Amphenol® RF

SMPM Product Series Solutions Guide

Board-to-Board and Cable-to-Board Solutions

ABOUT AMPHENOL RF

Amphenol RF, a division of Amphenol Corporation, is the largest manufacturer of radio frequency connectors, coaxial adapters and RF cable assemblies in the world.

With a global team of experienced engineers, Amphenol RF is able to offer the broadest portfolio of standard RF products on the market today.

As a leader in design and manufacturing of RF interconnect products, our dedicated team of engineers specialize in custom product development to meet the challenges of design-specific constraints.

GLOBAL PRESENCE

With a global presence, Amphenol RF has experienced engineers and production capabilities in multiple regions across the globe. Our experienced cross-functional teams oversee the entire process from the initial design through delivery, and beyond.

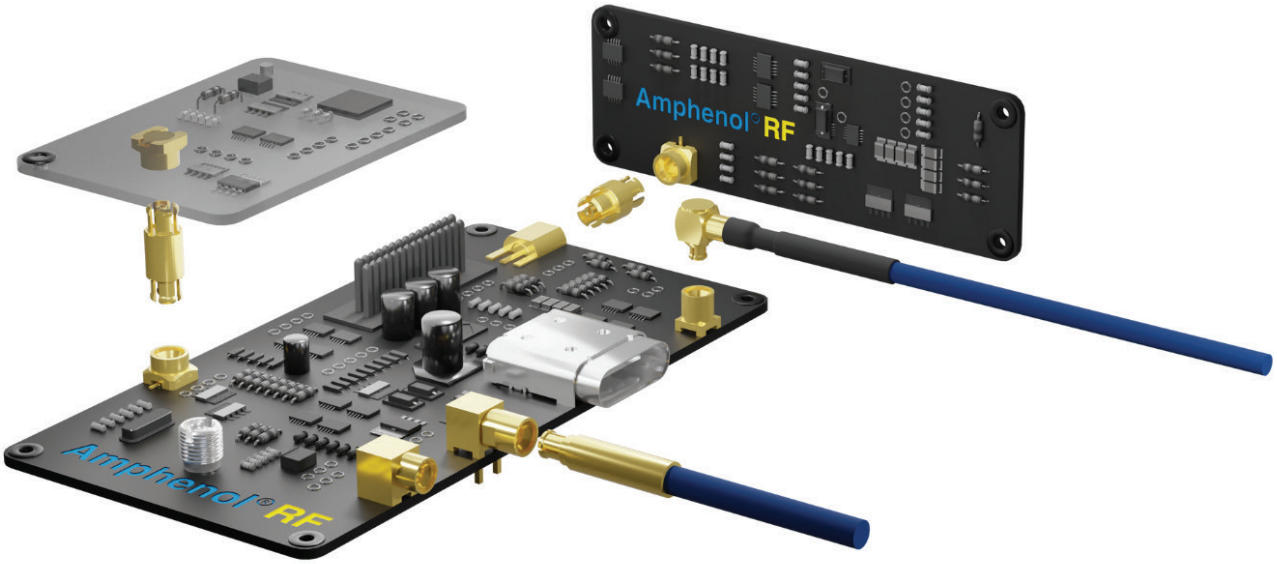
Amphenol RF has a global footprint of operations in North America, Europe and Asia.

SMPM PRODUCT SERIES

The SMPM interface is a micro-miniature interface with a frequency range of DC to 65 GHz. It is commonly used in miniaturized high frequency coaxial modules and is offered in both push-on and snap-on mating styles.

The full detent and smooth bore mating systems provide respective levels of engagement/disengagement forces. This family of interconnects addresses small package design needs; it can be utilized as a highly shielded interconnect for high data rate applications or in a board-to-board system using a floating bullet adapter. This floating bullet provides a link between mated pairs compensating for both radial and axial misalignment.

Available in a cable-to-board mated pair, the plug side can be provided in either right-angle or straight with termination capability to either 0.047” or 0.086”, semi-rigid or conformable coax. The receptacles are designed for surface, through hole, or end launch mounting.



The SMPM product series is available in a variety of board-to-board and cable-to-board configurations for versatile design capabilities.

