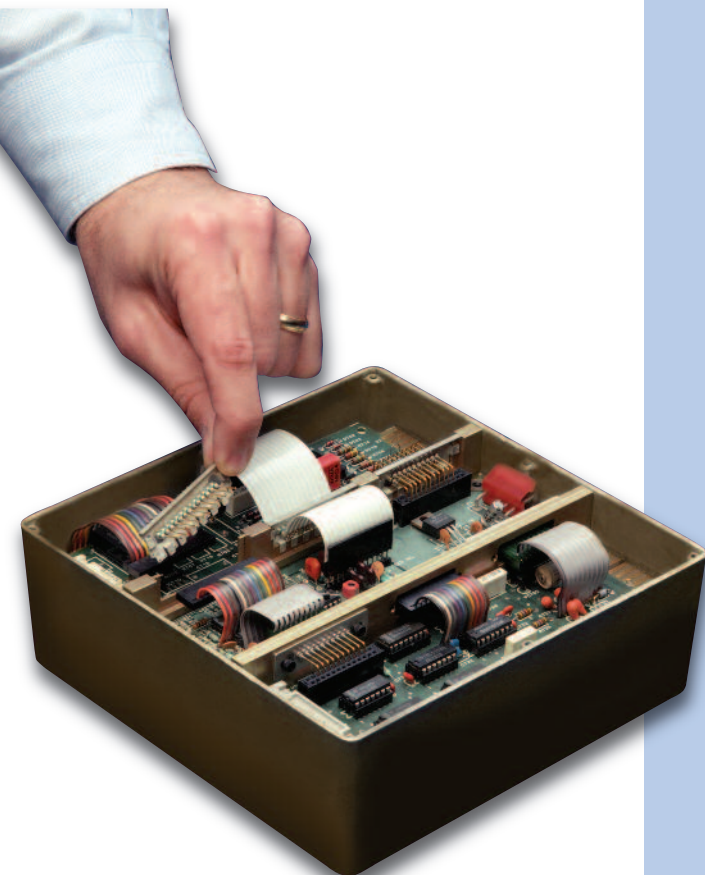
Reduce production operations and lead times.



Build-to-order low pass filters.

EMI Filtered Arrays

our filter plates and terminal blocks provide exceptional EMI protection of signal and power lines at a lower total installed cost



Easy Mate® Filter Plates reduce installation time and overall cost with its patented snap-in design to maximize real estate on PCBs. The Easy Mate® Jr. offers a lower profile for installation of feed-through filters into small hardware applications...32

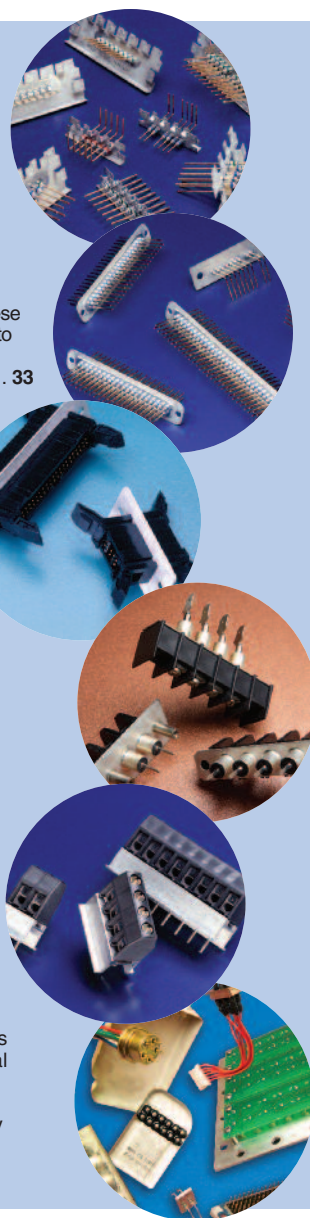
Bolt-In Filter Plates provide EMI filtering for signal and power lines and an excellent method for electronic system interface. These plates eliminate the need to mount filters into bulkheads and are ideal for the isolation of electronic compartments to suppress EMI... 33

Shrouded Latch Filter Plates combine a bolt-in filter plate with the latching feature of a ribbon cable header providing an easy to install and highly effective method for an electronic interface and EMI solution in one package... 34

Barrier Strip Filtered Terminal Blocks are available in 2 to 6 terminal versions and our filter elements provide high insertion loss for EMI/RFI filtering of AC and DC power and control lines...35

PCB Mount Filtered Terminal Blocks with 2 to 12 terminals available, they provide quick and easy PCB installation and maintenance with a filter element that delivers high insertion loss for EMI/RFI filtering of low voltage DC power and control lines...36

Custom Filtered Arrays help meet your design or manufacturing parameters through special mechanical and electrical specifications or by adding varying cable lengths and terminations for a complete turnkey assembly. Custom high reliability assemblies available...37



Advantages of a Filtered Array

- Provide an EMI filtered signal or power line between electronic system modules
- Reduce cost . . . economical method to meet EMC requirements
- Reduce labor . . . eliminate need to assemble filters into a bulkhead
- Outperform surface mount EMI filters at frequencies above 50 MHz
- Reduce risk of damage to filter elements due to thermal shock and installation
- Improve reliability . . . every filter plate is 100% tested for key parameters
- Maximize real estate on PCB
- Mixed schematics in a single filter plate package



Filter Plate Part Numbering System

Example: **52-898-206-B A 2**

The part number shown represents an Easy Mate® filter plate with 2 rows, 6 filters per row. Filters are C style with a capacitance value of 100pF. The plate length is 1.092", and the leads are bent 90° to the right side.

| 52 | - | 898 | - | 2 | - | 06 | - | B | - | A | - | 2 |
|--|---|--|---|---|---|---|---|---|---|--|---|---|
| Filter Plates 52 - Easy Mate®, Easy Mate® Jr. & Bolt-in Style 53 - Shrouded Latch | | 898 Easy Mate® Standard Density 960 Easy Mate® Hi-density 978 Easy Mate® Jr. Standard Density 979 Easy Mate® Jr. Hi-density 970 Bolt-in Standard Density 971 Bolt-in Hi-density 038 Shrouded Latch | | No. of Rows 1 = 1 row 2 = 2 rows | | No. of Filters Number of Lines per Row If less than 10, use a 0 (zero) first. | | Filter Designation A - T (Refer to Filter selection table online) | | Plate Length Easy Mate® A - 1.092 (27.74mm) B - 1.812 (46.02mm) Easy Mate® Jr. A - .990 (25.15mm) B - 1.240 (31.49mm) Bolt-in Style A - 1.060 (26.92mm) B - 1.560 (39.62mm) C - 2.560 (65.02mm) D - 3.560 (90.42mm) Latch Height (Shrouded Latch only) S - Short .435" (11.0mm) L - Long .575" (14.6mm) | | Lead Configuration 0 - Straight 1 - 90° (left) 2 - 90° (right) 3 - 90° (both) Shrouded Latch Configuration 1 - Double Shroud 2 - Single Shroud 3 - Single Shroud w/90° bend opposite side |

Filtered Terminal Block Part Numbering System

Example: **52-160-006-A AOO**

The part number shown represents a barrier strip terminal block with six terminals and rated for 20 Amps. Male disconnects (.250") are the method of termination.

| | | | | | | | | |
|--|---|--|---|---|---|---|---|------------|
| 52 | - | 160 | - | 006 | - | A | - | AOO |
| Connection Barrier Strip 160 - Front panel mount 188 - Rear panel mount 257 - AC rated PCB type 227 U.S. pin spacing 228 Metric pin spacing | | Number of Terminals Barrier Strip 002 - 2 terminals through 006 - 6 terminals PCB type 002 - 2 terminals through 012 - 12 terminals | | Current Rating Barrier Strip A - 20 Amps Sizing PCB type L - Low profile | | Special Terminations Code Note: Leave blank if ordering standard product. Male quick disconnects directly on terminal block. AO1187 (4.8) AOO250 (6.4) | | |



Easy Mate® Filter Plates

Spectrum Control developed a new EMI/RFI filter plate, Easy Mate®, which simplifies installation and eliminates the need for mounting hardware. The Easy Mate®, **patented**, is designed to “snap” into the chassis of electronic systems, reducing the labor required to complete a plate installation.

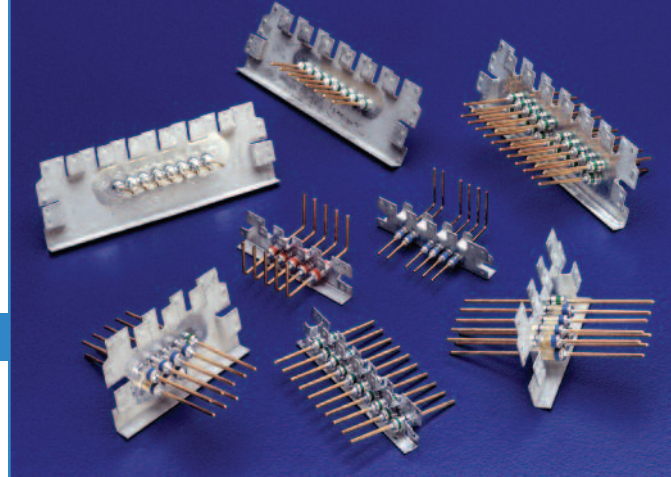
These plates are available in four lengths and in both standard density centers (.100") and high density centers (2mm). Standard density Easy Mate® plates offer up to 26 lines per plate in a double row configuration, while high-density plates offer up to 32 lines. Custom sizes for Easy Mate® plates are available.

Easy Mate® Jr. Filter Plates

Spectrum Control has expanded its popular Easy Mate® family to include two more package sizes. These new sizes are lower profile and facilitate installation of feed-through filters into small hardware applications such as PCS linear power amplifiers and RF transmitters.

Easy Mate Features

- Reduces installation time and overall cost
- Eliminates mounting hardware and prepwork
- Flexibility for 1 or 2 rows and standard density centers (.100") or high density centers (2mm)
- Improves overall quality and reliability
- Multiple dimpled finger ground contacts provides excellent long term EMI filtering from 5 MHz to 18 GHz
- Outperforms surface mount devices
- Maximize real estate on PCB
- Mixed capacitance values and schematics
- Ideal for isolation of electronic compartments
- Available in RoHS compliant versions



Mechanical Specifications

Base Plate Material Beryllium copper

Base Plate Thickness012 inches (0.30mm)

Plating Tin, RoHS version will be silver

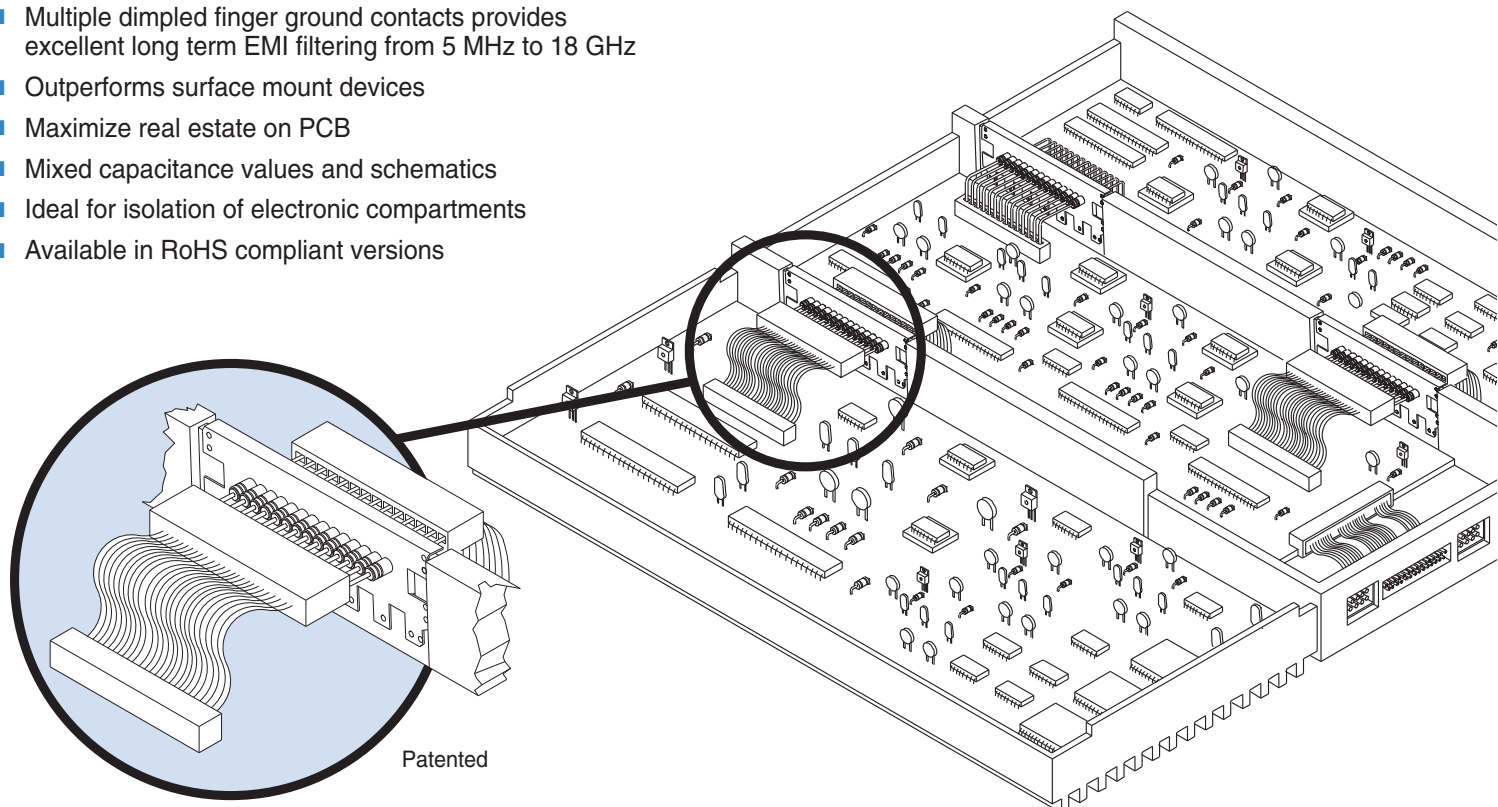
Lead Material Copper alloy

Lead Plating Gold plate

Lead Diameter \varnothing .025" (.64mm) for 0.100" centers (2.54mm)
 \varnothing .020 (.51mm) for 0.079" centers (2.00mm)

Current Rating 5 Amps for .025" \varnothing (.64mm)
 3 Amps for .020" \varnothing (.51mm)

Plate Lengths Easy Mate® 1.092" (27.74mm) and 1.812" (46.02mm)
 Easy Mate® Jr. 0.990" (25.15mm) and 1.240" (31.49mm)



Patented



Bolt-in Style Filter Plates

The Bolt-in style plate provides an excellent method for electronic system interface and EMI filtering. Bolt-in filter plates are available in a variety of plate sizes and up to 74 lines per plate in high density (2mm) and 60 pins per plate in standard density (.100"). On the larger plate sizes, Spectrum ensures structural integrity through a unique, patent pending, coining process.

Features

- Eliminates the need to assemble filters into a bulkhead
- Excellent filtering from 5 MHz to 1 GHz
- Total cost savings vs. customer installed discrete filter elements
- Ideal for isolation of electronic compartments to suppress EMI
- Outperforms surface mount filters over 50 MHz
- Improved reliability
- Mixed capacitance values and schematics
- Maximize real estate on PCB
- Available in RoHS compliant versions
- Four standard plate lengths from 1.060" to 3.560"



Mechanical Specifications

Base Plate Material Brass UNS C26000/C27000

Base Plate Thickness020 inches (.51mm)

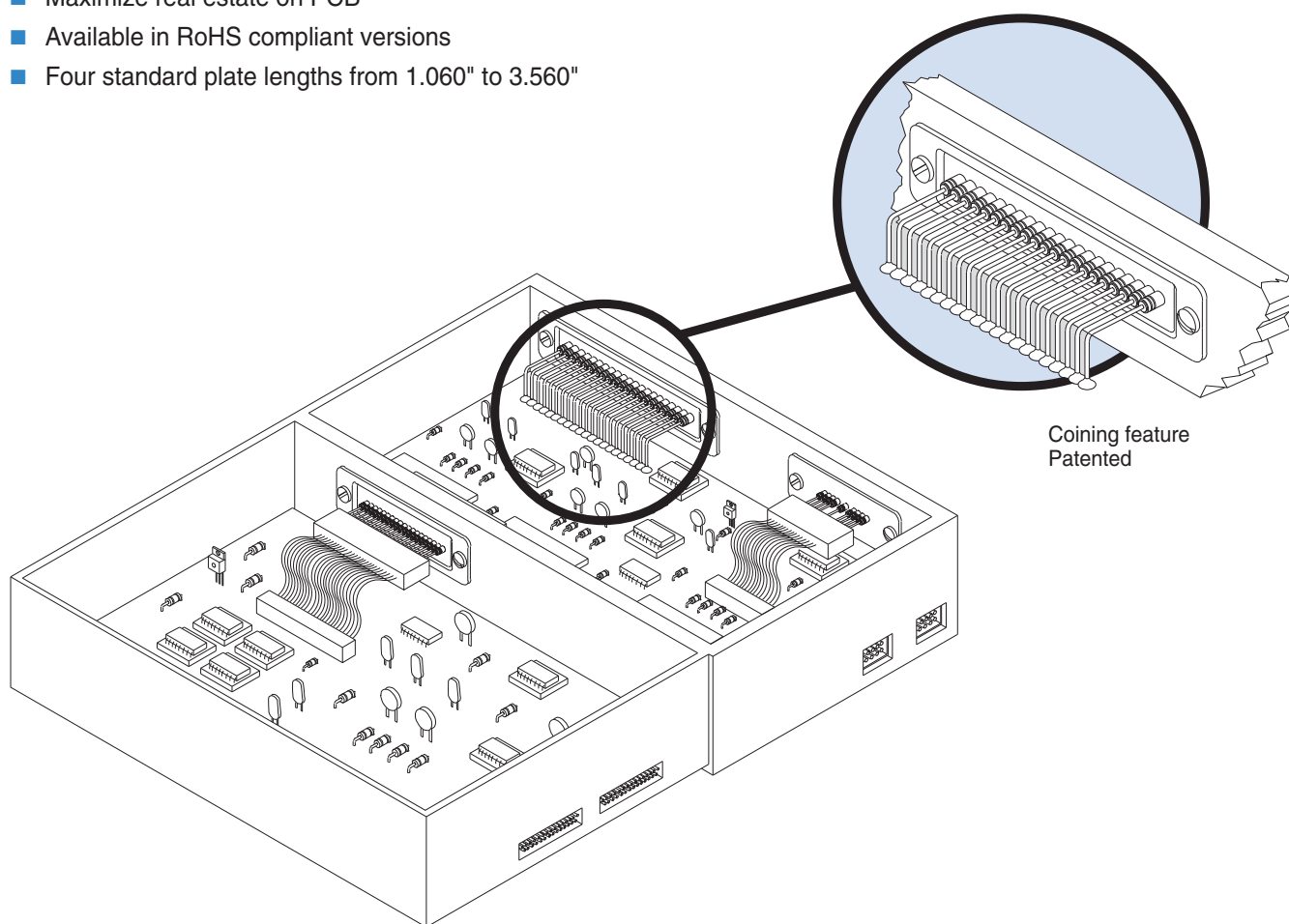
Plating Tin, RoHS version will be silver

Lead Material Copper alloy

Lead Plating Gold plate

Lead Diameter \varnothing .025" (.64mm) for 0.100" centers (2.54mm)
 \varnothing .020 (.51mm) for 0.079" centers (2.00mm)

Current Rating 5 Amps for .025" (.64mm) \varnothing
 3 Amps for .020" (.51mm) \varnothing



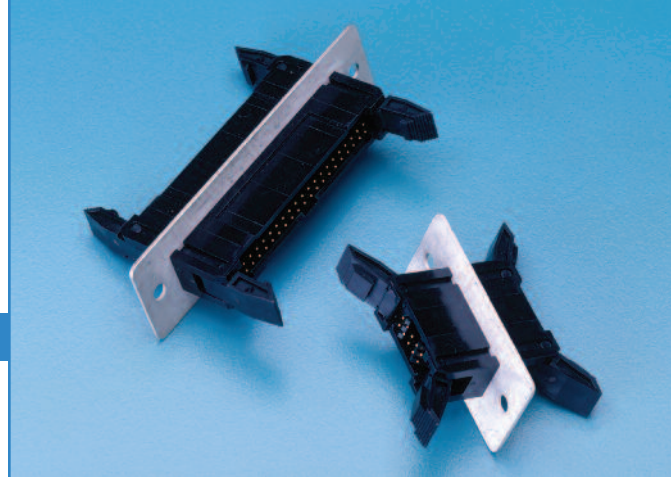
Shrouded Latch Filter Plates

Shrouded Latch Filter Plates are an effective method for combining an electronic interface and EMI solution in one package. The shrouded latch incorporates the bolt-in concept filter plate with the latching feature of popular ribbon cable headers. This product is available in pin counts of 10 through 64 positions. The latch is available in a variety of standard heights.

