

# Amphenol Sensing, Interconnect and Antenna Solutions for Reliable IoT

Amphenol is a technology leader in the design, manufacture, and supply of high-performance interconnect systems, sensors, and antennas for a broad range of IoT applications. The benefits of the combined product portfolio enables customers to design reliable, small form-factor IoT devices.

## Amphenol Enables Reliable IoT

Amphenol's interconnect products, sensors, and antenna solutions enhance the performance of IoT products, systems and networks.

- **Sensors:** Amphenol's growing portfolio of sensor technologies is the result of R&D investments and acquisitions. Amphenol's sensing portfolio now includes temperature, pressure, CO<sub>2</sub>, humidity, dust and moisture sensors.
- **RF products:** Amphenol's interconnect technology enables OEMs to build networks and devices that manage the exponential growth in data traffic. Commonly used RF interconnects in IoT and wireless applications include AMC, AMMC, MCX, MMCX, FAKRA SMB, SMA, and TNC coaxial interfaces. Cable assemblies and IP67/68 sealed solutions available.
- **Antenna solutions:** Amphenol's expertly engineered antenna technology enables OEMs to meet tight space constraints while maintaining reliable connectivity. Antennas for IoT devices include solutions for single/dual-band Wi-Fi®, Bluetooth®, ZigBee®, Sub-GHz, LoRa, and Cellular technologies (2G/3G/4G/NB-IoT/eMTC).

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Wi-Fi®, Bluetooth®, ZigBee®, LoRa, Sub-GHz, Cellular (2G/3G/4G/NB-IoT/eMTC)	

## Amphenol's IoT Solutions Successfully Deployed in Various IoT Applications



Smart Cities



Industry 4.0



Healthcare



Agriculture

## Sensing Solutions: Critical Information for Real-Time Decisions

Amphenol has an extensive sensing portfolio of Temperature, Pressure, Humidity, CO<sub>2</sub> and Dust Sensors for IoT applications in a variety of industrial and commercial settings.

### Temperature Sensors

Amphenol's temperature sensors include high accuracy NTC thermistors, PTC heaters, non-contact Infrared (IR) and custom design capabilities globally. Our temperature sensing solutions are used in a wide range of applications in the healthcare, automotive, industrial, and consumer markets.



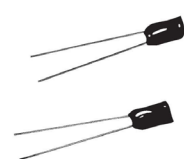
Current Limiters



Infrared (IR) Sensors



NTC Thermistors



PTC Thermistors



Temperature Sensor Assemblies



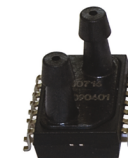
Temperature Standards

### Pressure Sensors

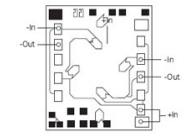
Amphenol's pressure sensor product line includes highly cost effective families of surface mount, hybrid and media-isolated sensors available in all levels of calibration, from uncalibrated to fully-calibrated, amplified analog, digital output versions and vacuum or positive pressure environments.



Pressure Sensors



Board Mount Pressure Sensors



Pressure Sensor Die

### CO<sub>2</sub>, Humidity and Dust Sensors

Amphenol's Carbon Dioxide (CO<sub>2</sub>) Sensors have been on the forefront of CO<sub>2</sub> sensing technologies for over 25 years, having manufactured the world's first and leading low cost NDIR CO<sub>2</sub> Sensors. In more recent years, our CO<sub>2</sub> sensing product line has expanded to offer other air quality sensors, including Dust (PM 2.5 and PM 10) and Relative Humidity Sensors.



