



RF Interconnect for RF Modules and M2M Applications

Welcome to Amphenol RF's training module focused on RF interconnect for wireless RF modules and machine to machine (or M2M) applications.

RF Interconnect for RF Modules

Amphenol RF is a leading interconnect supplier to manufacturers of radio frequency (RF) modules used in M2M applications. Our expertly engineered products provide superior RF performance for today's M2M technologies including wireless monitoring, mesh networking, telemetry systems, and automated industrial control applications. We also offer small form factor products ideal for wearable technology and IoT applications.



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Amphenol RF is a leading interconnect supplier to manufacturers of wireless radio frequency modules used in M2M applications. Wireless modules are available from many suppliers and are used to integrate wireless technology, such as bluetooth, GPS or cellular connectivity, into other devices. Our products provide superior RF performance for today's M2M applications including wireless monitoring, mesh networking, telemetry systems, and automated industrial controls. As wearable technology is gaining traction, the demand for micro-miniature connectors is growing. Our AMC and AMMC connector series are ideal for use in wearable and portable devices. Other Amphenol RF products commonly used in M2M and wireless applications include MMCX, MCX, FAKRA (for telematics applications), SMA and TNC connectors. Coaxial adapters and cable assemblies are also commonly found in wireless applications.

The Internet of Things (IoT)

- M2M related technologies are already in place and the market has massive potential for growth.
- Operators, integrators and vendors have expressed the strong desire to standardize the end to end M2M service platform.



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The Internet of Things represents the ultimate in manageability for service providers and usability for end customers. M2M technologies are already in place and the market has massive potential for growth. Operators, integrators and vendors favor standardization across the M2M service platform making standard, pre-configured wireless modules and standard connectivity and interconnect options a popular solution.

Wireless Module Connections

- Specialize in getting from board to antenna
- SMA, SMB, and TNC connectors/adapters offered in IP67, IP68 in mated and unmated conditions
- PCB connectors available with integrated switch
- Jumpers available with microcoax, RG174, RG316
- Cable assemblies available for system integrators
- Custom cable assemblies and other solutions available



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In wireless applications, RF connectors and coaxial cable assemblies are typically used to connect an external antenna to a wireless module mounted on a PCB. Our AMMC, AMC, MMCX or MCX PCB jacks are typically mounted on the module itself. A mating cable assembly leads to an external antenna. SMA and TNC connectors are commonly used for the antenna connector and are available sealed to IP67 or IP68, in the mated and unmated conditions. Micro-Coaxial cable, RG-174 and RG-316 coaxial cable is frequently used. Standard pre-configured assemblies and custom solutions are available.

M2M Applications

FLEET MANAGEMENT

Cargo Tracking / Stock Management
Temperature Control / Route Planning
Order Tracking / Vehicle Diagnostics

SECURITY & SURVEILLANCE

Public Surveillance / Assent
Monitoring / Congestion & Movement
Monitoring Urban Management

TELEMETRY

Utility Meters / Parking Meters
Industrial Meters / Elevators
Vending Machines

TELEMATICS / VEHICLE

Navigation / Traffic / Weather Info /
Road Safety / Vehicle Diagnostics
/ Location Services



SALES AND PAYMENT

POS Terminals / Vending
Machines / Gaming &
Entertainment / Kiosks

SERVICE & MAINTENANCE

Industrial Machines / Vending
Machines

HOME

Heating Control / Electrical Appliances
Alarms & Security / Surveillance Cameras
Garage & Garden

E-HEALTH

Patient Monitoring / Remote Diagnostics
Activity Monitoring / Lifestyle Suggestions
Personal Security

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Wireless modules are used in a variety of M2M applications including fleet management, security, telemetry, telematics, home automation, healthcare, service and maintenance as well as payment solutions. In the next few slides, we will go into detail on a few specific markets and applications.

Wireless LAN (WLAN)

Market Products

- Access Points
- Mobile Devices



RF solutions

- AMC
- AMMC
- MCX
- MMCX
- SMA, RP-SMA
- Jumpers/Cable Assemblies



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Local area networks pepper the globe making it easy for people to share data, collaborate and to directly communicate. The devices that make this possible include mobile phones, tablets, desktop and laptop computers all connected to local area networks via wireless access points. These devices may contain a variety of connector styles including micro-miniature solutions such as AMMC, AMC, MCX and MMCX connectors. Larger form factor connectors such as SMAs and TNCs are also common when external antennas are needed.