The Shrouded Latch Filter Plate is ideal for securing and protecting the filter element from exposure to mechanical shock and vibration which could loosen the cable interface.

Features

- Available in 10 to 64 positions
- Mates to most ribbon cable connectors
- Variety of latch ejector heights available
- Pins on .100" centers
- Reliable cable retention for high vibration applications
- Mixed capacitance values and schematics available
- Excellent filtering from 5 MHz to 1 GHz and beyond
- Shroud protects filter elements from potential damage
- Available in RoHS compliant versions



Mechanical Specifications

Base Plate Material Brass UNS C26000/C27000

Base Plate Thickness040" (1.0mm)

Plating Tin, RoHS version will be silver

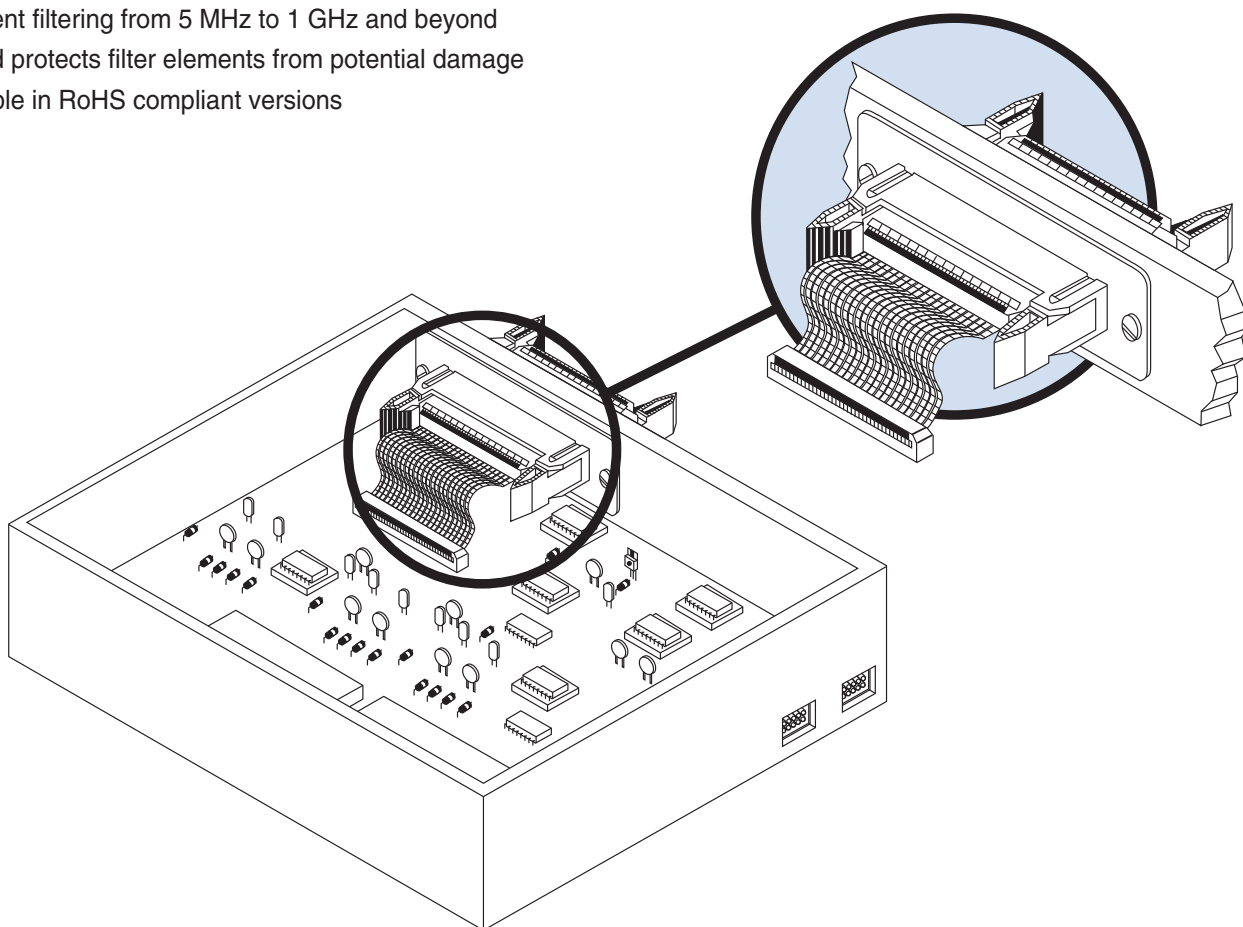
Shrouded Material Thermoplastic Polyester UL94V-0

Lead Material Copper alloy

Lead Plating Gold plate

Lead Diameter \varnothing .025" (0.6mm)

Current Rating 5 Amps

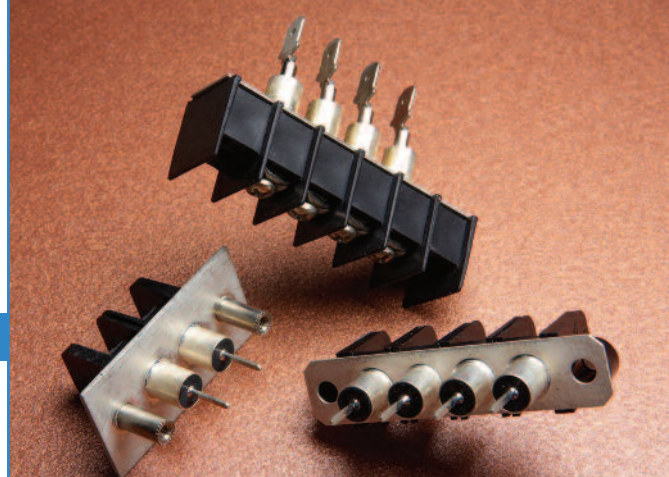
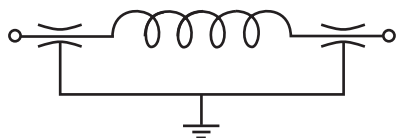




Features

- ## Circuit Schematic

Pi Filter



Mechanical Specifications

Terminal Brass, tin-plated

Electrical Specifications

D.C. Resistance01 ohms max.

Note: For product with AC rating, consult factory for 52-257-Series product and request data sheet. Product UL/CSA recognized.

Typical Loss (dB) In 50 Ohm Circuit

| Frequency | Insertion Loss (dB) |
|-----------|---------------------|
| 30 MHz | 22 |
| 50 MHz | 32 |
| 100 MHz | 48 |
| 300 MHz | 70 |
| 500 MHz | 75 |
| 1000 MHz | 75 |

PCB Mount Filtered Terminal Blocks

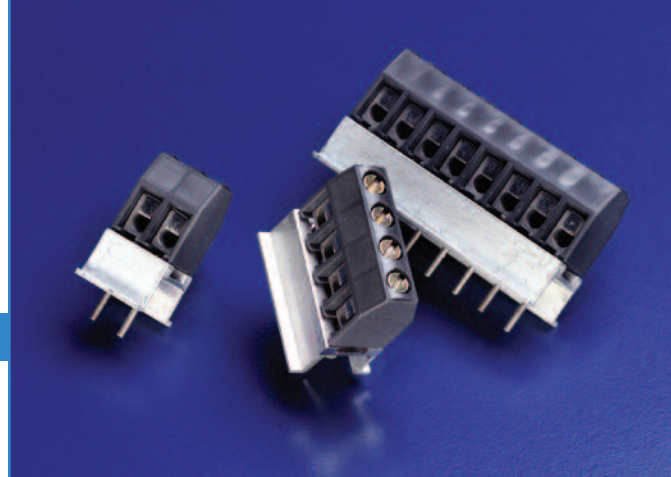
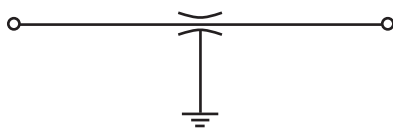
The PCB mount filtered terminal block is designed to provide excellent EMI/RFI filtering of low voltage DC power lines and control lines. These new terminal blocks use a unique screw clamp system with a wire protector which provides for quick and easy installation. Spectrum's PCB Mount terminal blocks can be used for a variety of power supply filtering applications in telecommunications equipment, metering, industrial controls, instrumentation and EDP equipment.

Features

- Filter element provides high insertion loss for EMI/RFI filtering of DC power and control lines
- Rugged construction provides protection to filtering element; especially useful for repeated changes in wiring or field connections
- 2 to 12 terminals available (combine if larger number of terminals needed)
- Quick and easy PCB installation and maintenance
- Cost-effective solution for industrial interconnection EMI filtering problems
- Selectively loaded filter pins to economically meet exact filtering requirements
- Available with European (5 mm) or US (.200") pin spacing
- Available in RoHS compliant versions

Circuit Schematic

C Filter



Mechanical Specifications

Center Spacing US .200: (5.08 mm)
EURO .197" (5 mm)

Wire Size AWG 12 through 26

Screw Material Steel, zinc chromate plate

Recommended PCB

Hole Diameter 0.05" (1.30 mm) contact hole

Molded Material UL rated 94VO polyamide

Tightening Torque 2.5 in.-lbs. max.

Terminal Brass, tin-plated

Electrical Specifications

Operating Temperature . . -40°C to 80°C

Working Voltage 100VDC

Capacitance 2500 pF +80% / -20%

Dielectric

Withstanding Voltage . . . 707VDC

Current Rating 12 Amps max.

D.C. Resistance 0.01 ohms max.

Typical Loss (dB) In 50 Ohm Circuit

| Frequency | Insertion Loss (dB) |
|-----------|---------------------|
| 10 MHz | 10.4 |
| 50 MHz | 23.9 |
| 100 MHz | 29.9 |
| 500 MHz | 43.9 |
| 1000 MHz | 49.9 |



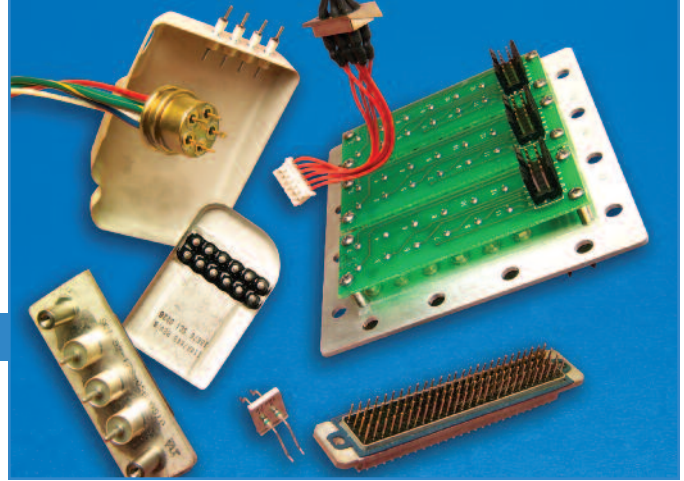
Custom Filtered Arrays

Spectrum Control will custom design a filter plate or terminal block that meets your size, material and filtering requirements. We have engineered a variety of capacitive only filter elements that provide excellent RF isolation from 5 MHz to 1 GHz and beyond. In addition, we are capable of providing stringent testing and analysis of our filter plate or terminal block assemblies to MIL-F-15733 and MIL-F-28861.

In addition to our standard and custom filter plates and terminal blocks, we offer a number of value-added features designed to complement your manufacturing operation. Our marketing and engineering staff will evaluate your design or manufacturing parameters and develop a filter solution which provides increased filtering performance economically.

Spectrum Capabilities

- Custom assemblies with varying cable lengths and terminations
- Integrate a filter solution with other components to ensure a completely functional device
- Perform EMC evaluations on your equipment, recommending proper placement of EMI/RFI filtering components
- Custom high reliability assemblies



Filtered Headers

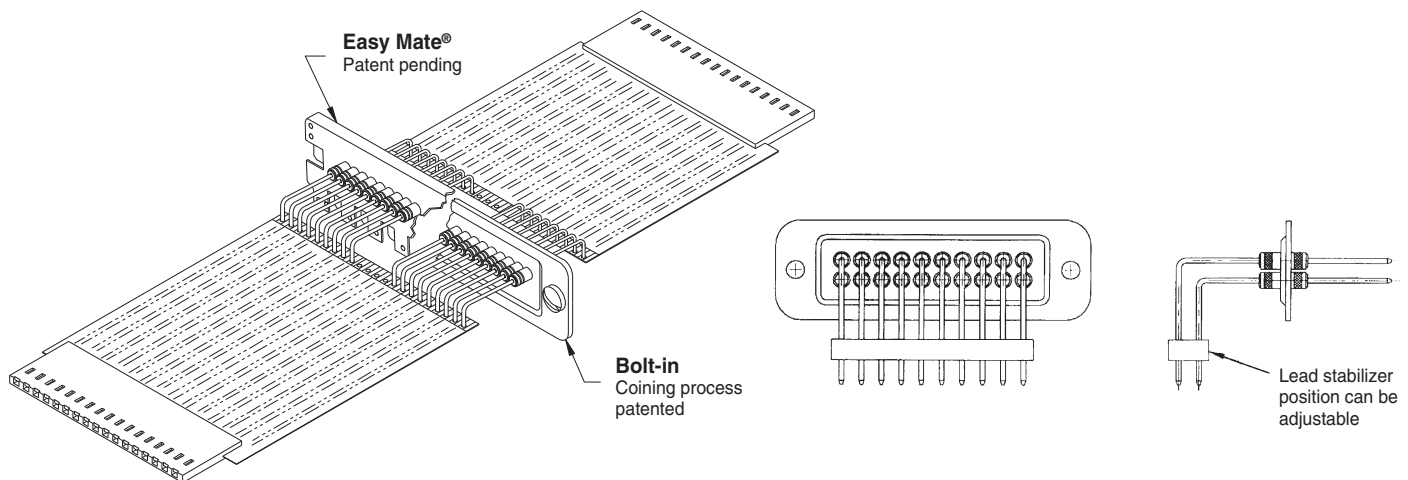
Replace the unfiltered connector on your PC board with Spectrum's low cost filtered header. This innovative new product allows you to meet EMC emissions and susceptibility standards with minimal or no board change.

Flat Conductor Cables

Flat conductor cables are often selected as an effective method of interconnection. Spectrum can save you time and money by installing conductor cables to your filter plates. Flat conductor cables are available in varying lengths, conductor counts and in several termination configurations.

Lead Stabilizer

Spectrum Control has developed a filter plate lead stabilizer bar to protect leads during installation and ensure proper alignment to PCB.