CO<sub>2</sub> Sensor Modules



CO<sub>2</sub> Transmitters



CO<sub>2</sub> Handheld Meters



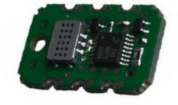
Dust Sensors



Humidity Sensors



Humidity Transmitters



VOC

## Use Cases and Applications for Amphenol IoT Products

### Industry 4.0



- Wired and wireless industrial sensing
- Robotics
- SCADA systems
- Environmental monitoring in factories

### Building Automation



- Indoor environment monitoring & HVAC
- Boiler/chiller control
- Water management

### Smart Cities



- Environment monitoring
- "Smart Poles" - Traffic management, lighting
- Bike-share
- Smart grid/energy management

### Agriculture



- Irrigation & water management
- Environment & soil analysis with wireless sensor networks
- Livestock monitoring

### Healthcare



- Patient monitoring and critical care systems
- Portable wireless devices
- Environmental monitoring in hospitals

### Food & Beverage



- Food monitoring and tracking
- Commercial equipment (ovens, refrigeration, meat processors, etc.)
- Cold chain

## RF Solutions: For Reliable IoT Communications

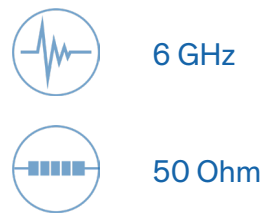
Amphenol is a leading manufacturer of coaxial connectors for use in radio frequency, microwave, and data transmission system applications. Standard products include RF connectors, coaxial adapters and RF cable assemblies. Custom engineered products include multi-port ganged interconnect, blind mate and hybrid mixed-signal solutions.

Amphenol connectors remove the risks of:

- Premature field failures
- Degradation in signal strength through connectors
- Performance impacts from poor IP67 and IP68 implementation
- Performance degradation from material and plating corrosion
- Product communication failure due to poor quality PCBA connectors

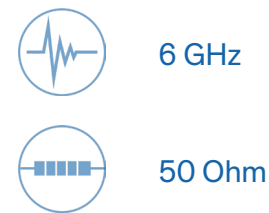
Featured products for IoT include:

### AMC



Micro-coaxial connector with a low-profile (2.5mm) and small footprint (3mm x 3mm).

### AMMC



Micro-miniature coaxial connector with a super low-profile (1.4mm) and extremely small footprint (2mm x 2mm).

### BNC



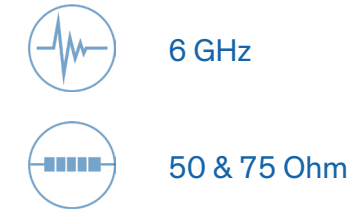
Invented by Amphenol, the BNC series features a bayonet coupling system allowing for quick connect and disconnect.

### FAKRA



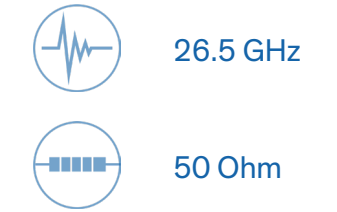
Designed for the automotive market, FAKRA connectors utilize SMB connectors in color/ key coded housings to prevent mismatching.

### MCX



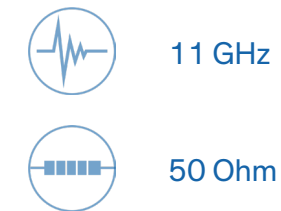
The MCX series features secure, fast and easy snap-on/snap-off coupling, with broadband capability.

### SMA



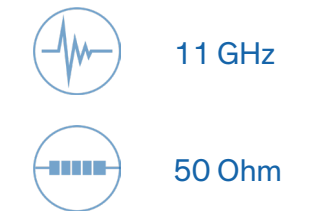
SMA connectors offer high performance in a threaded, compact design, excellent for antenna and base station applications.

### TNC



The TNC is a miniature, threaded series with a constant 50 Ohm impedance and a frequency range of DC - 11GHz.

### N-TYPE



N-TYPE connectors are durable, medium-size RF connectors used in many military and commercial wireless applications.