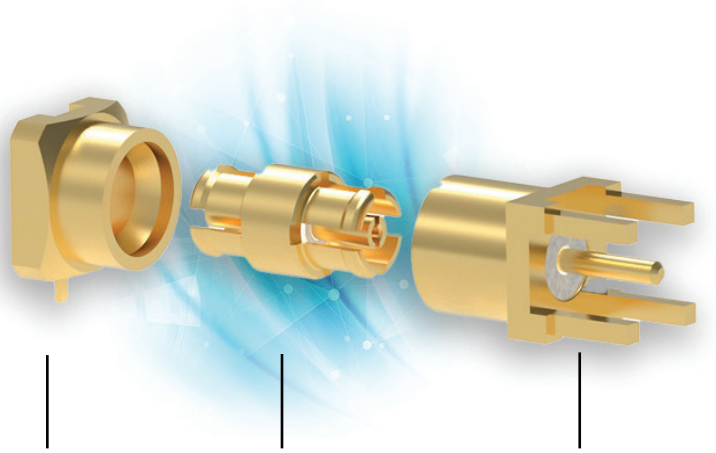
FEATURES AND BENEFITS

- Nominal impedance: 50Ω
- Frequency range up to 40 GHz (DC – 65 GHz on Extended Range Designs)
- Minimum board-to-board distance: 6.6 mm
- Axial misalignment: 0.25 mm
- Radial misalignment: 3° (Function of bullet length)
- Different detent types: smooth bore, full detent
- Mating cycles: Full detent: ≥ 100; Smooth Bore: ≥ 500
- Interface dimensions per MIL-STD-348
- High density mounting potential due to minimum pitch and board-to-board distances
- Push/snap-on locking for fast and easy disconnection
- Automatic and cost-effective assembly with tape and reel packaging options

APPLICATIONS

- Antennas
- Broadband
- Military
- Instrumentation
- Test and Measurement
- Medical
- Quantum Computing
- Handheld and Portable Devices

BOARD-TO-BOARD MATING CONFIGURATION



Smooth Bore with Gathering Cone Interface

Bullet Adapter

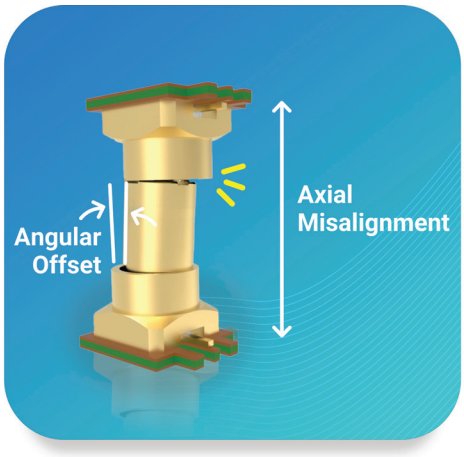
Full Detent Interface Hold Bullet

BOARD-TO-BOARD SOLUTIONS

The SMPM connector series offers a board-to-board solution delivering consistent performance through 26.5 GHz. PCB optimization analysis also allows for enhanced performance up to 65 GHz for some connector designs. This dependable mating system utilizes a three-piece configuration and is focused on keeping a consistent RF signal with up to 4° radial float angle and 0.010" (0.25 mm) axial float.

PCB spacing varies depending upon the PCB jack design and the bullet adapter length, with minimum achievable nominal spacing of 9.91 mm.

This performance focus makes SMPM connectors a good choice for military, measurement and quantum computing applications.



CABLE-TO-BOARD SOLUTIONS

The SMPM connector series offers cable-to-board mated pairs. The plug side can be provided in either straight or right-angle with termination capability to either 0.047 or 0.086 inch, semi-rigid or conformable coax cable. The receptacles are designed for surface, through-hole or end launch mounting.

NON-MAGNETIC PRODUCTS

Ideal for medical, aerospace and quantum computing applications, non-magnetic SMPMs offer high-performance with low magnetic field susceptibility and no electric field distortion. Materials and plating are confirmed to be non-magnetic in nature and provide the same reliable connections for board-to-board or cable-to-board interconnect products.

MANUFACTURING & MATERIALS

SMPM connectors are manufactured using the latest high-speed efficient methods. Proven designs include stamped contacts and bullet adapter bodies, and injection molded insulator-contact components. These methods, coupled with extensive RF engineering analysis, provide consistent high-performing interconnect products.

These connectors are available in beryllium copper, brass or stainless steel bodies with gold, nickel or passivated plating. The contacts are manufactured from either beryllium copper or brass.

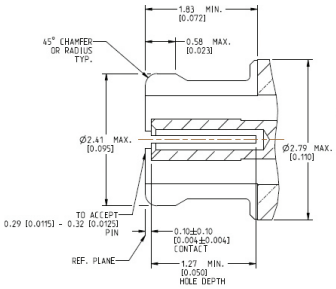
HFSS PCB OPTIMIZATION MODELS

Amphenol RF strives to provide engineers with the tools they need to design the best applications for our products to work in. Because of the endless number of PCB design options, HFSS 3D component models are available, allowing our users to optimize their board launch designs. Designs are available on our website for many of our SMPM products, with new models being added all the time.