EMI Filtered Connectors

from performance to board space, to cost, we offer many reasons and options for managing EMI @ the signal & power I/O



Series F Ferrite Filtered Connectors offer a low cost, space saving solution for high frequency interference... 40

Series 100 Chip-Cap Connectors provide economical filtering as a "drop-in" replacement for non-filtered D-Sub connectors... 41

Series 500 Low-Profile Feed-Through Connectors deliver reliable EMI filtering in 90° PCB and straight PCB connectors... 42

Series 600 Hi-Density Filtered Connectors meet the growing need for increased circuit densities in smaller packages... 43

Series 700 High Performance Connectors feature feed-through capacitive and Pi filters for the most effective filtering... 44

Filtered Combo D-Sub Connectors use tubular capacitors for high insertion loss in signal, power and coaxial contacts... 45

Series E (ESD/EFT) Transient Protected Connectors offer a fail-safe design to protect from transient over-voltages... 46

Micro D Series Connectors allow designers to incorporate EMI filtering into even smaller packages... 47

USB Connectors incorporate EMI filtering and ESD protection into standard USB packages freeing up valuable board space. Rugged USB also available... 48-49

Datacom Connectors including modular jack, miniature ribbon and mini-DIN protect critical datacom lines... 50



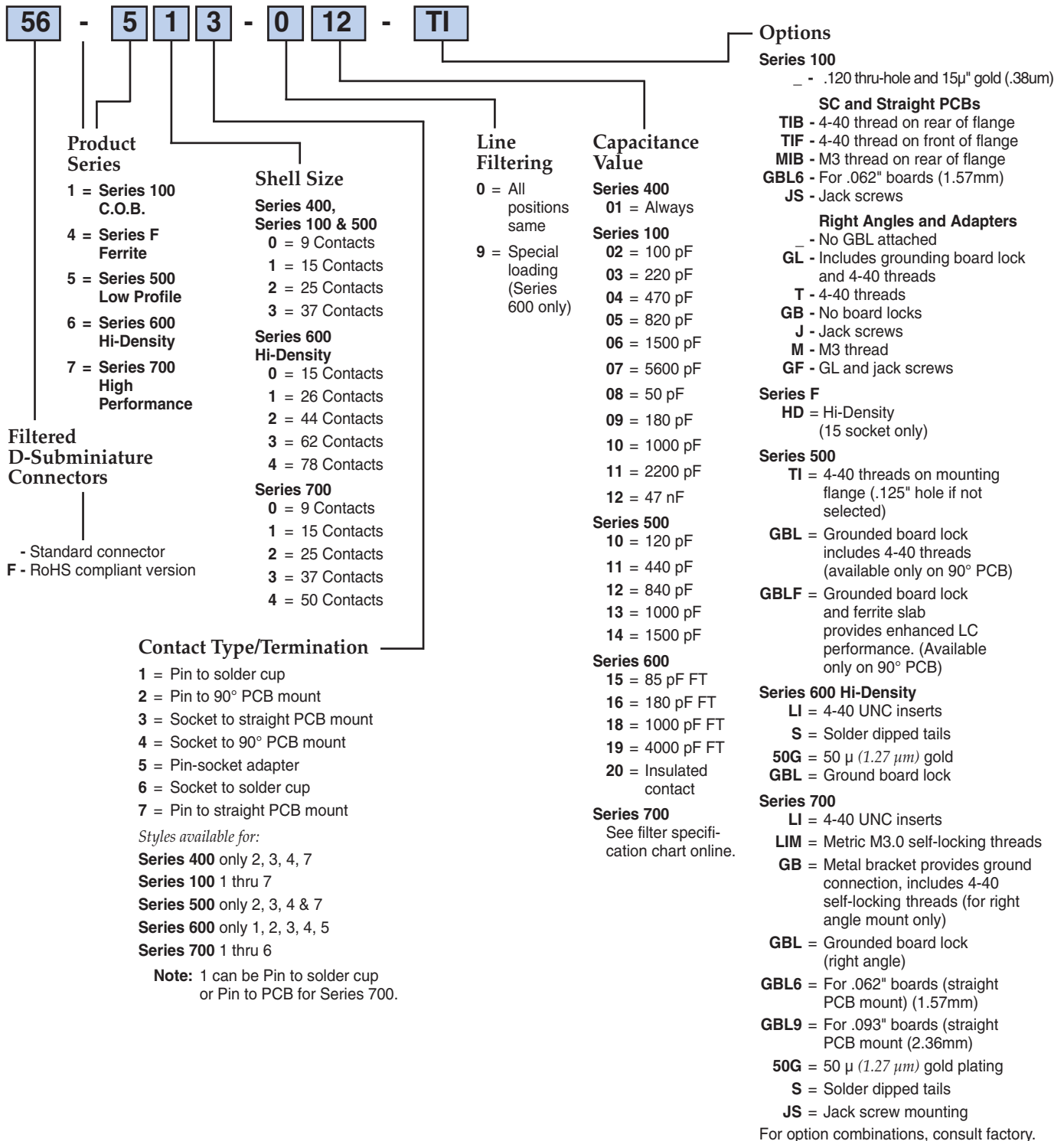
Advantages of a Filtered Connector

- **Low ground impedance** – Full ground plate and metallic shell provide minimal impedance and superior performance compared to on-board filter with high impedance
- **Eliminate re-radiation** – Filtered connector at interface leaves no path for bypassing the filter
- **Ground plane shielding** – Spectrum's filtered connector ground planes shield the box even at the connector port
- **Efficient space utilization** – Filters located in the connectors provide additional space on PCB board
- **Consistent performance** – Filtered connectors provide more consistent pin to pin performance
- **Fewer components** – Filtered connectors reduce component count creating cost savings
- **Reliability** – Spectrum tests 100% of filters, on-board filters are usually spot tested

D-Sub Connector Part Numbering System

This part number represents a Series 500 connector with 15 contacts in a socket to straight PCB mount configuration. All connector positions have a capacitance value of 840 pF and there are 4-40 threads on mounting flange.

Example: **56-513-012-TI**





Series F Ferrite Filtered Connectors

The Series F filtered D-subminiature connectors incorporate a solid slab of ferrite material as the filtering element. This rugged one-piece design provides a compact connector that is a drop-in replacement for standard connectors. The ferrite material has been chosen for optimum filtering performance in the 10 to 300 MHz range.

Features

- Low cost, high performance ferrite filter
- No distortion of wave forms
- Replaces individual ferrite bead filters, saving cost and space
- Provides both pin to ground and pin to pin filtering
- Effective in helping meet requirements of FCC, VDE, EN55022 and Japan's VCCI
- Short, space saving .318" footprint
- Interchangeable with standard D-subminiature connectors
- Can be installed directly over PCB trace pattern with no shorting
- 4-40 UNC locking insert eliminates loose hardware
- Metal shielding front shell
- Gold plated contacts
- RoHS compliant versions available (replace 56- with 56F)

Applications

- Personal computers, microcomputer-applied products and peripheral/terminal equipment
- Eliminates common-mode noise along data lines in data communication terminals and digital equipment

Mechanical Specifications

Front Shell Steel (Tin plated)

Housing UL 94V-0 Rated thermoplastic, black

Contacts Phosphor bronze (sockets) or brass (pins)

Contact

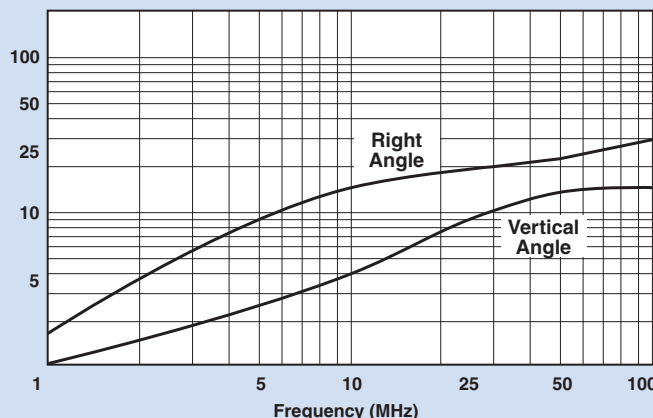
Plating Gold flash (<10µ in.) over nickel

Operating

Temperature -40°C to +105°C



Impedance (ohms)



Electrical Specifications

| Frequency (MHz) | Impedance (Ohms) | |
|-----------------|------------------|----------|
| | Right Angle | Vertical |
| 1 | 2 | 1 |
| 10 | 15 | 6 |
| 30 | 20 | 10 |
| 50 | 23 | 12 |
| 100 | 27 | 15 |

Frequency

Range 10 – 300 MHz

Current

Rating 5 Amps

Dielectric

Withstand Voltage 1000 VAC for one minute

Insulation

Resistance 1000 MΩ Min. @ 500VDC

Series 100 Chip-Cap Filtered Connectors

These versatile and widely used PCB connectors are an inexpensive filtering method that eliminates the problem of conducted electromagnetic interference (EMI).

Chip-cap plug and receptacles are available in 9, 15, 25 and 37 positions. These connectors are “drop-in” replacements for non D-subminiature connectors with matched PCB footprints. Housings are made of UL 94V-0 rated thermoplastic material. Low cost front metal shells are compatible with full metal-shell threaded insert mating hardware. Integral boardlocks secure posted connectors to the PC board, prior to soldering.

Features

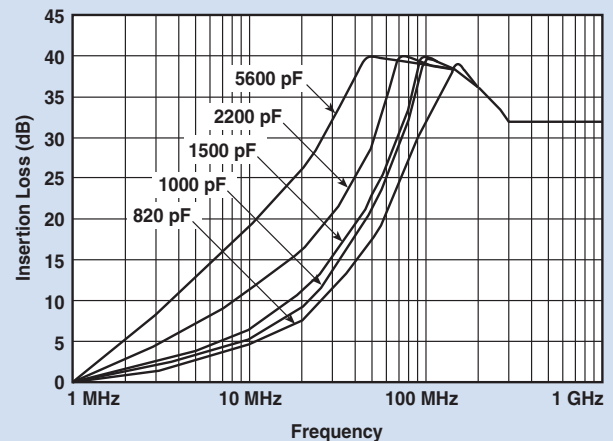
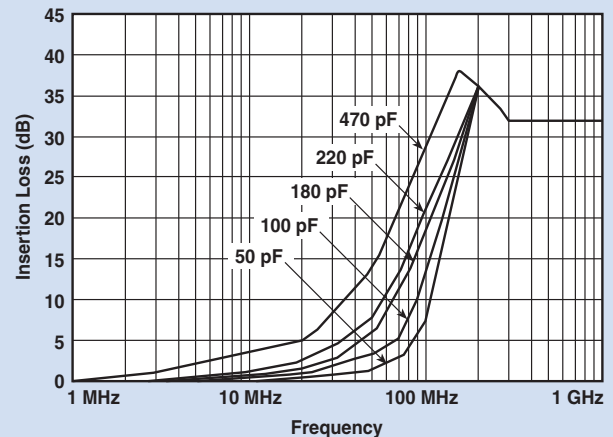
- Offer economical, high performance EMI/RFI protection
- Matched .318", .405" and .590" PCB footprints mean “drop-in” replacement for non-filtered connectors
- Low cost chip capacitors
- Connectors have industry standard interface
- Connector insulators made of UL 94V-0 rated high temperature, thermoplastic
- Connector body is recognized under the Component Program of Underwriters Laboratories, Inc. (E149046)
- Connector body is certified by the Canadian Standards Association

Mechanical Specifications

| | |
|-----------------------------------|---|
| <i>Shells</i> | Steel, tin plated |
| <i>Insulators</i> | 94V-0 rated thermoplastic, black |
| <i>Eyelets</i> | Brass, tin plated |
| <i>Threaded Inserts</i> | Zinc |
| <i>Boardlocks</i> | Copper alloy, tin plated |
| <i>Pin Contacts</i> | Brass |
| <i>Socket Contacts</i> | Phosphor bronze |
| <i>Contact Plating</i> | Duplex plated as follows: 15uin (.38um) gold on mating end, with entire contact 50uin (1.27um) min. nickel underplated and flash gold finish |



Typical Insertion Loss



Electrical Specifications

| | |
|--|--|
| <i>Current Rating</i> | 5 Amps |
| <i>Contact Resistance</i> | 8 mΩ max. |
| <i>Capacitance</i> | 50, 100, 180, 220, 470, 820 1,000, 1,500, 2,200, 5,600 pF and 47 nF ± 20% (custom valves and selective loading available) |
| <i>Dielectric Withstanding Voltage</i> | 700 VDC min. for 5 sec. |
| <i>Insulator Resistance</i> | 500 MΩ min. @ 100 VDC |
| <i>Working Voltage</i> | 200 VDC (100 VDC for 47 nF) |
| <i>Operating Temperature</i> | -55°C/+85°C |



Series 500 Low Profile Filtered Connectors

Spectrum Control's Series 500 are cost effective, highly reliable EMI filtered D-subminiature connectors that feature a .318" footprint for 90 degree PCB connectors and a low profile housing on straight PCB connectors. Series 500 filtered D-sub connectors are "drop-in" replacements for standard unfiltered D-sub connectors and use tubular capacitors for high performance EMI filtering.

Series 500 capacitive filtered D-sub connectors are an ideal solution to FCC/EC/VCCI emissions problems. These connectors are designed to protect equipment from external EMI noise and eliminate system glitches.

Features

- "Drop-in" replacements for unfiltered D-subminiatures
- Compact design, featuring .318" footprint
- Tubular feed-through capacitors provide filtering superior to on-board components
- Ground plane design provides EMI shielding
- Full interchangeability; based on MIL-C-24308
- Each connector position is tested 100% for critical electrical parameters to ensure consistent performance
- Insulators are UL recognized UL94-V0 flammability rated
- 9, 15 and 25 shell sizes
- Available with board lock feature and 4-40 mounting threads
- Selective filtering available
- UL/CSA approved
- Greater than 40 dB filtering up through 1 GHz without resonances
- Bi-directional control of EMI at the I/O ports

Mechanical Specifications

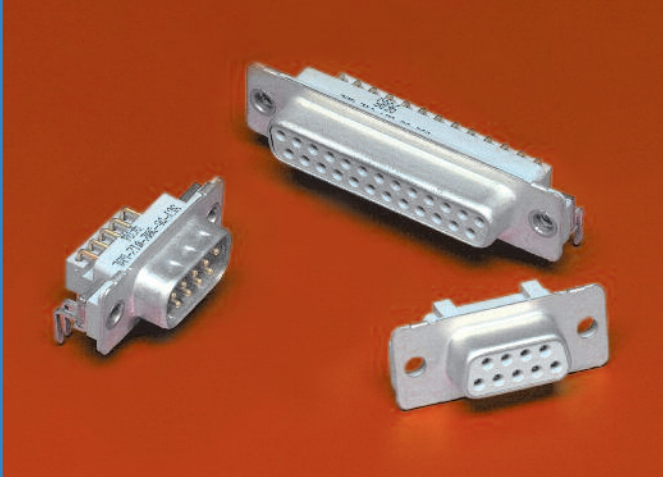
| | |
|-----------------|--|
| Shell | Steel, tin plated |
| Insulators | Glass-filled polyester, flammability UL94V-O |
| Pin Contacts | Copper alloy CA725, 15 microinch (0.38 μ m) gold plated* over nickel |
| Socket Contacts | Copper alloy CA725, 30 microinch (0.76 μ m) gold plated* over nickel |

*Heavier gold plating available upon request.

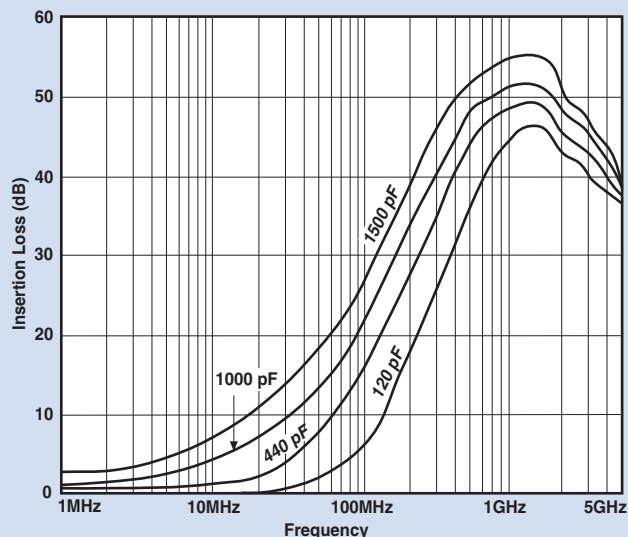
Ground Plane Phosphor bronze, nickel plated

Operating Temperature -40°C to +125°C

Capacitors Proprietary barium titanate ceramic formulations



Typical Insertion Loss



840 pF is typically within 2 dB of 1000 pF curve.

Electrical Specifications

| | |
|---------------------------------|--|
| Current Rating | 5 Amps |
| RF Current Rating | 0.3 Amps |
| Contact Resistance | 10 m Ω maximum |
| Capacitance | 120, 440, 840, 1000, 1500 pF \pm 30% |
| Working Voltage | 100 VDC |
| Dielectric Withstanding Voltage | 300 VDC |
| Insulation Resistance | 1 G Ω minimum |
| UL Recognized | Under category of communication circuit accessories, File #E149046 |

Series 600 Hi-Density Filtered Connectors

The miniaturization of electronic systems and sub-systems is pushing designers to increase circuit densities within smaller packages. To address this growing need, Spectrum Control has developed a line of filtered Hi-Density D-subminiature connectors. This new line of connectors incorporates the high performance and reliable filtering of Spectrum's standard D-sub's in the Hi-Density format.

Features

- Connectors designed to MIL-C-24308
- Capacitance values from 85 pF to 4000 pF
- Filter type feed-through C
- Selectively specify and filter each contact position
- Available in feed-through capacitive configurations

Hi-Density Filtered Adapter for Telecommunications

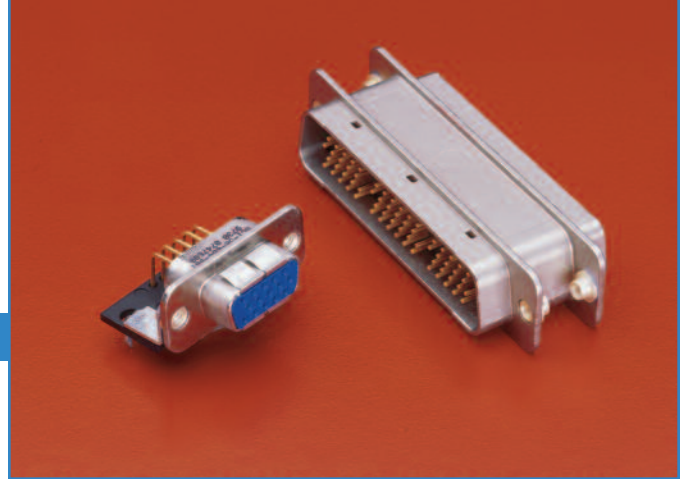
In response to the unique requirements of the telecommunication industry, we have developed a new Hi-Density filtered adapter.

Features

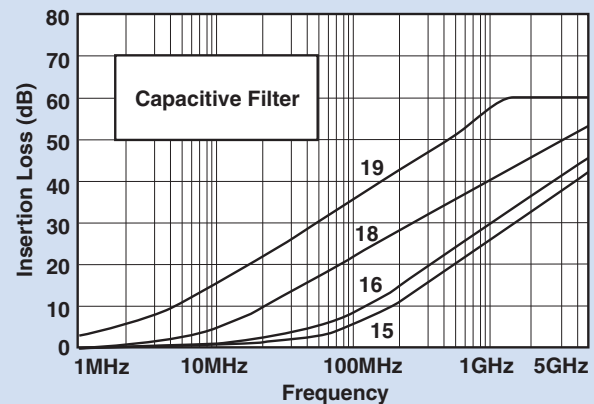
- New ceramic technology and filter element construction to accept higher voltages
- Improved reliability compared to "ribbon" type connectors
- Integral ground plane and one-piece diecast housing for the highest level of EMI integrity
- More contacts/wires per square inch of panel space through Hi-Density arrangements
- 64 contact positions standard, with 78 positions available by request in any filter combination
- Meet Bellcore TR-NWT-001089 requirements
 - 1000 volts AC withstand for one minute
 - 2500 volts spike surge testing

Mechanical Specifications

| | |
|--------------|---|
| Shell | Zinc diecast, nickel plated 150 μ inches (3.81 μ m) min. |
| Insulators | Thermoplastic, UL94V-0 |
| Contacts | One-piece, screw machined Copper alloy, contact area plated 50 μ inches (1.27 μ m) gold over 50 μ inches (1.27 μ m) nickel |
| Ground Plane | Brass, solder plated |



Typical Insertion Loss



Insertion loss measured per MIL-STD-220, no load, 50 ohm source and load.

