# Antennas & Solutions for IoT
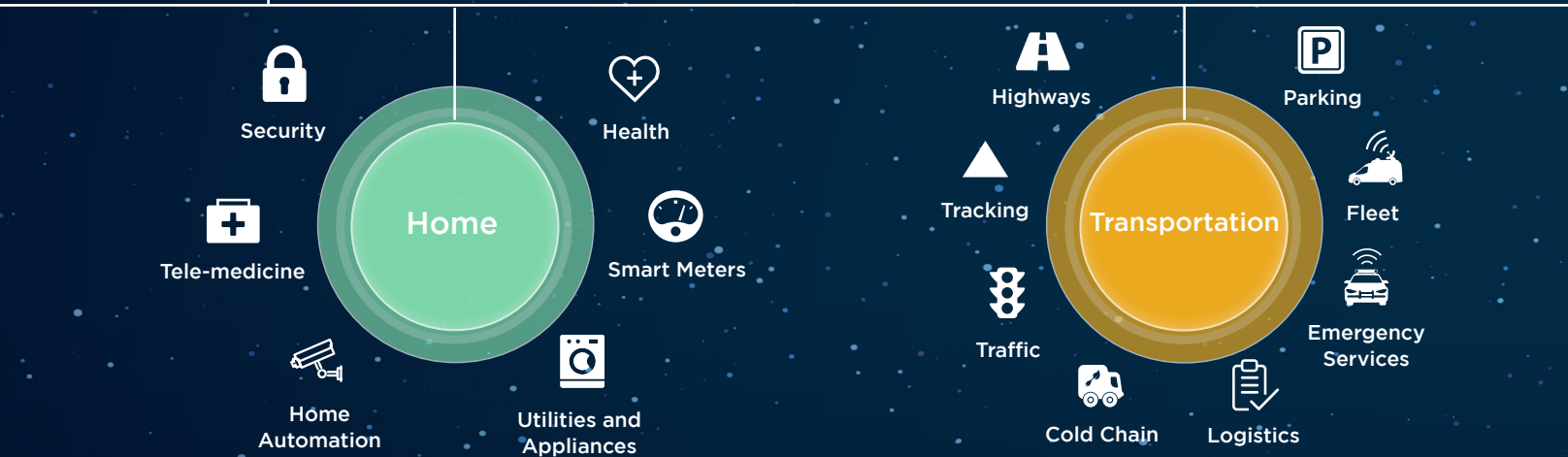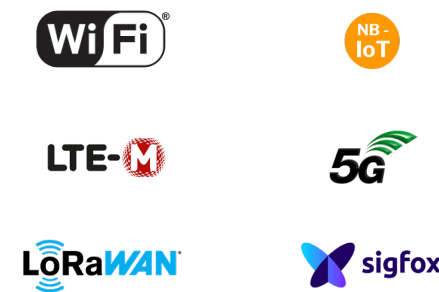
## The IoT is about Connecting Everything – And We've Got the Tools to Connect It

**Industrial**
- Agriculture
- Lighting
- Building Management
- Inventory Management
- Warehousing
- Surveillance
- Food / Grocery

**National**
- Infrastructure
- Utility
- Oil and Gas
- Pipeline
- Grid: Transmission and Distribution
- Remote Monitoring

**Community**
- Retail
- Lighting
- Waste Management
- Smart-Grid Aggregators

**Home**
- Security
- Health
- Tele-medicine
- Smart Meters
- Home Automation
- Utilities and Appliances

**Transportation**
- Highways
- Parking
- Tracking
- Fleet
- Traffic
- Emergency Services
- Cold Chain
- Logistics

In every industry and in every application, wireless connectivity is the business-critical upgrade driving the world's cutting edge products and services. In retail, smart metering, remote monitoring, transportation, public safety, and everything in between, getting data to the cloud and enabling sense and control on the ground is critical to satisfying customer demand and enabling smarter products that produce previously-impossible results. The right IoT antenna isn't just nice to have – it's critical to robust, cutting-edge next generation products that perform reliably in the field, no matter what.