Cable assemblies and IP67/68 sealed solutions also available

## Antenna Solutions: Enabling Wireless Communications for IoT

Antennas are an integral part of wireless communications. Antenna efficiency, sensitivity, size and other characteristics have implications on range and reliability of a wireless system. Amphenol offers antennas that support all major wireless standards – Wi-Fi®, Bluetooth®, LoRa, ZigBee®, Cellular, etc. Featured products are listed below:

### Single and Dual-Band Wi-Fi®/BT/ZigBee® Antennas



2.4GHz Band PCB Antenna



2.4GHz Band Flexible Antenna



5GHz Band PCB Antenna



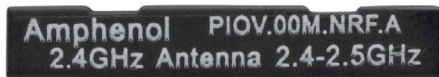
5GHz Band Flexible Antenna



2.4GHz/5GHz Band PCB Antenna



2.4GHz/5GHz Band Flexible Antenna



2.4GHz Band SMD LDS Antenna



2.4GHz/5GHz Band SMD LDS Antenna



5GHz Band SMD LDS Antenna

### Sub-GHz Antennas



433MHz ISM Band PCB Antenna



470MHz ISM Band PCB Antenna



868MHz ISM Band PCB Antenna



433MHz ISM Band SMD LDS Antenna



470MHz Band SMD LDS Antenna



915MHz ISM Band PCB Antenna

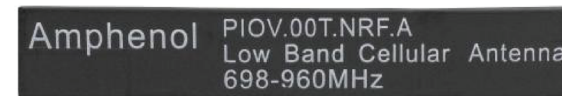


868MHz Band SMD LDS Antenna



915MHz Band SMD LDS Antenna

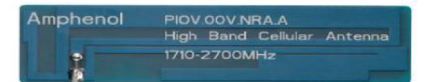
### Cellular Antennas (2G/3G/4G/NB-IoT/eMTC)



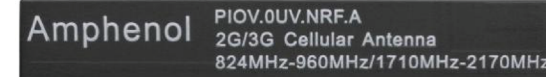
Low Band Cellular Antenna



High Band Cellular Antenna



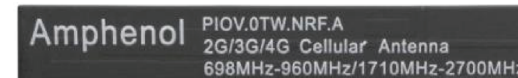
High Band Cellular PCB Antenna



2G/3G Cellular Antenna



2G/3G Cellular Band PCB Antenna



2G/3G/4G Cellular Antenna



2G/3G/4G Cellular Band PCB Antenna

# Are You Five Years Out?

Most people live in the present. The world of now. But a handful of us work in a unique world that doesn't quite exist yet—the world of Five Years Out.

Five Years Out is the tangible future. And the people who live and work there know that new technologies, new materials, new ideas and new electronics will make life not only different, but better. Not just cheaper, but smarter. Not just easier, but more inspired.

Five Years Out is an exciting place to be. So exciting that, once you've been there, it's hard to get excited about the present. Because we know what's coming is going to be so much better.

Five Years Out is a community of builders, designers, engineers and imaginers who navigate the path between possibility and practicality. Creating the future of everything from cars to coffeemakers.

Are you one of them? Then you're probably working with us.

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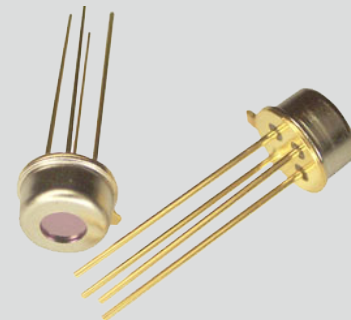
## Email

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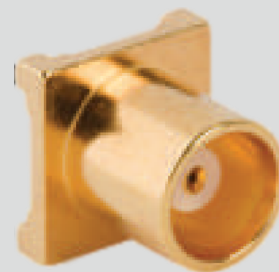
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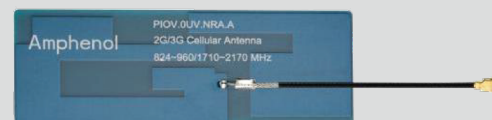
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Sensors



RF Products



Antenna Solutions