Grounding Springs Beryllium copper, tin plated per MIL-T-10727

Operating Temperature -55°C to +125°C

Capacitor High performance ceramic feed-through utilizing ultra low ESR design

Electrical Specifications

Voltage Rating 100 VDC

Current Rating 3 Amps

Contact Resistance 15 m Ω max.

Dielectric Withstanding Voltage 1000 VRMS (FCC Part 68 test)

Capacitance 1000 pF, \pm 25%

Voltage Surge Meets 2500 volts surge (10/1000)

UL Recognized Under category of communication circuit accessories, File #E149046

Note: VGA adapters also available. Consult factory.

For complete specs and drawings, visit www.SpecEMC.com/series600

Series 700 High Performance Filtered Connectors

These connectors are a highly effective method of filtering at the I/O interface. The ability to selectively filter lines allows signals of various rates to pass without degrading signal integrity. Series 700 connectors feature a .590" footprint on right angle connectors. Styles are available with pin or socket contacts or as pin/socket adapters.

Features

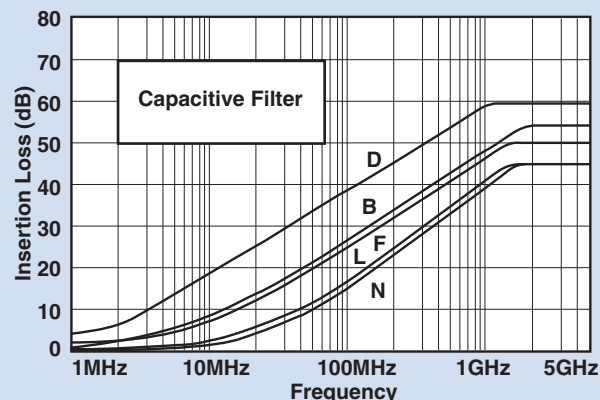
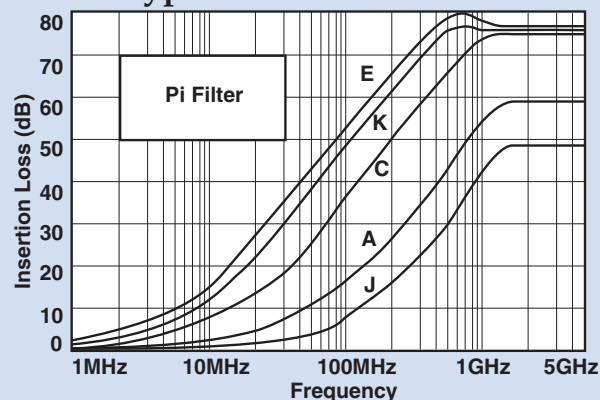
- Available in 9, 15, 25, 37 and 50 shell sizes
- One-piece die cast housing design
- Available in both feed-through capacitive and PI configurations
- Selective line filtering is available
- Tubular capacitor filtering provides effective performance through 10 GHz
- RoHS compliant versions available

Mechanical Specifications

| | |
|--|---|
| Shell | Zinc diecast, nickel plated 150 μ inches (3.81 μ m) min. |
| Insulators | Glass-filled polyester, flammability UL94V-0 |
| Pin Contacts | Copper alloy, 15 μ inches (0.38 μ m) gold plated * over nickel |
| Socket Contacts | Copper alloy, 30 μ inches (0.76 μ m) gold plated * over nickel |
| * Heavier gold plating available upon request. | |
| Terminations | Gold flash for PCB mount and solder cups. Solder dipped also available. |
| Ground Plane | Brass, solder plated |
| Grounding | |
| Springs | Beryllium copper, tin plated per MIL-T-10727 |
| Capacitors | Proprietary barium titanate ceramic formulations |



Typical Insertion Loss



Electrical Specifications

| | |
|--|---|
| Current Rating | 5 Amps |
| RF Current Rating | 0.3 Amps |
| Contact Resistance | 10 m Ω maximum |
| UL Recognized | Under category of communication circuit accessories, File #E149046 |
| Inductance on PI Filters | ~ 860 nH between 100 kHz and 1 MHz |
| Operating Temperature | -55°C to +125°C |
| Solder cups accept up to a 20 gauge wire | |



Capacitive filtering is available in 470, 820, 1000 and 1500 pF. Additional capacitance ranges and configurations can be provided upon request. Please consult factory for more information.

- Telecommunications base station equipment
- Switching and transmission equipment
- Power supplies
- Industrial equipment
- Computer work stations

- 3W3 in plug-solder cup and plug-right angle
- 5W5 in plug-vertical
- 9W4 in socket-solder cup, socket-vertical and plug-right angle
- 24W7 in socket-solder cup

Example: **563A03W3101GBL9**



Three metal connectors with gold pins and sockets, arranged on a red background. The connectors are made of a silver-colored metal and have a rectangular shape. Each connector has a row of gold pins on one side and a row of gold sockets on the other. The connectors are arranged in a triangular pattern, with one at the top left, one at the top right, and one at the bottom center. The background is a solid, vibrant red color.

| | |
|--|--|
| <i>Shells</i> | Steel, tin plated |
| <i>Power Contacts</i> | Brass, gold plated .000030 in. (0.762 μ m) minimum |
| <i>Signal Contacts</i> | Pin: brass, gold plated .000015 in. (0.762 μ m) min. Socket: copper alloy, gold plated .000030 in. (0.762 μ m) min. |
| <i>Insulator</i> | Glass-filled polyester, flammability UL94V-0 |
| <i>Operating Temperature</i> | -55°C to +125°C |
| <i>Capacitors</i> | Proprietary barium titanate ceramic formulations or high voltage MLCC |

| | |
|---------------------------------|--|
| Operating Voltage | 200 VDC |
| Current Rating* | 40 Amp power/ 5 Amp signal |
| Insulation Resistance | 1 GΩ at 100 VDC |
| Capacitance | 470, 820, 1000, 1500, or 4000 pF (FT only) ±20% (10 - 5000 pF available for signal pins, consult factory for part number on values above 1500 pF and below 470 pF) |

Dielectric Withstanding
Voltage 600 VDC

***30 Amp available. Consult factory.**

- LI** = 4-40 UNC inserts
- LIM** = Metric M3.0 self-locking threads
- GB** = Metal bracket provides ground connection, includes 4-40 self-locking threads (for right angle mount only)
- GBL** = Grounded board lock (right angle)
- GBL6** = for .062" boards (straight PCB mount)
- GBL9** = for .093" boards (straight PCB mount)
- 50G** = 50 μ (1.27 μ m) gold plating
- S** = Solder dipped tails
- JS** = Jack screw mounting

For option combinations, consult factory.



Series E (ESD/EFT) Transient Protected Connectors

These fully integrated connectors and adapters provide protection from Electro-Static Discharge (ESD) and Electronically Fast Transients (EFT) that can damage or even destroy your equipment. The connectors are designed to meet various IEC 61000-4-21, EN 61000-4-2 and IEC 61000-4 standards, and are offered in a wide range of clamping voltages to fit your specific application. The connectors have integrated ESD transient voltage suppressors from Littelfuse®, are available in industry standard sizes and are “drop in” replacements for unprotected connectors.

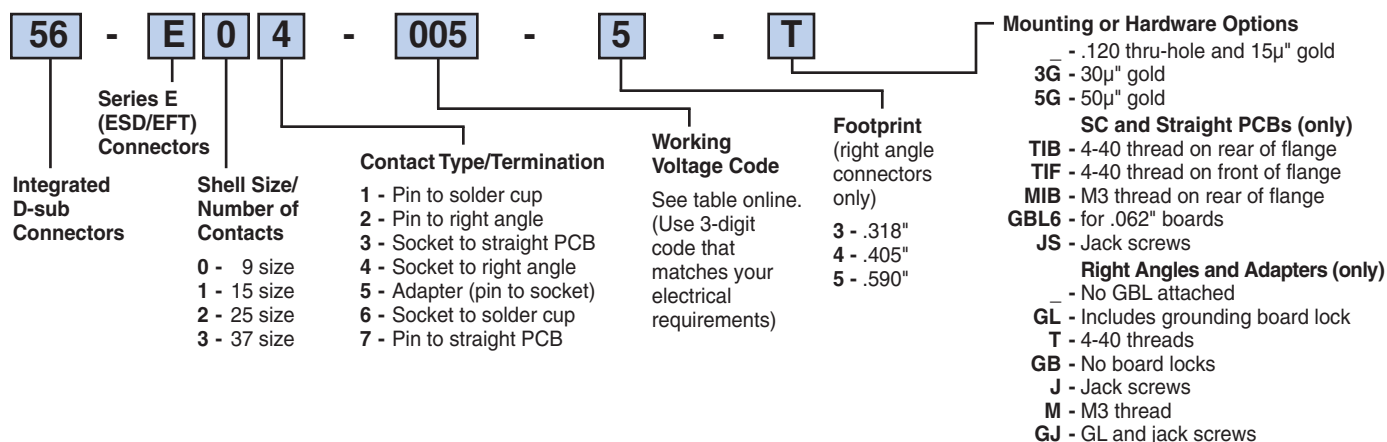
They are available with various capacitance levels to condition your signals to handle EMI issues at the same time or with as little as a 0.05 pF to protect the integrity of your signal in high speed or digital applications.

Features

- **ESD/EFT protection at the I/O ports** – Prevents the transients from entering the system before they can cause harm or create EMI problems.
- **Low ground impedance** – The metallic shell provides minimal impedance to direct the damaging transient spikes to ground, which is essential for proper protection.
- **Removal of ground traces from the board** – This eliminates potential line-to-line noise problems and spark-overs between ground and signal lines.
- **Complete protection** – All lines, including ground lines, have bi-directional protection.
- **Available capacitance** – Available with various capacitance values to supply EMI protection along with the transient protection, all in one complete package.

Ordering Information

Example: **56-E04-005-5-T**



This part number represents a Series E connector with a shell size of 9 and a socket to right angle configuration. The maximum working voltage is 5.5 VDC and the connector has a .590" footprint with 4-40 threads.



Mechanical Specifications

| | |
|----------------------------|---|
| Front Shell | Steel, tin plated |
| Housing | 94V-0 rated thermoplastic, black |
| Eyelets | Brass, tin plated |
| Threaded Inserts | Zinc |
| Boardlocks | Copper alloy, tin-lead plated |
| Pin Contacts | Brass |
| Socket Contacts | Phosphor bronze |
| Contact Plating | Duplex plated as follows: 15 μ in (.38 μm) gold on mating end, with entire contact 50 μ in (1.27 μm) min. nickel underplated and flash gold finish. |

Electrical Specifications

| | |
|--------------------------|-----------------|
| Current Rating | 5 Amp per pin |
| Operating Temp | -55°C to +125°C |

Filtered Micro D Series Connectors

For designs that require even smaller connector packages, Spectrum has designed a line of filtered Micro D-Subminiature connectors. This line of connectors offers a range of reliable filtering options, including capacitive and ESD versions, and several sizes and termination options. Spectrum has a Micro D-sub connector to satisfy your smallest space constraints.

Features

- Light weight
- Compact size
- Environmentally sealed contact area when mated
- Corrosion resistant
- Durable (500 cycles min.)
- Superior electrical performance
- RoHS compliant



Mechanical Specifications

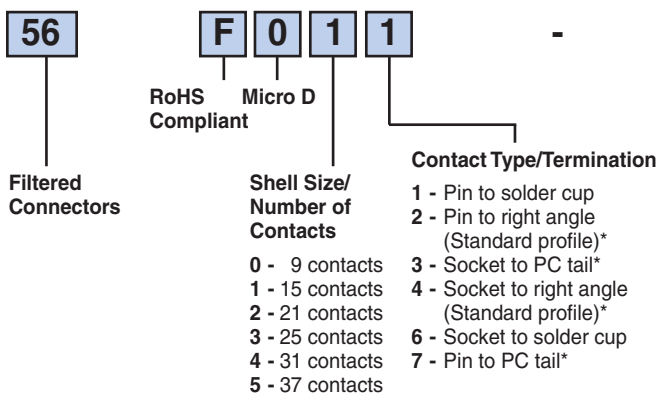
| | |
|------------------|---|
| Shell | Aluminum, electroless nickel plated 500 μ in (12.7 μ m) minimum |
| Insulator | Glass filled polyester, flammability UL94V-0 |
| Contacts | Copper alloy, gold plated 50 μ in (1.27 μ m) minimum |
| Potting | Flammability UL94V-0 |
| Interfacial Seal | Silicon |

Electrical Specifications

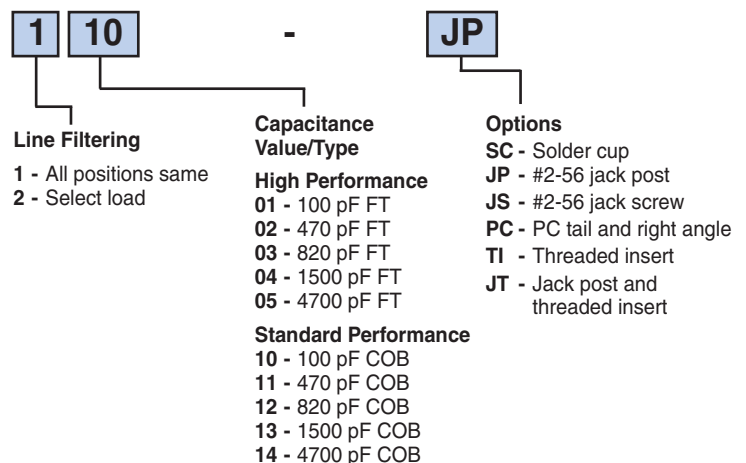
| | |
|-----------------------|-------------------|
| Operating Voltage | 100 VDC |
| Dielectric | |
| Withstanding Voltage | 300 VDC |
| Current Rating | 3 Amps |
| Insulation Resistance | 5G ohms @ 100 VDC |

Ordering Information

Example: **56-F011-110-JP**



This part number represents a micro D-sub connector with a shell size of 15 and a pin to solder cup configuration. All lines are filtered with same capacitance value, which is 100 pF COB. The connector includes an optional #2-56 jack post.



* Right angle and PC tail length (Standard Profile) is 0.109. Other lengths available, consult factory.

All capacitance values $\pm 20\%$ @ 25°C



EMI Filtered & ESD Protected USB Connectors

Spectrum Control has developed a series of USB connectors that incorporates EMI and ESD filters into an industry standard USB package. By moving the EMI filtering or ESD protection to the USB connector, designers can free up valuable PC board space for other components and provide better protection for the entire device. These connectors are drop-in replacements for unfiltered connectors, making them ideal solutions for the ongoing miniaturization of peripheral devices. Spectrum's EMI filtered and ESD protected USB connectors can eliminate the need to redesign PC boards in the event of noncompliance during either EMC or ESD testing. Various models of these connectors meet the requirements of USB 1.1 or USB 2.0 specifications and all are RoHS compliant.

Applications

- EMI/RFI sensitive electronics
- Test and measurement equipment
- Notebook computers and peripherals
- Home entertainment and multimedia
- Industrial controls
- Data acquisition

Material

Shell Brass, nickel plated
 Insulator Thermoplastic, UL94V-0, reflow compatible
 Contacts. Phosphor bronze, gold flash over nickel

Part Numbers

USB-F (EMI Filtered)

Inductive Filters for USB 2.0

56FU04-020 - socket right angle through hole connector
 56FU04-020SM - socket right angle surface mount connector

Capacitive Filters for USB 1.1

56FU04-004 - socket right angle through hole connector
 56FU04-004SM - socket right angle surface mount connector
 56FU04-004TPM - socket right angle through hole connector with panel mount tabs

USB-E (ESD Protected)

56FU24-E01 - stacked socket right angle through hole connector with TVS diodes
 56FU04-E01 - socket right angle through hole connector with TVS diodes
 56FU04-E01SM - socket right angle surface mount connector with TVS diodes



Electrical Specifications

Operating Temperature . . -55°C to +125°C
 Working Voltage 5 VDC
 Current Rating 1 Amp max.
 Contact Resistance 30 mΩ max.
 Temperature Range -40°C to +71°C

USB-F (EMI Filtered)

Capacitance Filtered

Capacitance 100pF

Dielectric

Withstand Voltage 125 VDC

Inductive Filtered

Common Mode

Impedance 90Ω ±25% @ 100MHz

IR 10 MΩ min.

DC Resistance 0.30 Ω max.

USB-E (ESD Protected)

Reverse Standoff

Voltage 5 Volts

Reverse Breakdown

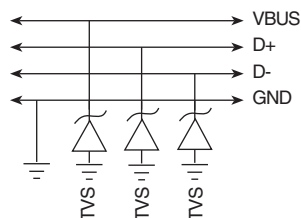
Voltage 6 Volts

Clamping Voltage Ipp=1A, tp=8/20us, 9.8 Volts
 (15 Volts for 56FU24-E01)

Junction Capacitance,

I/O to GND 10pF max. (3pF max. for 56FU24-E01)

Protection Schematic (USB-E)





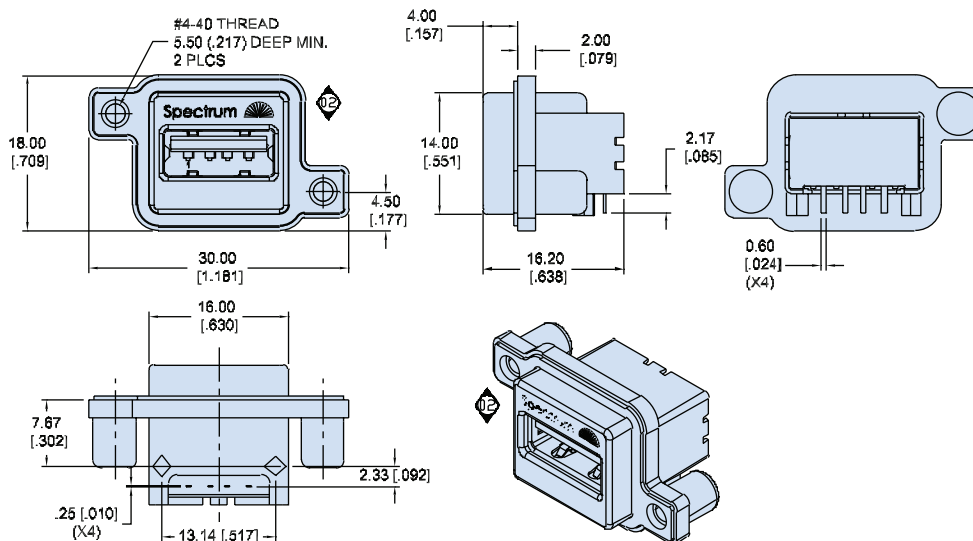
Rugged USB Connectors

New rugged USB Connectors from Spectrum Control feature a heavy-duty design able to connect to USB 2.0 or 1.1 ports, making them ideal for demanding, high stress applications.

