

Amphenol® RF



HD-EFI 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.

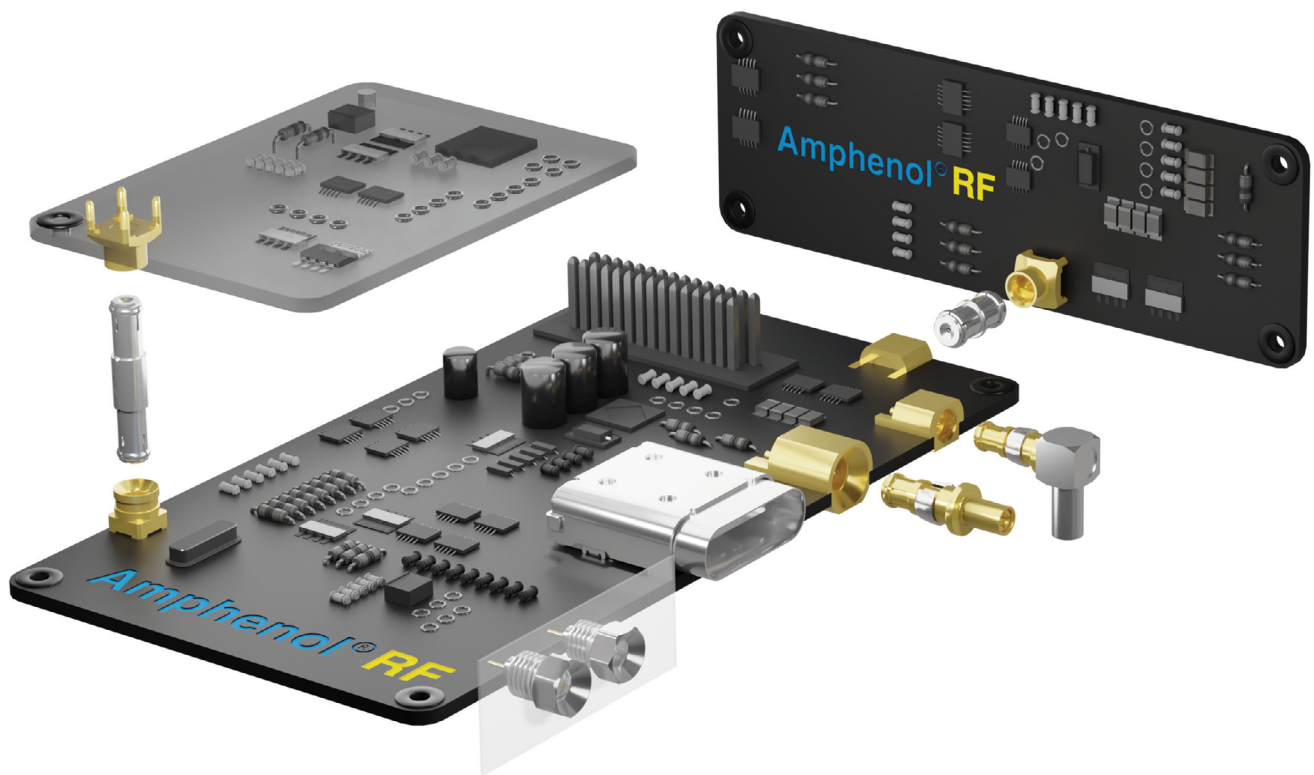
Amphenol RF has a global footprint of operations in North America, Europe and Asia.

HD-EFI PRODUCT SERIES

The HD-EFI product series is a micro-miniature interface designed to allow large board tolerance stack ups, blind mating and multiple RF lines. It is available in common PCB jack and cable plug configurations with an assortment of bullet adapters to accommodate many board-to-board spacing options.

The HD-EFI interface is a proprietary design allowing for a very stable RF signal over the full axial range of the connector system. It has a generous float to compensate for the axial and radial misalignment tolerance common in small package sized applications.

This interface is available as a 50 ohm connector system with reliable electrical performance up to 6 GHz which makes it ideal for high-performance applications with a small package size.