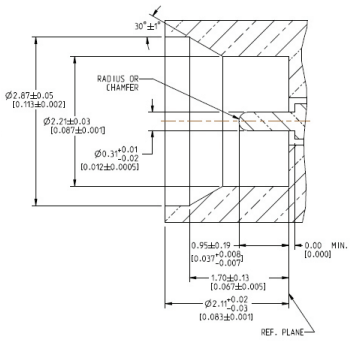
SMPM PRODUCT SERIES

INTERFACE DIMENSIONS

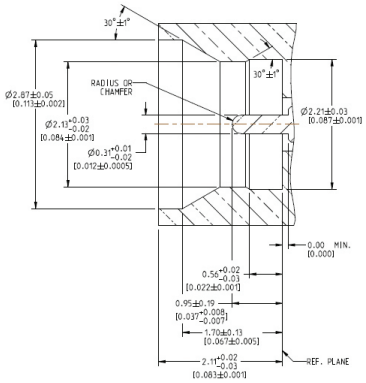
Plug



Jack (smooth bore)



Jack (full detent)



PCB MOUNT CONNECTORS

SMPM PCB mount connectors are available in straight and right-angle smooth bore or full detent jack configurations with surface mount (SMT) contact termination in a variety of body styles. This board-to-board solution is designed to maximize radial and axial float, eliminating the need for cables between boards and simplifying designs to eliminate assembly errors. Most of these connectors are sold in either individual or tap and reel packaging.

Connector Body Types

Full Detent - A full detent has an undercut that the female tines snap into, allowing for secure mating.
Smooth Bore – A smooth bore interface does not use an undercut. The female tines compress to ensure a secure connection.

Straight Jacks with Male Contact – Full Detent

Part Number	Packaging Type	Body Mount	Max Frequency (GHz)	Image
925-126J-51P	Individual Bag	End Launch	40	
925-138J-51P	Individual Bag	Through Hole	40	
925-143J-51P	Individual Bag	Surface Mount	10	
925-143J-51PT	Tape & Reel	Surface Mount	10	
925-196J-51PT	Tape & Reel	Surface Mount	26.5	

Straight Jacks – Full Detent (continued)

Part Number	Packaging Type	Body Mount	Max Frequency (GHz)	Image
925-196J-51P	Individual Bag	Surface Mount	26.5	
925-202J-51P	Individual Bag	Through Hole	26.5	
925-202J-51PT	Tape & Reel	Through Hole	26.5	
925-204J-51P	Individual Bag	Surface Mount	10	
925-204J-51PT	Tape & Reel	Surface Mount	10	

Straight Jacks with Male Contact – Smooth Bore

Part Number	Packaging Type	Body Mount	Max Frequency (GHz)	Image
925-137J-51P	Individual Bag	Through Hole	40	
925-144J-51P	Individual Bag	Surface Mount	10	
925-144J-51PT	Tape & Reel	Surface Mount	10	
925-169J-51P	Individual Bag	End Launch	40	
925-169J-51PT	Tape & Reel	End Launch	40	
925-197J-51P	Individual Bag	Surface Mount	26.5	
925-197J-51PT	Tape & Reel	Surface Mount	26.5	

SMPM BULLET ADAPTERS

SMPM bullet adapters are mated between a smooth bore and a full detented jack. The detented jack retains the bullet while the smooth bore jack allows for a degree of freedom. The floating bullet provides a link between mated pairs in order to compensate for any radial and axial misalignment.

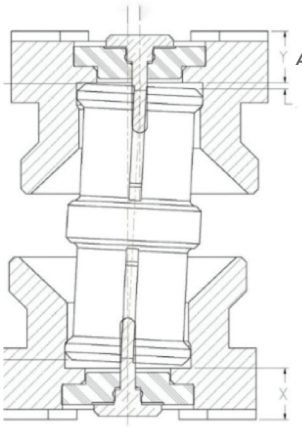
All SMPM bullet adapters are non-magnetic and compatible with all Amphenol RF non-magnetic plug and jack connectors.