Product Highlights

- Connectors meet seal requirements of IEC-60529, Code IP67 on PCB side
- Meet immersion requirements per MIL-STD-810F, Method 512.4 to 20 meters (unmated)
- RoHS compliant
- Supplied with gasket
- Ideal for demanding applications in the military, communications, medical, industrial and computing industries
- Type A, right-angle mounted connector
- USB 2.0 or 1.1 applications
- Part Number: 56FU04-017

Dimensions



Electrical Specifications

Operating Temperature . . -40°C to +105°C

Current Rating 1.5 Amps

Contact Resistance 30 mΩ



Filtered Datacom Connectors

Filtered Miniature Ribbon Connectors

Filtered miniature ribbon connectors are fully intermateable and interchangeable with existing standard products. Rugged design construction and predictable capacitive filter performance is available in right angle and male/female adapter versions.

Features

- Lower installed cost
- Assists with FCC Part 15; available for Part 68 requirements
- Applicable for VDE specifications 0871, 0875-0878, Vfg Federal Regulations and VCCI noise requirements
- Drop-in replacement, matched footprint
- All circuit lines filtered

Filtered Modular Jack Connectors

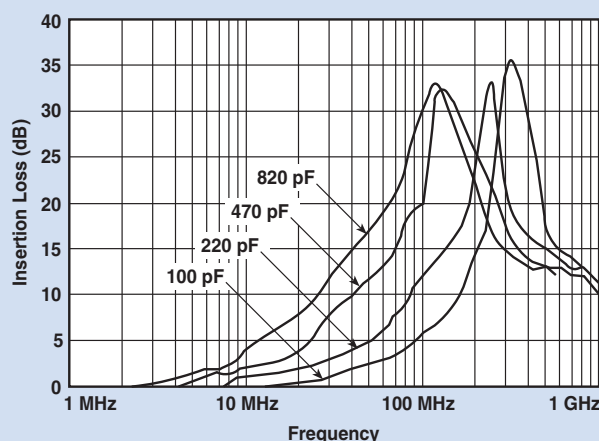
These compact, low cost, filtered printed circuit board RJ45 modular jack connectors from Spectrum Control offer an inexpensive way to protect equipment from conducted and radiated electromagnetic interference (EMI), while meeting all appropriate performance requirements. Offering compact size and high reliability, these connectors are fully intermateable and interchangeable with existing standard product. The low profile and narrow width of the multi-port style allows more ports to be packed into less space. Filtering options include ferrite, capacitive and TVS diode (ESD). Modular jack connectors assist with PCC Part 15 A and B; and CISPR 22 compliance.

Features

- Lower installed cost
- Assists with FCC Part 15 A and B; and CISPR 22 compliance
- Drop-in replacement, matched footprint
- All circuit lines protected
- Inductor, capacitor or TVS (ESD) versions
- Available with two grounding options – PCB or parallel
- Unshielded or shielded versions
- Certified by Canadian Standards Association File No. LR 7189
- Certified by Underwriters Laboratories, Inc., File Number E81956

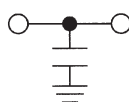


Typical Insertion Loss - Miniature Ribbon Connectors



Circuit Schematic - Modular Jack Connectors

Capacitive Version



Ferrite Version



ESD Version



Filtered Mini-DIN Connectors

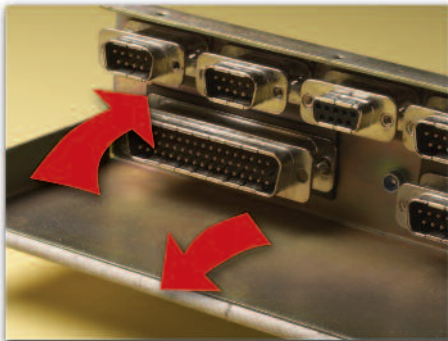
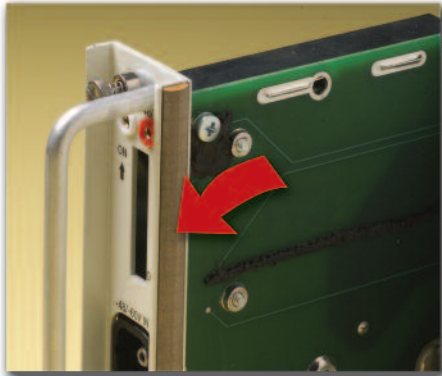
Filtered mini-DIN connectors are available in several configurations and sizes. These are "drop-in" replacements for standard unfiltered connectors with matched footprints. Housings are made of high temperature UL94V-0 rated thermoplastic material. Connectors are available with full metal shields and kinked or straight ground tabs. Each size can be shielded or filtered with ferrites. Primary applications are in computer keyboard and mouse connections.

Features

- Audio, video and computer equipment
- Drop-in replacement for unfiltered connectors
- Shielded, ferrite or capacitive filtering

Quietshield™ Gaskets & Shielding

flexible, conformable and lightweight Quietshield™ products deliver effective EMI shielding across seams or gaps within an enclosure



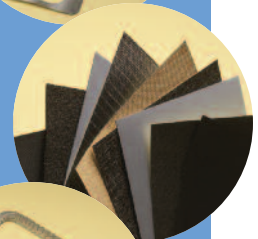
Foam Over Fabric are low cost, soft and easy to apply. These gaskets are available in a variety of materials and profiles, including rectangular, "D" shaped, FL shaped and DD shaped.

Waved Metal Gaskets, Fabric Over Foam Gaskets and I/O Connector Electromagnetic Shielding Gaskets are flat products used to provide a ground contact between a metal connector and the electronic enclosure or mating connector.

Shielding Tapes and Fabrics are flexible, lightweight, and easy-to-install shielding materials offering high conductivity with a low electrical resistance and are available in a variety of fabric styles.

Wire Mesh Gaskets are available as all mesh or elastomer core mesh gaskets. They provide excellent heat and corrosion resistance and are used between two surfaces to maintain electrical continuity while shielding electromagnetic waves.

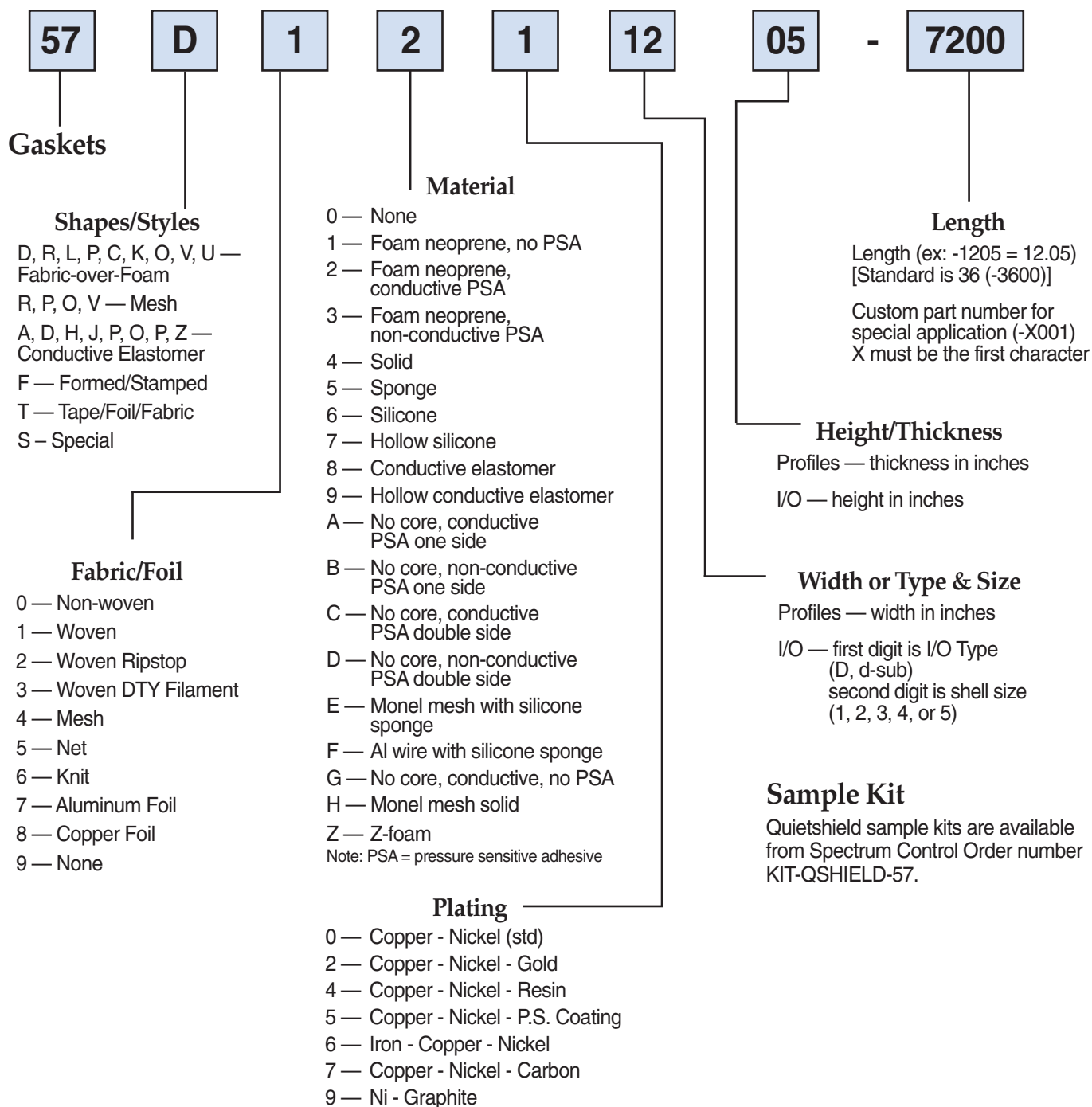
Conductive Silicone is used for its heat resistant properties and can be produced in many different forms such as sheets, molded parts, die-cuts or strips. These conductive elastomers are water resistant, can eliminate static electricity, and act as an absorber at high frequencies.



Quietshield™ Part Number System

Example: **57D1211205 - 7200**

The part number shown represents a foam-over-fabric gasket with woven foam made of neoprene, conductive PSA. The gasket has copper-nickel plating that is 0.120" wide x 0.050" thick x 72" long.



Sample Kit

Quietshield sample kits are available from Spectrum Control Order number KIT-QSHIELD-57.

Specialty Connectors & Harnessing

a premium line of custom and specialty filtered and unfiltered connectors with a range of value-added harnessing products and services

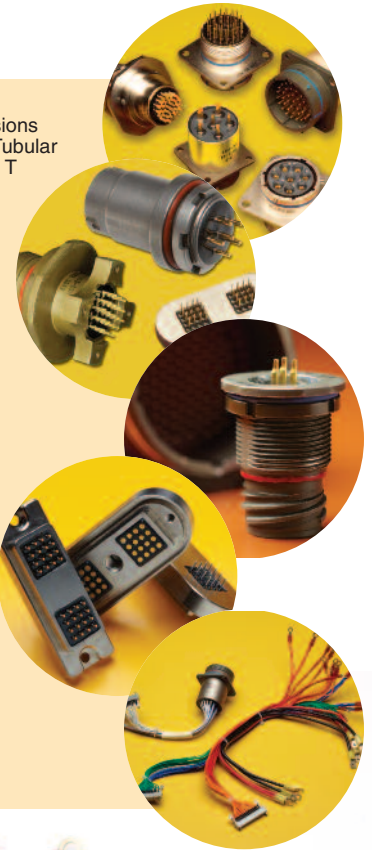
Custom Filtered Connectors provide filtered versions of MIL-STD connectors in custom configurations. Tubular and planar filtered arrays are available with Pi, LC, T and C circuits... 54

Custom Unfiltered Connectors are built to meet various environmental requirements and MIL specifications with power, signal and coax line combinations and multiple terminations available... 54

Mini-MIL Connectors offer space and weight savings with MIL-DTL-38999 equivalent performance... 55

Rapid Mate Connectors provide positive mating force to ensure a reliable connection, offering the ease and reliability of hot shoe style mating with the added benefit of integral EMI filtering.... 56

Harnessing Products and Services are designed in accordance with IPC-A-610 and J-STD-001 for military, commercial and industrial applications. We provide assemblies for both unfiltered and filtered interconnects including lead wire preparation, soldering and tinning, marking and ribbon cable processing... 57



- Audio, circular and hermetically sealed connectors
- Connector harnessing built to IAW, IPC-A-610 and J-Std-001
- Complete electro-mechanical assembly and testing services
- Custom connectors can be designed to meet RTCA/DO-160 Section 22 Lightning Strike
- EMI filtered connectors with complex schematics available

Specialty Connectors

Custom Filtered Connectors for MIL & Hi-Rel Applications

Spectrum Control offers a complete line of compact and extended shell filtered connectors providing a wide range of design flexibility. Our compact shell filtered connectors offer designers an effective filtering device that reduces the amount of real estate required within a product enclosure. Our extended shell connectors are constructed by adding either planar or tubular capacitor filtering to the rear of a standard connector, which makes them ideal when quick turnaround is required for prototype devices.

Styles offered include the following, as well as custom designs.

- MIL-DTL-38999 ■ MIL-DTL-55116
- MIL-DTL-83723 ■ MIL-DTL-24308
- MIL-DTL-26482 ■ MIL-DTL-5015

We offer tubular and planar style filtered arrays in Pi, LC, T and C circuits with TVS protection also available. Reliability is ensured through 100% testing of each position for critical electrical parameters.

Custom Unfiltered Connectors

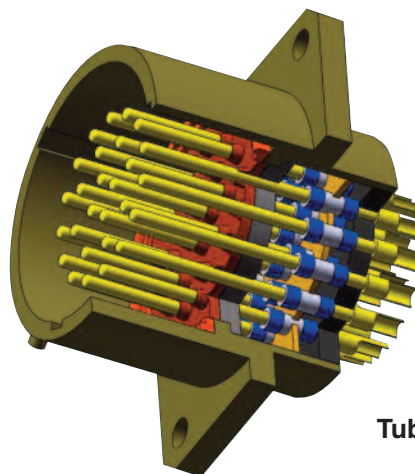
Spectrum also offers unfiltered custom connector design and manufacturing. Parts can be designed to meet your mechanical and environmental specifications or those of similar QPL connectors.

Features

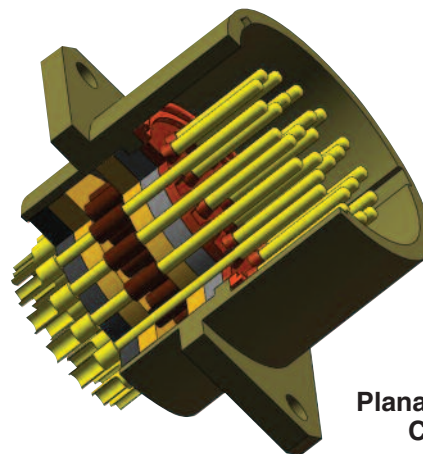
- Built to MIL specifications
- Custom shells to fit your available space
- Multiple terminations available
- Built to meet various environmental requirements
- Integral strain relief
- Power, signal and coax line combinations

Vertically Integrated

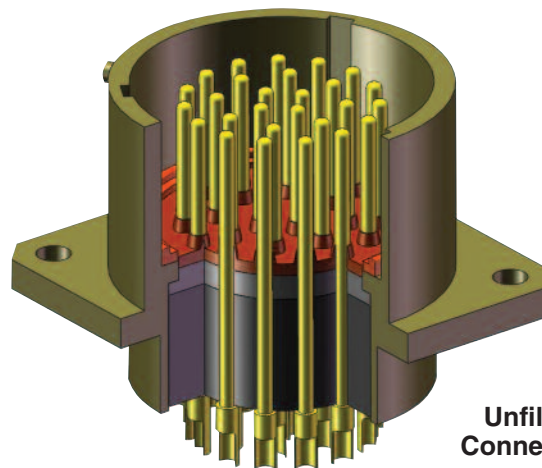
Spectrum's custom filtered and unfiltered connector offerings are fully vertically integrated. Components including capacitors and shells are manufactured by Spectrum, providing our customers high quality parts at very competitive prices, with the industry's shortest lead times.



Tubular Filtered Connector



Planar Filtered Connector



Unfiltered Connectors



Mini-MIL Connectors

Spectrum's new Mini-MIL circular connectors are small and lightweight offering space and weight savings while providing equivalent performance to standard MIL-DTL-38999 connectors. These connectors are available filtered with C, Pi or mixed capacitance, or unfiltered, and can be customized to satisfy various mechanical and electrical requirements. These connectors are ideal for military, industrial and medical applications where space restrictions do not allow for larger 38999 connectors.

Specifications

Engagement Types:

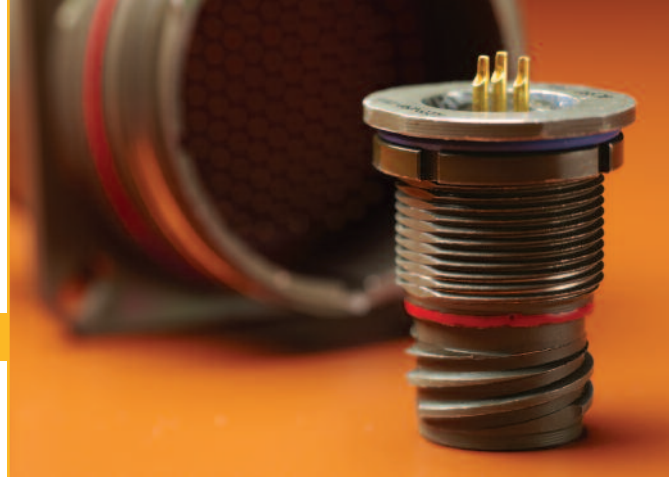
- Bayonet
- Single-start UN thread
- Double-start ACME thread
- Triple-start ACME thread

Termination Types:

- PC tail
- Solder cup
- Crimp removable
- Piggyback socket
- Custom

Receptacle Types:

- Flange mount (front or rear mount)
- Jam nut (front or rear mount)
- In-line



Mechanical Specifications

- Shell* Eight shell sizes are available in either pin or socket contact genders
- Shell Materials* Aluminum, stainless steel, composite, custom
- Contacts* Pin and socket contacts are available in 1 to 55 contacts in various combinations of size 23 to size 12.