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

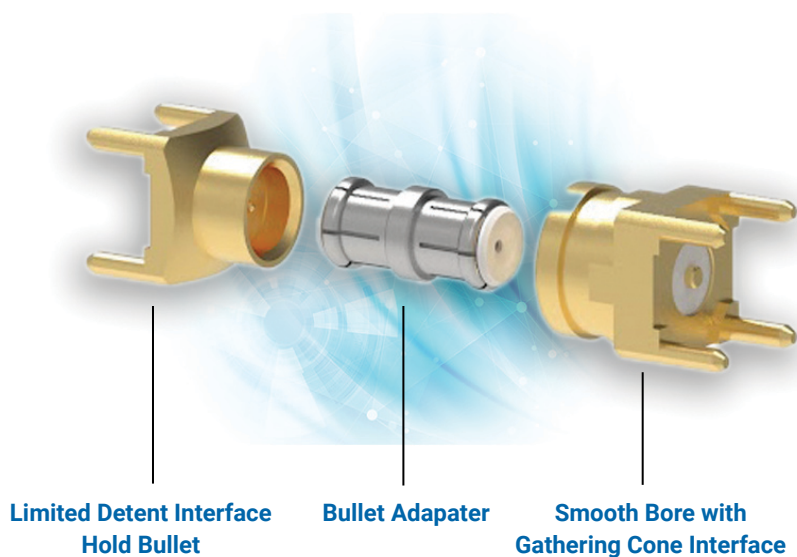
FEATURES AND BENEFITS

- Performance to 6 GHz for 50 ohm systems
- Proprietary configuration designed to maximize radial and axial float in board-to-board applications
- Closed entry interface
- Crash-proof mating design
- Ideal for blindmating and multiple RF lines between boards

APPLICATIONS

- Wireless Base Station Equipment
- Multiple Board-to-Board Connections
- Complex PCB Stack-ups
- Military & Defense/Aerospace
- Broadband
- Routers
- Telecommunications

BOARD-TO-BOARD MATING CONFIGURATION



BOARD-TO-BOARD SOLUTIONS

The HD-EFI connector series offers a board-to-board solution delivering consistent performance through 6 GHz. This dependable mating system utilizes a three-piece configuration and is focused on keeping a consistent RF signal with up to 3.5° working radial float angle and 1.4 mm of axial float. PCB spacing varies depending upon the PCB jack design and the bullet adapter length, with minimum achievable nominal spacing of 11.46 mm. This performance focus makes HD-EFI connectors a good choice for military, broadband and telecommunications applications.



BOARD-TO-CABLE SOLUTIONS

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

MATERIALS

HD-EFI 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.

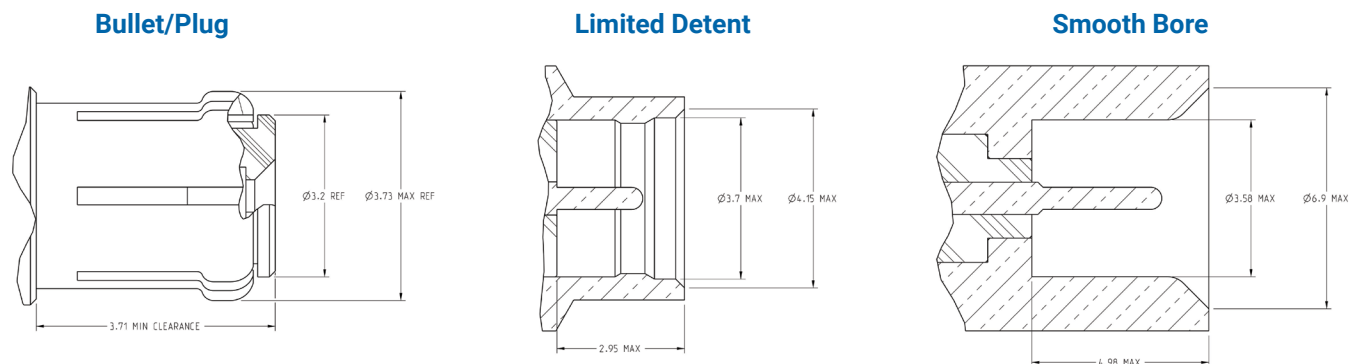
HFSS PCB OPTIMIZATION MODELS

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 HD-EFI products, with new models being added all the time.

HD-EFI PRODUCT SERIES

Amphenol RF's HD-EFI series is designed with board-to-board solutions in mind. These stamped and formed connectors and adapters are a low cost alternative to SMPM with better axial and radial float.

INTERFACE DIMENSIONS



PCB MOUNT CONNECTORS

HD-EFI PCB mount connectors are available in straight smooth bore or limited detent jack configurations with surface mount, through-hole, edge mount and thread-in contact termination options. 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.







Connector Body Types

Limited Detent – A limited detent has an undercut that the tines of a mating connector snap into, allowing for secure mating.



Smooth Bore – A smooth bore interface does not use an undercut. The smooth bore connector is what provides the float.

Note: For a board-to-board system, we recommend the use of one limited detent and one smooth bore connector.