RFID Market

Market Products

- RFID Readers
- RFID Assemblies



RF solutions

- AMC, AMMC
- MCX, MMCX
- TNC, RP-TNC
- FAKRA
- Jumpers/Cable Assemblies
- Gangmate Solutions



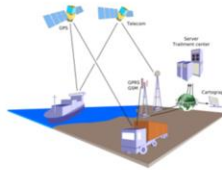
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RFID technology uses wireless non-contact system that uses radio-frequency to transfer data from a tag attached to an object, for the purposes of automatic identification and tracking. RFID systems are used in several commercial and consumer markets for the purpose of stock management and asset monitoring. RFID tags have a wireless antenna, a chip, and some kind of delivery packaging, used for attachment to the object being identified. With RFID readers mounted in a variety of environments, Amphenol can provide many standard RF connectors ideal for RFID applications or can supply a custom solution to meet the needs of the end customer.

Telematics/Fleet Management

Market Products

- Asset Tracking
- Infotainment



RF solutions

- AMC, AMMC
- MCX, MMCX
- SMA, RP-SMA
- TNC, RP-TNC
- FAKRA
- Jumpers/Cable Assemblies



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Use of radio frequency technology is growing quickly in the telematics and fleet management arena. Operators are protecting their assets by introducing aftermarket GPS tracking devices and driver monitoring systems into vehicles. Passenger cars now come equipped with advanced technology including bluetooth communication, wireless tire pressure monitors and back up cameras, GPS navigation, remote start and satellite radio. A growing number of aftermarket solutions will continue to drive activity in this market. Amphenol RF offers a full range of RF interconnect that is ideal for this industry including industry standard FAKRA connectors.

Industrial

Market Products

- Payment Systems
- Security
- Medical



RF solutions

- AMC, AMMC
- MCX
- MMCX
- SMB
- Jumpers



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M2M applications stretch across many segments of the industrial market. RF technology is prominent throughout the market. From payment systems to surveillance devices to systems that track the location of surgical tools, wireless technology is used. Amphenol RF's products enable the expansion of wireless technology in the market.

Applications and Products Summary

Market	Applications	Product Solutions
Wireless LAN	Access Points	AMC, AMMC
	Routers	MCX, MMCX
	Modems	SMA, RP-SMA
	Mobile Devices	Jumpers, Cable Assemblies
RFID	RFID Readers	AMC, AMMC
	Stock Management	FAKRA
	Cargo Tracking	MCX, MMCX
		TNC, RP-TNC
Telematics Fleet Management		Jumpers, Cable Assemblies
	Asset Tracking	AMC, AMMC
	Industrial Meter Reading	FAKRA
	Navigation Systems	MCX, MMCX
Industrial	Automotive Telemetry	SMA, RP-SMA
		TNC, RP-TNC
		Jumpers, Cable Assemblies
	Payment Systems	AMC, AMMC
	Security Networks	MCX, MMCX
	Wireless Monitoring (E-Health)	SMB
		Jumpers, Cable Assemblies

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In summary, wireless modules can be found across several markets and used in a variety of M2M applications.

Electrical Specifications

Electrical Specifications					
Interface	AMMC	AMC	MMCX	MCX	SMA
Impedance	50 Ohm	50 Ohm	50 Ohm	50 or 75 Ohm	50 Ohm
Frequency Range	DC to 6GHz	DC to 6GHz	DC to 6GHz	DC to 6GHz	DC to 18GHz
Insulation Resistance	500 MΩ IN.	500 MΩ IN.	1,000 MΩ IN.	10,000 MΩ IN.	5,000 MΩ IN.
Contact Resistance	Center: ≤20mΩ Outer: ≤10mΩ	Center: ≤20mΩ Outer: ≤10mΩ	Center: ≤10mΩ Outer: ≤5mΩ	Center: ≤5mΩ Outer: ≤2.5mΩ	Center: ≤2mΩ Outer: ≤2mΩ
Dielectric W/standing Volt.	200 VRMS	200 VRMS	500 VRMS	1000 VRMS	1000 VRMS

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Here is an overview of electrical specifications for our M2M wireless connectivity product solutions. Our micro-miniature products include the AMMC, AMC, MMCX and MCX series. These 50 ohm interconnects feature excellent performance up to 6GHz and are ideal for RF applications where space is limited. Our sub-miniature SMA interconnects are precision units that provide offers high performance in a compact design and outstanding mechanical durability. We offer a wide range of standard product configurations to meet your customers design requirements.

Thank You!

For more information, visit our website
www.amphenolrf.com

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