Electrical Characteristics with C Filter

| Capacitance (pF, GMV)* | Working Voltage | | Dielectric Withstanding Voltage (VDC) | Minimum Insertion Loss (dB) | | | | | |
|---------------------------|-----------------|---------|---------------------------------------|-----------------------------|-------|--------|---------|---------|-----------|
| | DC 85°C | AC 85°C | | Cut-Off Freq. MHz | 1 MHz | 10 MHz | 100 MHz | 500 MHz | 1,000 MHz |
| 1,000 | 200 | 115 | 500 | 5 | — | 4 | 21 | 34 | 39 |
| 2,000 | 200 | 115 | 500 | 1 | — | 9 | 26 | 39 | 44 |
| 3,000 | 200 | 115 | 500 | 1 | — | 12 | 30 | 43 | 48 |
| 5,000 | 200 | 115 | 500 | 1 | 1 | 16 | 34 | 46 | 52 |
| 7,000 | 200 | 115 | 500 | 1 | 3 | 19 | 37 | 49 | 55 |
| 10,000 | 200 | 115 | 500 | 1 | 4 | 21 | 39 | 52 | 57 |
| 20,000 | 100 | — | 250 | .50 | 9 | 26 | 44 | 57 | 58 |

Electrical Characteristics with Pi Filter

| Capacitance (pF, GMV)* | Working Voltage | | Dielectric Withstanding Voltage (VDC) | Minimum Insertion Loss (dB) | | | | | |
|---------------------------|-----------------|---------|---------------------------------------|-----------------------------|-------|--------|---------|---------|-----------|
| | DC 85°C | AC 85°C | | Cut-Off Freq. MHz | 1 MHz | 10 MHz | 100 MHz | 500 MHz | 1,000 MHz |
| 1,000 | 200 | 115 | 500 | 5 | — | 4 | 28 | 54 | 65 |
| 2,000 | 200 | 115 | 500 | 1 | — | 8 | 39 | 65 | 70 |
| 3,000 | 200 | 115 | 500 | 1 | — | 11 | 47 | 70 | 70 |
| 5,000 | 200 | 115 | 500 | 1 | 1 | 14 | 54 | 70 | 70 |
| 7,000 | 200 | 115 | 500 | 1 | 3 | 18 | 60 | 70 | 70 |
| 10,000 | 200 | 115 | 500 | 1 | 4 | 22 | 64 | 70 | 70 |
| 20,000 | 100 | — | 250 | .50 | 9 | 33 | 70 | 70 | 70 |

* Custom values available.



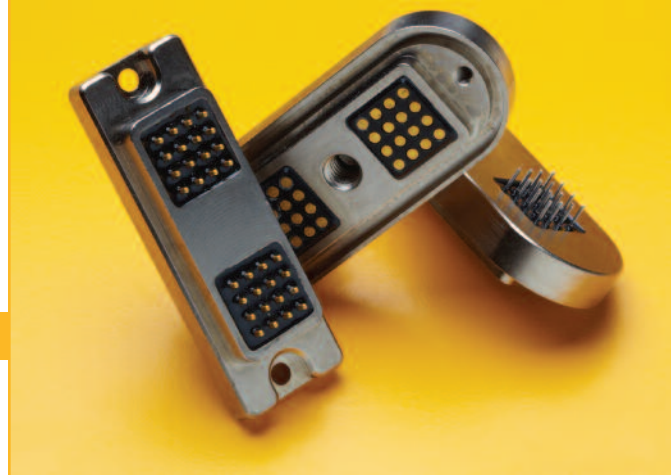
Rapid Mate Connectors

Spectrum's Rapid Mate connectors offer the ease and reliability of hot shoe style mating with the added benefit of integral EMI filtering. By mating via spring loaded, compliant contacts, Rapid Mate connectors provide positive mating force to ensure a reliable connection. This method provides rapid connection with low mating force, allowing for some misalignment during mating.

Additionally, the EMI filter experts at Spectrum can design a filtered Rapid Mate connector built to your requirements, providing the advantages of hot shoe style mating while ensuring system functionality in EMI-prone applications.

Applications

- Military and commercial communications systems
- Thermal and ambient light imaging cameras
- Docking stations
- Scanners



EMI Filter Performance

The electrical characteristics table indicates the performance of feed-through capacitors and Pi type filters. Utilize this information to specify the EMI filtering components included in your connector. Selective loading and custom values can also be designed.

Features

- Custom filtering
- 100% tested before shipment
- Rugged and reliable
- Resists sand, dust and water
- Low, flexible mating force

| Filter Designation | Filter* Circuits | Capacitance | | 3 dB Max Cut-off Frequency (MHz) | Working Voltage DC -55°C to +125°C | Minimum Insertion Loss - Decibels (dB) 50 ohm system per MIL-STD-220 (no load) | | | | | | | |
|--------------------|------------------|-------------|-----------|----------------------------------|------------------------------------|--|--------|--------|--------|---------|---------|---------|-------|
| | | Value | Tolerance | | | 5 MHz | 10 MHz | 20 MHz | 50 MHz | 100 MHz | 200 MHz | 500 MHz | 1 GHz |
| A | | 68 pF | ±20% | 77 | 100V | — | — | — | — | — | 3 | 10 | 16 |
| B | | 100 pF | ±20% | 53 | 100V | — | — | — | — | 1 | 6 | 14 | 19 |
| C | | 135 pF | +100/-0% | 23 | 100V | — | — | — | 1 | 5 | 10 | 16 | 20 |
| D | C | 470 pF | ±20% | 11 | 100V | — | — | 2 | 7 | 13 | 19 | 25 | 27 |
| E | | 820 pF | ±20% | 6 | 100V | — | 2 | 6 | 12 | 18 | 24 | 30 | 33 |
| F | | 1000 pF | ±20% | 5 | 100V | — | 3 | 7 | 14 | 20 | 26 | 32 | 35 |
| G | | 1500 pF | ±20% | 3.5 | 100V | 1 | 4 | 10 | 16 | 22 | 29 | 36 | 37 |
| H | | 2500 pF | +100/-0% | 1.3 | 100V | 5 | 11 | 17 | 23 | 29 | 35 | 38 | 40 |
| I | | 4000 pF | +100/-0% | .8 | 100V | 9 | 15 | 21 | 27 | 34 | 38 | 42 | 46 |
| J | Insulated | 10 pF | Max. | 635 | 100V | — | — | — | — | — | — | — | — |
| K | Grounded Insert | | | | | — | — | — | — | — | — | — | — |
| L | | 68 pF | ±20% | 65 | 100V | — | — | — | — | 1 | 6 | 17 | 23 |
| M | | 100 pF | ±20% | 46 | 100V | — | — | — | — | 2 | 9 | 22 | 28 |
| N | | 135 pF | +100/-0% | 25 | 100V | — | — | — | 1 | 6 | 17 | 26 | 34 |
| O | Pi | 470 pF | ±20% | 11 | 100V | — | — | — | 9 | 18 | 22 | 36 | 43 |
| P | | 820 pF | ±20% | 6 | 100V | — | — | 4 | 13 | 23 | 31 | 45 | 52 |
| Q | | 1000 pF | ±20% | 5 | 100V | — | 2 | 7 | 16 | 24 | 36 | 51 | 59 |
| R | | 1700 pF | +100/-0% | 1.9 | 100V | 1 | 6 | 14 | 28 | 35 | 49 | 64 | 69 |
| S | | 2500 pF | +100/-0% | 1.3 | 50V | 4 | 9 | 16 | 28 | 41 | 54 | 70 | 70 |
| T | | 5000 pF | +100/-0% | .7 | 100V | 9 | 15 | 28 | 41 | 53 | 66 | 70 | 70 |



Harnessing Products & Services

Spectrum Control offers custom harnessing products and services for military, commercial and industrial applications. Our skilled operators and supervisors work in a modern well-equipped facility to provide interconnect assemblies made to the highest workmanship standards.

Our manufacturing engineers design tooling and fixturing, which meet the tightest tolerances. From simple to complex, Spectrum can provide assemblies in compliance with all requirements.

Product Capabilities

- Built in accordance with IPC-A-610 and J-Std-001
- Cable harnessing
- Wide range of interconnects
- Coaxial and RF cabling
- Flat ribbon cable
- High voltage
- Electro-mechanical assembly

Manufacturing Capabilities

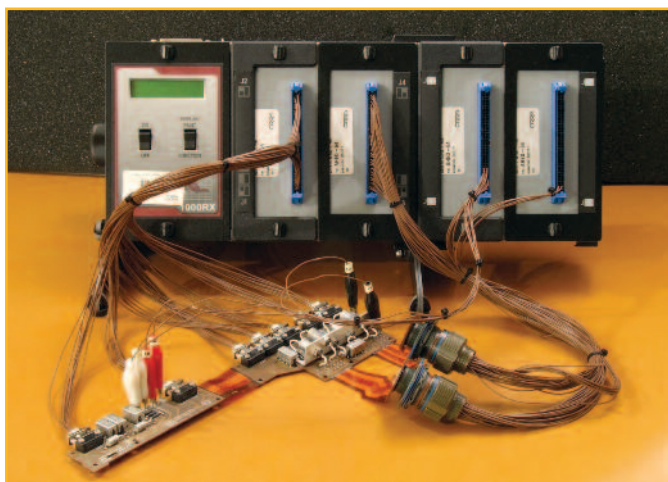
- Lead wire preparation
- Soldering and tinning
- Strip and removal of insulation
- Wire, component and assembly marking
- Ribbon cable processing

Wire Harnesses

Spectrum will add wires to a filtered or unfiltered connector to allow the customer to easily install the connector into the system at a lower cost. These value-added services include adding wires terminated or unterminated to all lines or only select lines, twisted pairs and labeling of wires for easy placement in your system. We can also encapsulate the wires inside the connector adding strength to the total harness.

By contracting Spectrum to add the harness assembly, customers are assured the performance of the connector has not been adversely affected. **All of our custom connectors are 100% tested for integrity and effective performance.**

Spectrum's connector manufacturing operators are all certified to MIL-STD-2000 solder specification. We have invested in this certification to provide you with confidence that the quality of our custom construction meets the highest standards in the industry.



Markets Served

- | | |
|---------------|----------------------------|
| ■ Medical | ■ MIL Spec |
| ■ Electronics | ■ Military instrumentation |
| ■ Automotive | ■ Marine |
| ■ Telecom | ■ Industrial |

EMI Power Filters & Film Capacitors

*find the ideal method to
filter the AC or DC power
entering your system to
prevent radiated or
conducted EMI with our
line of standard power
filters and custom
power solutions*



Power Entry Modules, Power Line & 3 Phase Power Filters are designed in multiple configurations to cover a range of industrial applications. These have excellent attenuation for high voltage impulse, are available in single and dual stage and address FCC Part 15 regulations while meeting your power filtering needs... **59-61**



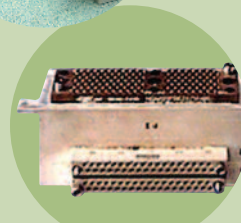
Single Line Feed-Through (SLFT) Power Filters provide superior filtering in a compact, durable package with single, dual, and triple feed-throughs available. These filters are ideal for meeting broad frequency applications with a bolt-in style for easy installation... **62-63**



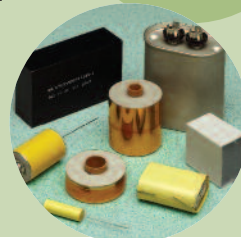
Military/Aerospace Multisection Filters provide excellent EMI filtering for demanding high reliability applications. We offer standard filters, as well as custom designed mechanical packages for unusual or tight fitting spaces and higher performance filtering and expanded voltage ratings... **64-65**



EMI Power Filter Solutions will lower your costs and reduce your time to market while providing your system with protection from radiated or conducted EMI. Our comprehensive consulting, diagnostic testing and world class manufacturing allows us to meet your design/project parameters... **66-67**



Power Film Capacitors deliver high reliability, low inductance, low ESR and low DF with a high peak withstanding voltage. These ruggedized capacitors come in a wide range of dielectrics, various geometries, a variety of terminations, multiple sizes and electrical ratings of 250-15KVDC typical, ripple currents up to 400 Arms and 150°C operation. New DC Link Capacitors... **68-69**



EMI Filter Expertise

We differentiate ourselves from typical filter suppliers by offering our customers an integrated approach to EMC problem solving through consulting, diagnostic testing, design and manufacturing.

- In-house test facilities to provide a total solution for your compliance issues – anechoic chamber, shielded room and NARTE certified engineers ready to test for European emission and immunity regulations, FCC Part 15 and MIL standards

- Global manufacturing and design support with agency approved products available
- Engineering expertise and vertical integration reduce your time to market and save you money
- High reliability products with low leakage and nonmagnetic options available
- Available to meet MIL-PRF-15733 and MIL-STD-461 standards



Power Entry Modules, Power Line Filters & 3 Phase Power Filters

Features

- Good filtering characteristics for both differential and common mode
- RoHS compliant
- Easy-to-install
- Varieties available in bolt-in or snap-in model
- Ideally suited for products that must conform to part 15 FCC regulations
- In many cases agency approvals are applicable or pending
- Both metal and plastic casing provide high performance
- Metal case provides effective EMI shielding
- In some cases product is adaptable for custom options
- IEC product meets over voltage category II of IEC 664 and complies with IEC 950
- Low leakage versions available for medical applications
- All are distribution friendly
- Design flexibility with product available for PCB mount, fast-on tab, solder lug for flying leads



Tested and found to be
IAW VDE 0565 Part 3.



Applications

- Medical equipment
- Electronic equipment
- Digital equipment
- Industrial equipment
- Telecommunications equipment
- Measuring and testing instruments
- Personal computers and peripherals
- Home appliances
- Switch mode power supplies



EMI Power Filters

Power Entry Modules, Power Line Filters & 3 Phase Power Filters Part Numbering System

Part Numbering System

Example: 12-PMB-025-5-A

Part number 12-PMB-025-5A represents a power line filter with threaded studs, current rated for 25 Amps and with a leakage current of 0.50 mA.

12

-

PMB

-

025

-

5

-

A

Product Line Series

- 10 = Filtered IEC Inlets
- 11 = Printed Circuit Board Mount
- 12 = Power Line Filters
- 13 = Three Phase Power Line Filters
- 14 = Fused or Switched & Fused Power Entry Filters (250V)
- 15 = Switched & Dual Fused
- 16 = Single Phase (250V)

Product Style

- BBF = 3 Phase, terminal block connection
- BFF = Bolt-in fused filter
- BPF = Bolt-in IEC w/Fast-on rear terminals
- BPL = Bolt-in IEC w/wire lead termination
- BSF = Bolt-in switched & fused
- CCL = Cylindrical, capacitive inputs w/Fast-ons
- CLF = Cylindrical, inductive inputs w/wire leads
- MMB = Multiple stage filtering w/threading studs
- MMF = Multiple stage filtering w/Fast-on terminal
- MPC = Miniature PCB mountable
- PDB = 3 Phase, delta w/threaded studs
- PDF = 3 Phase, delta w/Fast-ons
- PDL = 3 Phase, delta w/wire leads
- PMB = Power line filter w/threaded studs
- PMF = Power line filter w/Fast-ons
- PML = Power line filter w/wire leads
- PWB = 3 Phase, wye w/threaded studs
- PWE = 3 Phase, wye w/busbar
- PWF = 3 Phase, wye w/Fast-ons
- PWL = 3 Phase, wye w/wire leads

Current Rating

- 001 = 1.0 Amp
- 002 = 2.0 Amps
- 003 = 3.0 Amps
- 005 = 5.0 Amps
- 006 = 6.0 Amps
- 010 = 10 Amps
- 015 = 15 Amps
- 016 = 16 Amps
- 020 = 20 Amps
- 025 = 25 Amps
- 030 = 30 Amps
- 035 = 35 Amps
- 050 = 50 Amps
- 080 = 80 Amps
- 100 = 100 Amps
- 150 = 150 Amps
- 160 = 16.0 Amps
- 200 = 200 Amps
- 300 = 300 Amps

Leakage Current (Y Cap)

- 250 VAC** **125VAC**
- 0 = 0.075 mA DC = DC
- 1 = 0.01 mA
- 2 = 0.20 mA
- 3 = 0.35 mA
- 4 = 0.10 mA
- 5 = 0.50 mA
- 6 = 0.60 mA
- 7 = 0.70 mA
- 8 = 1.0 mA
- 9 = 3.0 mA
- 10 = 2.0 mA
- 11 = 1.5 mA
- 12 = 4.5 mA
- 13 = 9.0 mA
- 14 = 20.0 mA
- 15 = 15.0 mA
- 17 = 33.0 mA
- 18 = 71.5 mA
- DC = DC

Outline Drawing/ Case Style

- 1 Select case style from following
 - * Cylindrical
 - * Power line w/Fast-on
 - * Power line w/threaded studs
 - * Power line w/wire leads
 - * PCB mount
 - * Large case 3 Phase delta
 - * Large case 3 Phase wye
 - * IEC Inlet
- 2 Refer to drawing list per selected case style
- 3 Letter at the end of the part is found in the case style drawing list: A, B, C, D, E, F, etc.