Part Number	Length
925-106A-51S	5.33 mm
925-207A-51S	6.42 mm
925-141A-51S	7.06 mm
925-142A-51S	8.38 mm
925-165A-51S	8.48 mm
925-166A-51S	12.7 mm
925-167A-51S	13.3 mm

925-165A-51S

925-166A-51S

How to Calculate Minimum PCB Spacing



Steps

1. Look at the product drawing and determine the dimension labeled as “X”
2. Look at the product drawing for the second connector and determine the dimension labeled as “Y”
3. Set the length of the bullet adapter as “Z”
4. Add X+Y+Z = Minimum PCB Spacing

CABLE MOUNT

SMPM cable-to-board solutions are available in straight or right-angle plug configurations with termination capabilities to 0.047” or 0.086” semi-rigid or conformable coaxial cable. These receptacles are designed for surface, through hole or end launch mounting.

Cable Plugs with Female Contact - Straight

Part Number	Cable Type	Body	Contact	Image
925-118C-51S	0.085-Inch Conformable	Solder	Solder	
925-124P-51S	0.047-Inch Conformable	Solder	Solder	
925-129C-51S	RG-178	Crimp	Solder	

Cable Plugs with Female Contact – Right-Angle

Part Number	Cable Type	Body	Contact	Image
925-120C-51R	0.047-Inch Conformable	Solder	Solder	
925-123C-51A	0.085-Inch Conformable	Solder	Solder	
925-128C-51A	RG-178	Crimp	Solder	

NON-MAGNETIC SMPM

Non-magnetic SMPM connectors offer a compact and reliable solution for high-frequency signal transmission without the presence of magnetic materials in their construction. They find extensive use in industries such as medical devices, aerospace and military, where avoiding magnetic interference is critical for equipment functionality and safety.

PCB Straight Jacks with Male Contact

Part Number	Packaging Type	Body Mount	Max Frequency (GHz)	Image
925-NM196J-51P	Individual bag	Surface Mount	26.5	
925-NM197J-51P	Individual bag	Surface Mount	26.5	

View all compatible SMPM Bullet Adapters

CABLE ASSEMBLIES

SMPM coaxial cable assemblies are used in various industries for high-frequency signal transmission and connectivity. These assemblies play a crucial role in ensuring reliable and efficient communication in applications such as telecommunications, aerospace and test and measurement equipment. SMPM coaxial cable assemblies are used to connect antennas, radios and other RF devices, facilitating the transmission of data, voice or video signals with minimal loss and interference. Their compact size, durability and superior electrical performance make them essential for high-frequency applications where signal quality and precision are paramount.

Part Number	Cable Configuration	Cable Type	Image
095-725-111XXXX	SMPM Straight Plug to SMPM Straight Plug	0.085-Inch Conformable	
095-725-112XXXX	SMPM Straight Plug to SMPM Straight Plug	0.047-Inch Conformable	
095-725-127XXXX	SMPM Straight Plug to SMPM Straight Plug	Times Microwave Tflex 405	
095-725-128XXXX	SMPM Right-Angle Plug to SMPM Straight Plug	Times Microwave Tflex 405	

TECHNICAL SPECIFICATIONS

Electrical

Impedance	50Ω
Frequency Range	DC - 26.5 GHz (DC - 65 GHz on Extended Range Designs)
Dielectric Withstanding Voltage	325 VRMS Min
VSWR (Return Loss)	DC - 10 GHz 1.15 (-23 dB) Max
	10 - 26.5 GHz 1.25 (-19 dB) Max
	26.5 - 50 GHz 1.35 (-16 dB) Max
Insulation Resistance	5000 MΩ Min
Center Contact Resistance	6 mΩ Max
Outer Contact Resistance	2 mΩ Max
RF Leakage (Interface)	-85 dB Max (DC - 4 GHz)
Insertion Loss	.1 √(f(GHz)) dB Max
Power Handling	16 W @ 1 GHz @ 25°C

Environmental

Temperature Range	−65°C to +165°C
Thermal Shock	MIL-STD-202, Method 107, Condition B
Corrosion	MIL-STD-202 Method 101 (Test Condition B) - 5% Salt Solution
Vibration	MIL-STD-202, Method 204, Condition B
Mechanical Shock	MIL-STD-202, Method 213, Condition A
Moisture Resistance	MIL-STD-202, Method 106

Mechanical

Mating Cycles	Full Detent: 100 Min; Smooth Bore: 500 Min.
Coupling Mechanism	Push-On
Interface Specification	MIL-STD-348
Engagement Force	≤ 15N
Disengagement Force	≤ 2N
Mechanical Misalignment	Axial 0.25 mm
	Radial (Function of Bullet Length) 3°
	Min Board to Board Distance 6.6 mm

Note: Technical specifications are typical and may vary by specific part number and design. See component drawing for additional details.

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