PCB Mounted Jacks

Part Number	Packaging Type	Body Mount	Detent Type	Max Frequency (GHz)	Image
920-501J-53P	Tray	Surface Mount	Smooth Bore	6	
920-502J-52P	Tray	Surface Mount	Limited Detent	6	
920-503J-53P	Tray	Through Hole	Smooth Bore	6	
920-504J-52P	Tray	Through Hole	Limited Detent	6	
920-507J-52P	Tray	End Launch	Limited Detent	6	
920-508J-53P	Tray	End Launch	Smooth Bore	6	

Thread-In Jacks

Part Number	Packaging Type	Body Mount	Detent Type	Max Frequency (GHz)	Image
920-526J-52S	Individual bag	Thread-In	Limited Detent	10	
920-532J-53S	Individual bag	Thread-In	Smooth Bore	10	

HD-EFI BULLET ADAPTERS

HD-EFI bullet adapters are mated between a smooth bore and a limited detent 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.

Part Number	Length	PCB Spacing
920-506A-51S	7.72 mm	11.46 mm
920-505A-51S	8.38 mm	12.7 mm
920-509A-51S	13.02 mm	17.34 mm
920-517A-52S	18.28 mm	22.6 mm



920-506A-51S

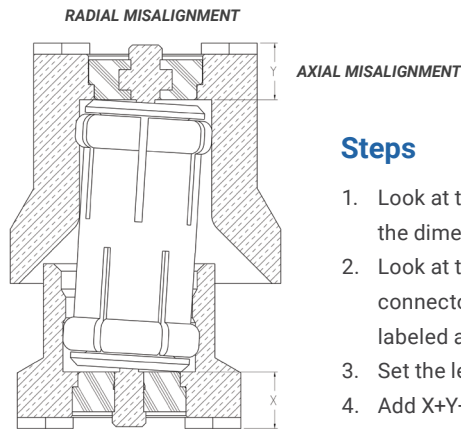


920-509A-51S



920-517A-52S

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

HD-EFI cable-to-board solutions are available in straight or right-angle plug configurations with termination capabilities to micro coaxial, semi-rigid or conformable coaxial cable. Many cable connectors include a 'C' clip for mounting in a panel or fixture.

Cable Plugs

Part Number	Cable Type	Body	Contact	Orientation	Image
920-510P-51S	RG-174	Crimp	Solder	Straight	
920-511P-51S	RG-178	Crimp	Solder	Straight	
920-512P-51S	1.13 mm	Crimp	Solder	Straight	
920-513P-51A	RG-174	Crimp	Solder	Right-Angle	
920-514P-51A	RG-178	Crimp	Solder	Right-Angle	
920-515P-51A	1.13 mm	Crimp	Solder	Right-Angle	

TECHNICAL SPECIFICATIONS

Electrical

Impedance	50Ω
Frequency Range	DC - 6 GHz
Voltage Rating	335 Volts RMS Continuous
Dielectric Withstanding Voltage	1000 Volts RMS Max
VSWR (Return Loss)	
Axial Misalignment ± 0.7 mm	DC - 2 GHz 1.14 (-24 dB) Max
	2 - 4 GHz 1.22 (-20 dB) Max
	4 - 6 GHz 1.38 (-16 dB) Max
Axial Misalignment ± 0.3 mm	DC - 2 GHz 1.08 (-28 dB) Max
	2 - 4 GHz 1.12 (-25 dB) Max
	4 - 6 GHz 1.2 (-21 dB) Max
Insulation Resistance	5000 MΩ Max
Center Contact Resistance	5 mΩ Max
Outer Contact Resistance	5 mΩ Max
Insertion Loss	DC - 3 GHz -0.14 dB Max
	3 - 6 GHz -0.27 dB Max
3rd Order Intermodulation	930 & 955 MHz (2X43 dBm), -163dBc Max (Low PIM Designs)
Power Handling	40 W Max @ 2.6 GHz @ 95°C
	120 W Max @ 2.5 GHz @ 95°C

Environmental

Temperature Range	-45°C to +125°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 - No Discontinuity Permitted
Humidity/Temperature Cycling	MIL-STD-202, Method 106, Condition A
Temperature Life	250 Hours at 125°C, No Damage to Parts

Mechanical

Mating Cycles	Limited Detent: 50 Min; Smooth Bore: 200 Min.
Coupling Mechanism	Push-On
Interface Specification	Amphenol RF Proprietary
Engagement Force	12 N Max (Smooth Bore), 25 N Max (Limited Detent)
Disengagement Force	2 - 6 N (Smooth Bore), 9 N Min (Limited Detent)
Mechanical Misalignment	Axial ±0.7 mm
	Radial (Function of Bullet Length) 5° gathering, 3.5° working
	Max Float Angle 5° Surface Mount Parts, 3.5° Through-Hole Mount Parts
	Min Board to Board Distance 11.46 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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Learn more
about our HD-EFI
product portfolio