Power Entry Modules, Power Line Filters & 3 Phase Power Filters Part Numbering System

Part Numbering System

Example: 60-BPR-060-5-4

Part number 60-BPR-060-5-4 represents a power entry module, bolt-in style with fast-on terminals, a current rating of 6 Amps, leakage current of 0.50 mA and capacitance of 0.047 μ F.

| 60 | - | BPR | - | 060 | - | 5 | - | 4 |
|---|---|--|---|-----------------|---|-------------------------|--------------|--------------------------------------|
| Product Line Series | | Product Style | | Current Rating | | Leakage Current (Y Cap) | | Capacitance (X Cap) |
| 60 = Power Entry Modules | | AFL = Appliance filter w/ inductive input | | 010 = 1.0 Amps | | 250 VAC | | 0 = none |
| 61 = Mini PCB Power Filters | | AFC = Appliance filter w/ capacitive input | | 015 = 1.5 Amps | | 0 = 0.075 mA | 0 = 0.035 mA | 1 = 0.01 μ F |
| 62 = Power Line Filters | | ARL = AFL plus bleeder resistor | | 016 = 1.6 Amps | | 1 = 0.01 mA | 1 = 0.005 mA | 2 = 0.022 μ F |
| 63 = Three Phase Power Line Filters | | BFF = Fused filter w/ Fast-on terminals | | 020 = 2.0 Amps | | 2 = 0.20 mA | 3 = 0.35 mA | 3 = 0.033 μ F |
| 64 = Fused or Switched & Fused Power Entry Filters (250V) | | BFS = Fused filter w/solder lug terminals | | 030 = 3.0 Amps | | 3 = 0.35 mA | 4 = 0.05 mA | 4 = 0.047 μ F |
| 65 = Fused or Switched & Fused Power Entry Filters (125V) | | BHP = High frequency bolt-in for PCB | | 040 = 4.0 Amps | | 4 = 0.10 mA | 5 = 0.50 mA | 5 = 0.050 μ F |
| 66 = Fused or Switched & Fused Low Leakage Power Entry Filters (250V) | | BHS = High frequency bolt-in w/solder lugs | | 050 = 5.0 Amps | | 5 = 0.50 mA | 6 = 0.60 mA | 6 = 0.068 μ F |
| 67 = Fused or Switched & Fused Low Leakage Power Entry Filters (125V) | | BPF = Bolt-In right angle terminals | | 060 = 6.0 Amps | | 6 = 0.60 mA | 7 = 0.70 mA | 01 = 2 x 0.01 μ F |
| 68 = Switched & Dual Fused Power Entry Filters | | BPL = Bolt-in w/wire leads | | 080 = 8.0 Amps | | 7 = 0.70 mA | 8 = 1.00 mA | 02 = 0.10 μ F & 0.22 μ F |
| 69 = Dual Fused Only or Dual Switched Only Power Entry Filters | | BPP = Bolt-in PCB mount | | 100 = 10.0 Amps | | 8 = 1.00 mA | 9 = 3.00 mA | 04 = 2 x 0.22 μ F |
| | | BPR = Bolt-in w/Fast-on tab terminals | | 150 = 15.0 Amps | | | | 06 = 2 x 0.4 μ F & 0.22 μ F |
| | | BPS = Bolt-in w/ solder lug terminals | | 160 = 16.0 Amps | | | | 10 = 0.15 μ F |
| | | BSF = Bolt-in switched & fused | | 200 = 20.0 Amps | | | | 11 = 0.10 μ F |
| | | MMF = Metal case w/fast-on tabs | | 300 = 30.0 Amps | | | | 12 = 0.22 μ F |
| | | MPC = Miniature printed circuit board | | 400 = 40.0 Amps | | | | 13 = 0.33 μ F |
| | | PMB = Metal case w/bolt-on terminals | | | | | | 14 = 0.47 μ F |
| | | PMF = Metal case w/Fast-on tabs | | | | | | 16 = 0.22 μ F & 2 x 0.33 μ F |
| | | PML = Metal case w/wire leads | | | | | | 21 = 1.00 μ F |
| | | PPF = Plastic case w/Fast-on tabs | | | | | | |
| | | PQF = Plastic case w/Fast-on tabs | | | | | | |
| | | PRF = Plastic case w/Fast-on tabs | | | | | | |
| | | SOF = Switched filter w/ Fast-on tabs | | | | | | |
| | | SOS = Switched filter w/ solder tabs | | | | | | |
| | | SPL = Snap-in w/wire leads | | | | | | |
| | | SPR = Snap-in w/Fast-on terminals | | | | | | |
| | | SPS = Snap-in w/solder lug terminals | | | | | | |
| | | SSF = Snap-in switched & fused | | | | | | |
| | | ARC = AFC plus bleeder resistor | | | | | | |

* Note: Not all series offer the product style, rating and leakage current



This product is ideal for applications within telecommunications, industrial, medical, avionic and military equipment including cellular base station, industrial processing, secure communications, defense systems and robotics where high current switching may occur. These components also offer a compact economic solution for any type of EMI issues.



- Low cost EMI solution
- Effective EMI performance from 100 kHz through 1.0 GHz
- Designed for bulkhead mounting, proper installation with a low impedance path from the mounting surface to case recommended for optimum performance
- Suitable for 0 - 400 Hz applications
- External discharge resistor recommended in application
- Operating temperature range: -40°C to +85°C without derating
- Can be used in both indoor and outdoor applications
- Excellent filtering in compact package
- Current ratings to 300 A
- Custom assemblies available upon request
- AC and DC models with Class Y4 caps
- C and Pi Configurations
- Bolt-in style with D-shaped bushing for easy installation
- UL approved and SEMKO approvals pending

Example: **52F226-041-63**

Represents a DC feed-through capacitor with a very high capacitance (470 nF) 63 A current rating.

EMI Power Filters

62

Commercial-Off-The-Shelf (COTS) Filters

Spectrum Control now offers COTS single line feed-through EMI filters that are the commercial equivalent to M15733-PRF/72, M15733-PRF/73 and M15733-PRF/74. These reliable AC and DC high performance filters meet all the requirements of the QPL equivalent. The filters provide an excellent source of filtering in a compact package and are well suited for the military and aerospace industries. They filter up to 500 A with an attenuation of 40 to 90 dB from 1 MHz to 1 GHz and voltage rating of 130 VDC to 250 VAC.

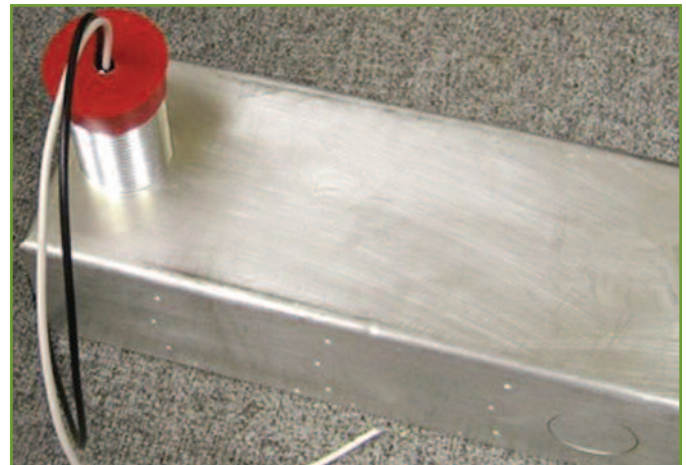
| MIL part M15733/ | Our Commercial Equivalent |
|------------------|---------------------------|
| 72-0034 | 5004-7053-100-A |
| 72-0046 | 5004-7053-100-A |
| 72-0049 | 5004-7059-100-A |
| 72-0053 | 5004-7065-100-A |
| 73-0034 | 5004-7058-125-A |
| 73-0043 | 5004-7053-100-A |
| 73-0043 | 5004-7058-125-A |
| 73-0046 | 5004-7052-125-A |
| 73-0049 | 5004-7058-125-A |
| 73-0051 | 5004-7059-250-A |
| 73-0053 | 5004-7064-125-A |
| 74-0030 | 5004-7041-250-A |
| 74-0036 | 5004-7047-250-A |
| 74-0042 | 5004-7053-250-A |
| 74-0045 | 5004-7059-250-A |

Shielded Filters

Spectrum has developed a new power filter product line which provides MRI/RF shielding solutions for medical, commercial and government applications. Offers 100 dB insertion loss per MIL-STD 220 from 14 KHz to 10 GHz.

Shielded Room Filters

| P/N Series | Configuration* | Description |
|------------|----------------|--------------------|
| 52-1490 | 1 x 5 | 1 x 5 A, 277 VAC |
| | 1 x 30 | 1 x 30 A, 277 VAC |
| | 1 x 100 | 1 x 100 A, 277 VAC |
| | 1 x 150 | 1 x 150 A, 277 VAC |
| | 1 x 200 | 1 x 200 A, 277 VAC |
| | 1 x 225 | 1 x 225 A, 277 VAC |
| | 2 x 0.5 | Speaker Filter |
| | 2 x 1 ALRM | Fire Alarm Filter |
| | 2 x 5 | 2 x 5 A, 277 VAC |
| | 2 x 20 | 2 x 20 A, 277 VAC |
| | 2 x 30 | 2 x 30 A, 277 VAC |
| | 2 x 50 | 2 x 50 A, 277 VAC |
| | 2 x 60 | 2 x 60 A, 277 VAC |



* Add to P/N series (eg. 52-1490-1x5)

Options are available with or without discharge light "L" at the end of the part (52-1490-1x5L). Custom configurations are available. Consult factory.



Military/Aerospace Multisection Filters

Spectrum Control will address virtually any requirement for a military/custom power product. Our engineering expertise and vertical integrations reduce your speed to market as well as saves you money. Our electromagnetic compatibility expertise in the tempest arena can help you meet MIL-F-15733 and MIL-STD 461 standard requirements.

Features

- High common and differential mode attenuation
- Standard designs up to 400 Amps
- Excellent insertion loss characteristics up to 10 GHz
- Voltage rating 115-250VAC and 400VDC up to 400 Hz
- Available to meet TEMPEST and FCC requirements
- Custom designs for application-specific requirements

Test Specifications

The high performance power line filters shown on pages 62 and 63 are designed to meet the following criteria.

The information shown can be used as a basis for filter specifications. (Contact factory for additional details).



Applications

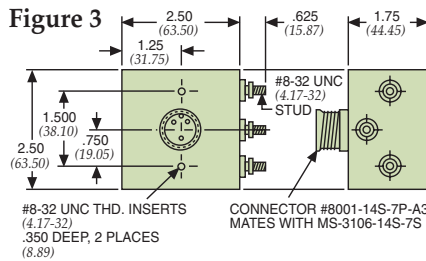
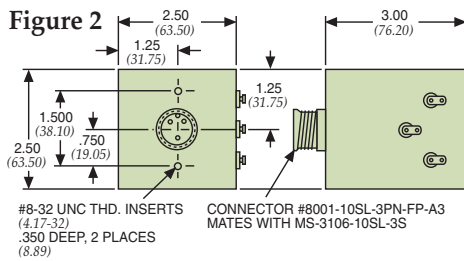
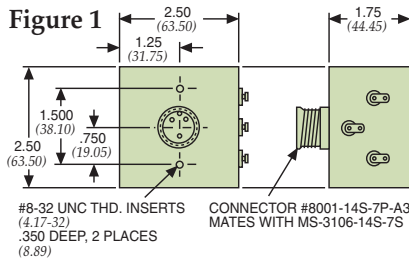
- Military
- Commercial and military/aerospace
- Secured communications
- Switching power supplies
- Data processing equipment
- Ruggedized computers
- Radar
- Electronic warfare
- Ground/air weapon systems
- Satellites
- Ship board systems
- Land based vehicles
- Fixed and mobile control stations

| Test Group | Order of Test | Examination or Test | Test Method (Per MIL-STD-202) | Post Test Requirements |
|------------|---------------|---------------------------|--|---|
| IIA | 1 | Voltage Drop | Paragraph 4.6.8 of MIL-F-15733 | Three percent of rated voltage max. |
| | 2 | Leakage Current | UL 1283 | Per applicable specification |
| | 3 | Temperature Rise | MIL-F-15733 Paragraph 4.6.4 | 25°C max. |
| | 4 | Terminal Strength | Method 211, Condition A | No evidence of loosening or rupture. 5 lb. applied force. Line Cords: 35 Lbs. |
| IIB | 1 | Shock, Medium Impact | Method 213, Condition G | Must pass DWV and Insertion Loss |
| | 2 | Vibration, High Frequency | Method 204, Condition A | Monitor for shorts or open |
| | 3 | Thermal Shock | Method 107, Test Condition A | Pass 90% DWV IR to be 30% of initial |
| | 4 | Humidity | Method 107, Condition B, except temperature equals 25°C | Pass 90% DWV IR to be 30% of initial |
| III | 1 | Life | Method 108, Condition D 1.2 x Rated AC voltage at max. operating temp. or 1.4 x DC voltage | Pass 90% DWV insulation resistance to be 30% of initial. |



Military/Aerospace Multisection Filters

Mechanical Dimensions



Circuit Schematics

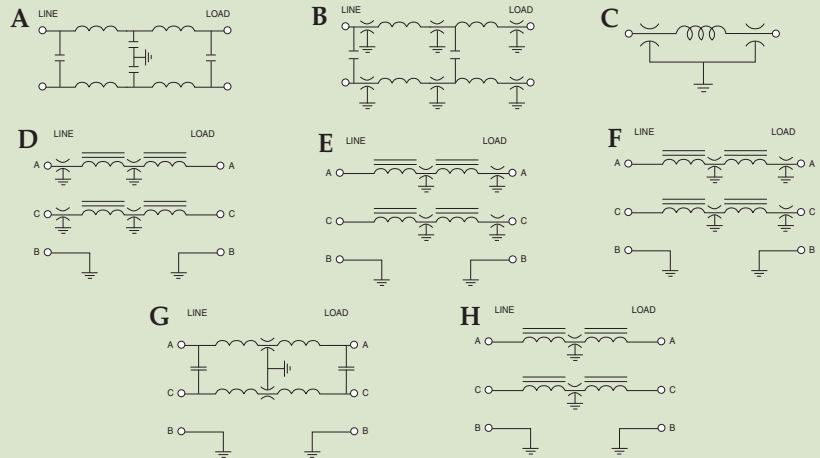


Figure 4

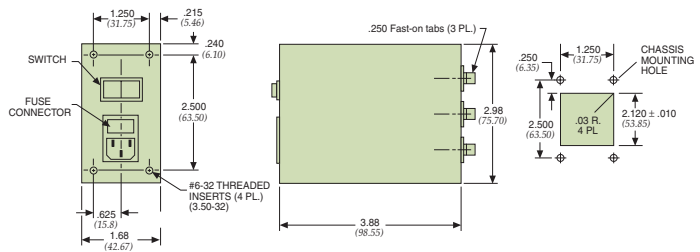


Figure 5

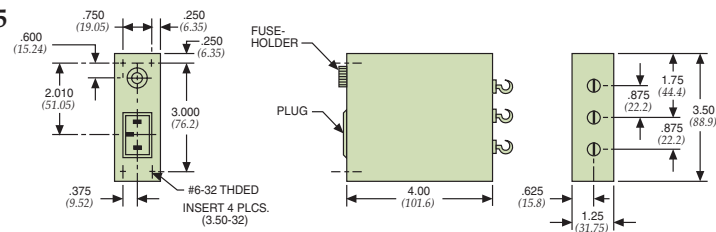
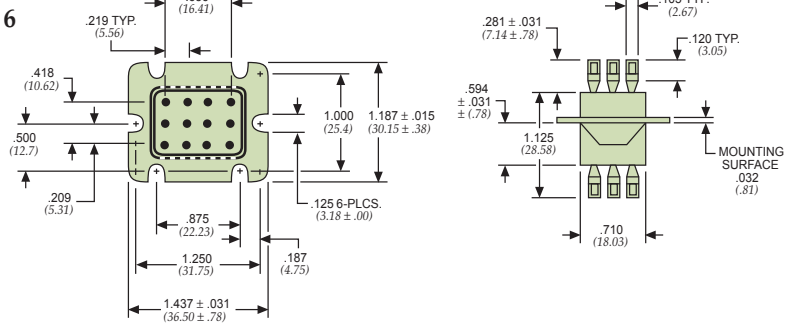


Figure 6



| Model | Current Rating | Voltage Rating | Insertion Loss Min. (db) | | | | | | | DCR max. (ohms) | Leakage Current (max.) | Figures | Current Schematic |
|------------|----------------|---------------------------|--------------------------|---------|---------|-----|------|-------|-------|-----------------|------------------------|---------|-------------------|
| | | | 50 KHz | 150 KHz | 300 KHz | 1 M | 10 M | 100 M | 1 GHz | | | | |
| 52-378-001 | 3 Amps | 240VAC 60 Hz Line to Line | 30 | 60 | 70 | 80 | 80 | 70 | 70 | .30 | 50 mA | 1 | D |
| 52-378-005 | 3 Amps | 240VAC 60 Hz Line to Line | 40 | 70 | 80 | 80 | 80 | 70 | 60 | .30 | 50 mA | 1 | E |
| 52-523-002 | 5 Amps | 120/240VAC 60 Hz | — | 55 | 60 | 80 | 80 | 70 | 60 | .25 | 1 mA | 5 | B |
| 52-378-002 | 5 Amps | 240VAC 60 Hz Line to Line | 34 | 64 | 70 | 80 | 80 | 70 | 70 | .20 | 50 mA | 1 | D |
| 52-378-004 | 5 Amps | 240VAC 60 Hz Line to Line | 24 | 64 | 70 | 80 | 80 | 70 | 70 | .20 | 50 mA | 1 | E |
| 52-387-012 | 5 Amps | 240VAC 60 Hz Line to Line | 34 | 64 | 70 | 80 | 80 | 70 | 70 | .20 | 5 mA | 2 | G |
| 52-600-001 | 5 Amps | 120/240VAC 60 Hz | 33 | 65 | 80 | 80 | 80 | 80 | 60 | .20 | 1 mA | 4 | A |
| 52-387-010 | 10 Amps | 240VAC 60 Hz Line to Line | 24 | 60 | 70 | 80 | 80 | 70 | 70 | .20 | 50 mA | 2 | F |
| 52-600-002 | 10 Amps | 120/240VAC 60 Hz | — | 50 | 70 | 80 | 80 | 70 | 60 | .10 | 1 mA | 4 | A |
| 1212-0502 | 10 Amps | 350VDC 240VAC 60 Hz | — | — | — | — | 20 | 65 | 70 | .01 | 1 mA | 6 | C |
| 52-409-001 | 14 Amps | 240VAC 60 Hz Line to Line | 14 | 30 | 45 | 80 | 80 | 70 | 60 | .04 | 50 mA | 3 | H |

For complete specs and drawings, visit www.SpecEMC.com/multi

EMI Power Filter Solutions

Custom Application-Specific Designs

Rarely does a 100% off-the-shelf power filter completely satisfy the mechanical, electrical and power requirements and constraints of a sophisticated OEM design. Yet for many the term custom is intimidating, implying long lead times and higher costs. At Spectrum Control, we're focused on providing a complete solution that takes all factors into consideration. Whether modifying an existing power filter design, working from a "clean sheet" approach, or integrating various technologies into a subassembly, the resulting Spectrum custom solution will be tailored to your project's design, logistic and budgetary requirements.

Application - Specific Options

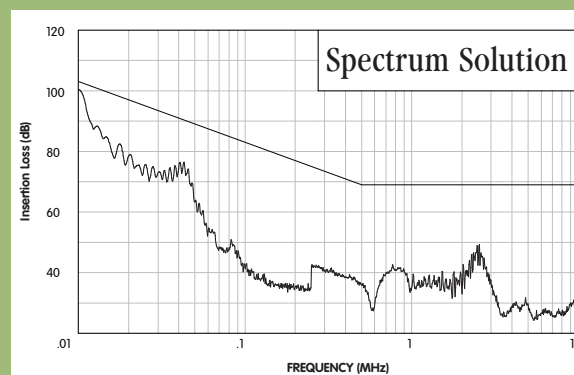
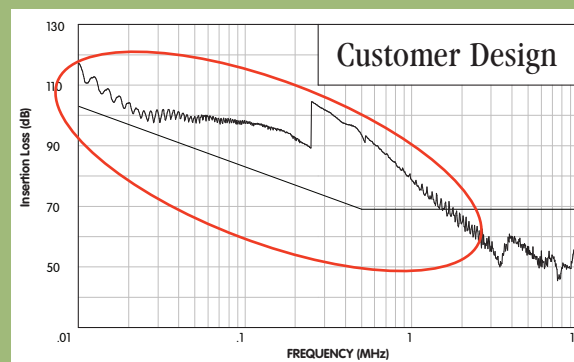
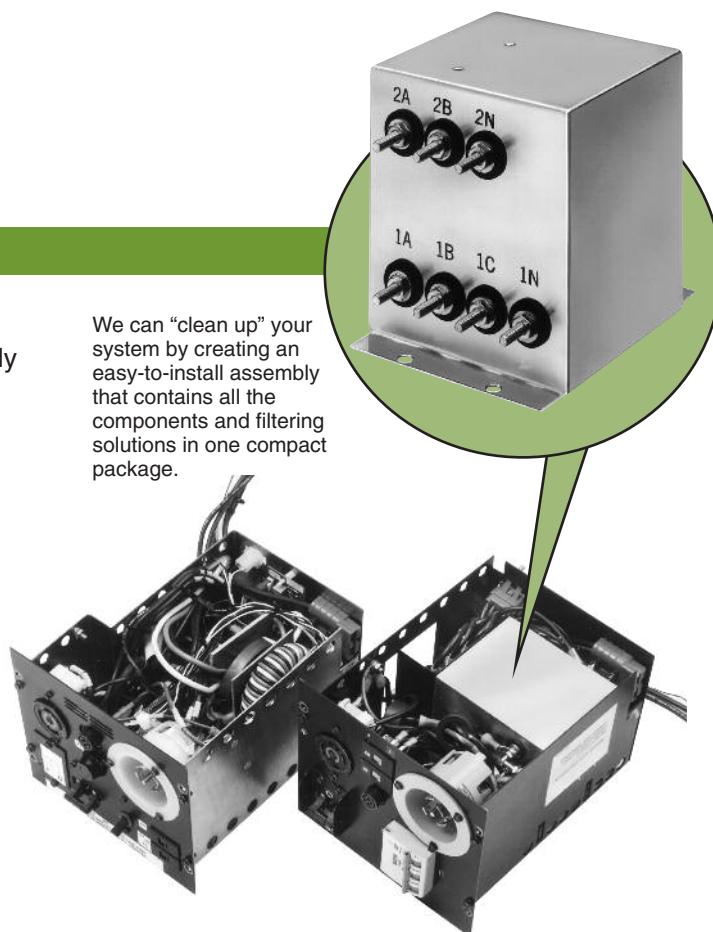
- EMI filtering
- Power distribution
- Transient protection
- Indicator lights
- Circuit breaker protection
- Leads or studs
- Voltage cut-off
- Agency approvals
- Reverse polarity

EMI Testing...Finding the Problem

Integral to finding a solution to an EMC problem is the ability to test for compliance. We conduct a wide range of EMC and environmental tests to help us identify potential problems and recommend design solutions. Our extensive in-house test capabilities allow for a faster turnaround of your complete design solution and lower total cost.

- In-house anechoic chamber and shielded room
- Baseline of device under ambient-free anechoic chamber
- NARTE certified engineering staff
- Highly accurate computer controlled instrumentation accumulates and presents data in multiple formats
- Testing for MIL standards, European emissions and immunity regulations, and FCC Part 15 (market specific detail on following pages).

We can "clean up" your system by creating an easy-to-install assembly that contains all the components and filtering solutions in one compact package.



EMI Power Filter Solutions

Military and Aerospace

Spectrum Control has a long history of partnering with leading suppliers of the defense industry. Our ability to find solutions to suppress or eliminate electromagnetic interference (EMI) allows us to provide the high reliability filters required for military and aerospace applications. Spectrum can design your custom filter with a unique mechanical package for those unusual or tight fitting spaces, higher performance filtering and the voltage rating you need to address all of your AC and DC power issues.

Communications

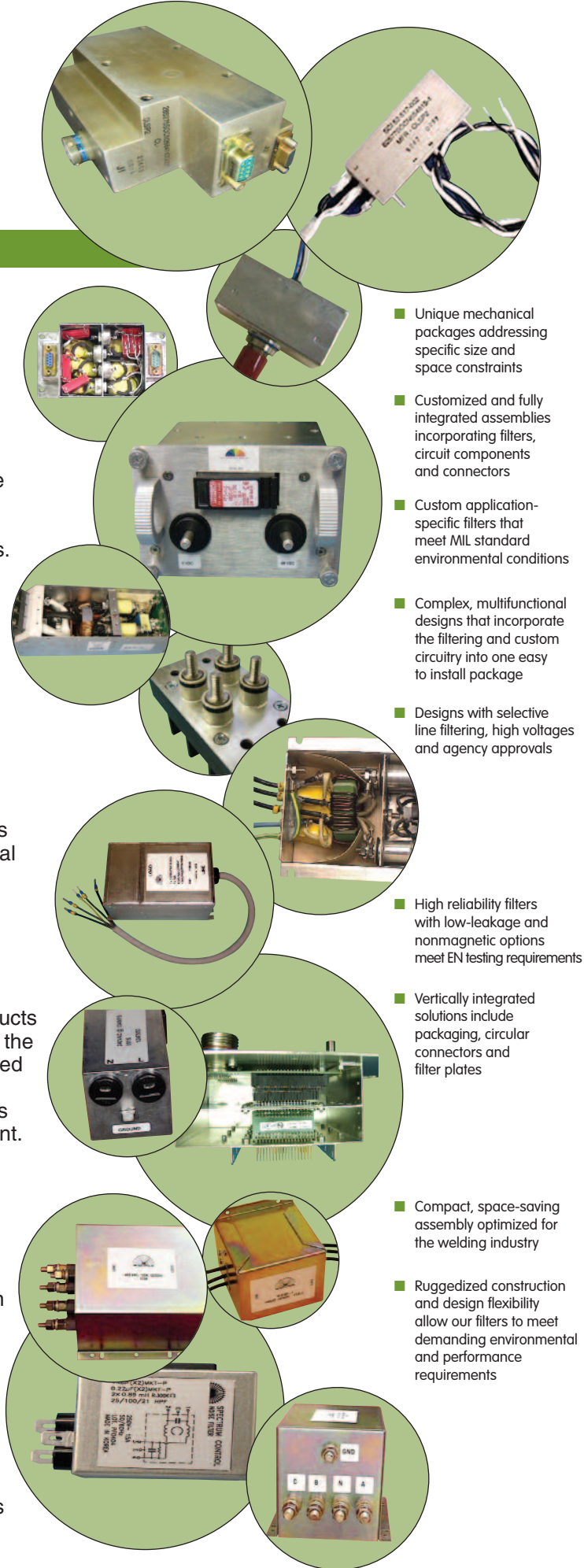
Spectrum's power filter solutions can create an agency-approved product that will filter and condition the power to your communications infrastructure equipment, as well as eliminate emissions that can contaminate your distributed AC and DC power. Our custom power filters will incorporate all the components and the filtering in one complete package to save you space, time and money. And as a vertically integrated supplier, Spectrum offers global low cost manufacturing which allows us to produce fast prototypes and a quicker time to market.

Medical

Our many years of experience in providing EMI/RFI solutions has given us the know-how to design products to meet the specific constraints and requirements of the medical industry. Much of the medical equipment used today requires complete suppression of any and all EMI, as well as low-leakage, nonmagnetic properties to prevent negatively affecting surrounding equipment. We will design and build a high reliability, high performance custom power filter to meet your system and all EN requirements.

Industrial

At Spectrum, we do everything from package design and metalworking to EMI filtering to EMC testing, which means a lower cost for you. Our engineers will design and build a custom power filter that will satisfy global EMC regulations, improve speed-to-market times, overcome space constraints and withstand harsh environmental conditions. Our plug-and-play designs cover a range of industrial and instrumentation applications that will address any of your power filtering needs with current ratings as high as 500 Amps.



- Unique mechanical packages addressing specific size and space constraints
- Customized and fully integrated assemblies incorporating filters, circuit components and connectors
- Custom application-specific filters that meet MIL standard environmental conditions
- Complex, multifunctional designs that incorporate the filtering and custom circuitry into one easy to install package
- Designs with selective line filtering, high voltages and agency approvals
- High reliability filters with low-leakage and nonmagnetic options meet EN testing requirements
- Vertically integrated solutions include packaging, circular connectors and filter plates
- Compact, space-saving assembly optimized for the welding industry
- Ruggedized construction and design flexibility allow our filters to meet demanding environmental and performance requirements

Power Film Capacitors

Spectrum Control introduces its new line of power film capacitors, designed using the latest film technology to achieve maximum capacitance density. Available in application-specific packages and terminations, these new power film capacitors feature rugged construction to withstand even the harshest environments.

Features and Specifications

- Metallized: polyester, polypropylene and polyphenylene sulphide film dielectrics
- Temperature ratings -55°C up to + 150°C
- Low ESR and ESL construction
- Rugged construction for even the harshest environments
- In-house electrical, environmental and reliability testing verification
- Standard designs up to 20,000 VDC/ 750 VAC
- Standard capacitance values up to 10,000 µF



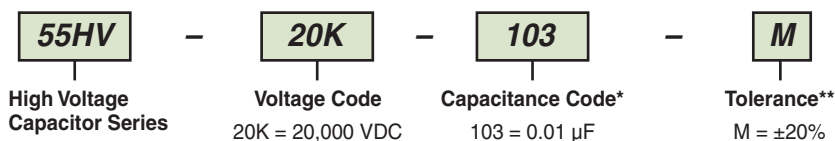
Applications

- Renewable energy inverters – solar converters, wind turbines and fuel cells
- Electric vehicle power conversion and battery chargers
- Aircraft power conversion systems
- Radar systems, laser pulse power
- Industrial welders, elevators, rail traction drives
- High voltage power supplies, switching power supplies
- Medical imaging equipment, defibrillators

Model Features & Ordering Information

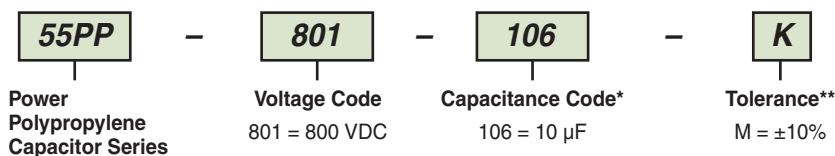
High Voltage Capacitor Series

- Metallized polyester
- Flame retardant tape wrap and epoxy end fill
- Temperature -55°C to + 125°C
- Voltages up to 20,000 VDC



High Power Capacitor Series

- Metallized polypropylene, low loss
- Flame retardant tape wrap and epoxy end fill
- Axial leads or tab termination
- Low ESL & ESR design for high ripple currents
- Temperature -55°C to +105°C
- Voltages up to 2,000 VDC
- Capacitance 1-100 µF



* Capacitance in Picofarads. The first two digits are significant and the third represents the number of zeros.

** Indicates standard tolerance. Others available upon request.

55DC Link Series Power Film Capacitors

Spectrum's high reliability DC link capacitors are ideal for power inverter applications which require superior life under harsh operating conditions, such as electric vehicle power conversions, battery chargers, aircraft power conversion systems and radar systems. Featuring a compact and cost-effective design, DC link capacitors are manufactured from segmented, self-healing metallized polypropylene, resulting in longer life expectancy (+100,000 hrs). With high capacitance density and ripple current capabilities, Spectrum's DC link capacitors are the ideal replacement for electrolytic capacitors.

Specifications

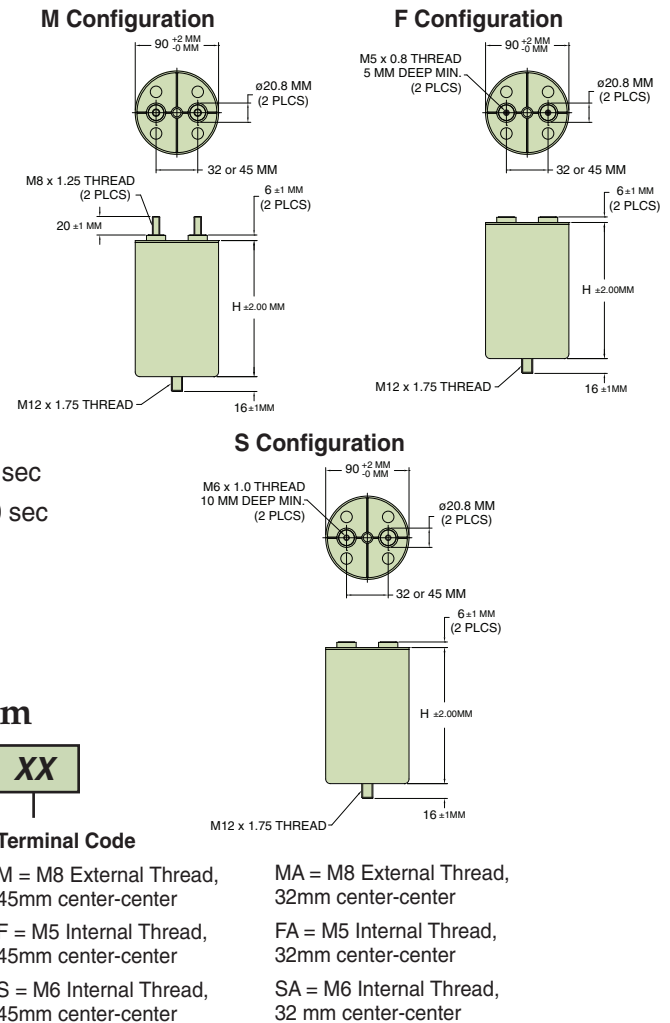
- Capacitance range: 160 μ F to 680 μ F standard (others available upon request)
- Capacitance tolerance: $\pm 10\%$ standard
- Rated voltage: 900 to 1300 VDC
- Operating temperature range: -55°C to $+85^{\circ}\text{C}$ standard ($+105^{\circ}\text{C}$ upon special request)
- Test voltage between terminals: 150% rated voltage for 10 sec
- Test voltage between terminals and housing: 5kVDC for 10 sec
- Enclosure/construction: aluminum housing, brass terminals with dry resin, UL 94V-0 encapsulant
- Low ESR and ESL
- RoHS compliant

55DC Link Series Part Numbering System

| | | | | | | |
|-------------|---|----------------|---|-------------------|---|--|
| 55DC | - | 901 | - | 321 | - | XX |
| Series | | Voltage | | Capacitance | | Terminal Code |
| | | 901 = 900 VDC | | 321 = 320 μ F | | M = M8 External Thread, 45mm center-center |
| | | 112 = 1100 VDC | | 441 = 440 μ F | | F = M5 Internal Thread, 45mm center-center |
| | | 132 = 1300 VDC | | | | S = M6 Internal Thread, 45mm center-center |



Dimensions



| Part Number | Rated Voltage (VDC) | Capacitance (μ F) | D Diameter (mm) | Height H (mm) | Typ ESR (mOhms) | Typ ESL (nH) | Irms Max. (A) M | Weight (kg) |
|-----------------|---------------------|------------------------|-----------------|---------------|-----------------|--------------|-----------------|-------------|
| 55DC-901-321-XX | 900 | 320 | 90 | 97 | 2.1 | 50 | 60 | 0.80 |
| 55DC-901-441-XX | 900 | 440 | 90 | 120 | 1.8 | 60 | 60 | 1.00 |
| 55DC-901-561-XX | 900 | 560 | 90 | 145 | 2.1 | 60 | 60 | 1.10 |
| 55DC-901-681-XX | 900 | 680 | 90 | 170 | 2.5 | 80 | 60 | 1.30 |
| 55DC-112-221-XX | 1100 | 220 | 90 | 97 | 2.5 | 50 | 60 | 0.90 |
| 55DC-112-281-XX | 1100 | 280 | 90 | 120 | 2.1 | 50 | 60 | 1.20 |
| 55DC-112-361-XX | 1100 | 360 | 90 | 145 | 1.9 | 60 | 60 | 1.30 |
| 55DC-112-421-XX | 1100 | 420 | 90 | 170 | 2.3 | 80 | 60 | 1.30 |
| 55DC-132-161-XX | 1300 | 160 | 90 | 97 | 2.1 | 50 | 60 | 0.80 |
| 55DC-132-211-XX | 1300 | 210 | 90 | 120 | 1.9 | 50 | 60 | 1.00 |
| 55DC-132-251-XX | 1300 | 250 | 90 | 145 | 2.5 | 60 | 50 | 1.20 |
| 55DC-132-321-XX | 1300 | 320 | 90 | 170 | 2.8 | 80 | 53 | 1.30 |

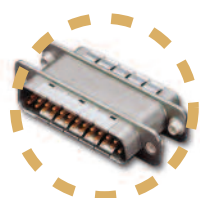


Instant Inventory Information

Check Stock will provide you with distributor names, part numbers, quantity on hand, online ordering capability and the last date inventory was updated for that particular component.

Project Starter

Design your product to meet the exact requirements of your application. Project Starter allows you to choose from multiple configurations to get a product that will best meet your application needs and you can even request a drawing, sample or quote of your custom product.



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About API Technologies Corporation:

API Technologies, a publicly traded company (NASDAQ: ATNY), designs, develops and manufactures electronic systems, subsystems, RF and secure solutions for technically demanding applications in the defense, aerospace and commercial industries.



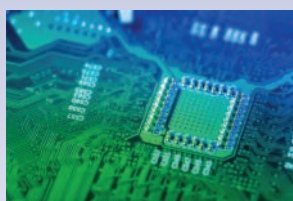
Systems & Subsystems Solutions

- Components & Subsystems
 - MIL-STD-1553
 - Custom Hybrids
- Engineered Systems
- Engineering Services
- Power Solutions
 - AC-AC Converters
 - DC-DC Converters
 - Custom Power Supplies



RF Solutions (RFS)

- RF & Microwave Filters
- Microwave Components
- IMAs
- Frequency Sources
- Integrated Solutions
- Coaxial Filters & Interconnects
- Power Filters
- Film Capacitors
- Specialty Connectors
- Antennas
- Advanced Ceramics
- Precision Sensors
- Inertial Measurement Systems
- Gyros



Electronics Manufacturing Services (EMS)

- New Product Introduction (NPI) & Rapid Prototyping
- Electronics Manufacturing
- Substrate Manufacturing
- Mechanical Production
- Design Engineering (DfM)
- Integration & Testing



Secure Systems & Information Assurance Solutions (SSIA)

- Encryption
- Secure Access
- Information Assurance
- TEMPEST & Emanation Security