Laird Connectivity's 70+ years of wireless design experience has produced a rich portfolio of IoT antennas that excel in their applications, whether they be internal, vehicle-mounted, infrastructure-based, and more. We're THE antenna authority on rugged, high-performance antennas that serve countless niche applications, so you'll never have to settle for a partial fit for your specific applications. They're available in indoor or outdoor enclosures, with fully customizable cable and connector options, and supporting multi-frequency applications for some of today's most ambitious IoT designs.

**This brochure includes a selection of the most popular IoT antennas from Laird Connectivity. The full range can be found** on our website. **Supplementary brochure for Fleet & Transportation Products** on our resources page.

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Today's smart applications are powered by several unique wireless protocols, each of which feature unique strengths and capabilities. Each brings something to the table: Bluetooth and Wi-Fi for gathering local data; LoRaWAN to route data to the cloud over low-power WAN; cellular 4G/5G/LTE-M for nationwide blanket coverage; FirstNet to support voice and data in public safety. Every problem has an ideal solution, and our wide range of IoT antennas get critical data where it needs to go.

**Wi-Fi** | **NB-IoT** | **LTE-M** | **5G** | **LoRaWAN** | **sigfox**

# Internal Antennas

Laird Connectivity offers the most innovative portfolio of cost-effective internal antenna solutions that provide unmatched connectivity for your wireless IoT devices. They are easily concealed within a product's enclosure for optimal aesthetics. They come in a variety of connector options to fit to the radio.

## Wi-Fi Antennas    🌐 webpage

The FlexPIFA provides less detuning than a dipole solution of other PCB antennas and the mFlexPIFA comes in a peel and stick package which can be put onto metal. For high end applications, take a look at the FlexMIMO solution. A variety of other PCB options are offered, as follows:

| Laird Connectivity Family | Part Number | Frequency (MHz) |
|---|---|---|
| D-Puck | MAF94192 | 2400-2500, 5150-5875 |
| FlexPIFA | 001-0014, 001-0022, 001-0025 | 2400-2480 |
| | 001-0016, 001-0021, EFB2455A3S-16MHF1 | 2400-2480, 4900-5900 |
| mFlexPIFA | 001-0030, EFA2400A3S-10MH4L | 2400-2480 |
| | 001-0034 | 2400-2480, 4900-5900 |
| Mini NanoBlade (Flex) | MAF95310, EMF2449A1-10UFL | 2400-2500, 4900-5875 |
| NanoBlade | CAF94504, CAF94505, MAF95056, MAF95090 | 2400-2500, 5150-5350, 5600 |
| NanoBlue | MAF94045, MAF94102, EBL2400A1-10MH4L | 2400-2500 |
| FLexNotch | 001-0015, 001-0023 | 2400-2480 |
| FLexMIMO | EFD2455A3S-10MHF1 | 2400-2480, 4900-5900 |

## LTE-M/NB-IoT/Cat M/ Cellular Antennas    🌐 webpage

The Revie Flex can bend inside the application, and is available in several frequency/size options.

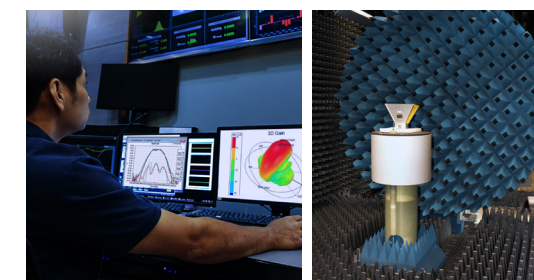| Laird Connectivity Family | Part Number | Frequency (MHz) |
|---|---|---|
| Revie Flex | EFF6925A3S-15MHF1<br>EFF6060A3S-xxMHF1 (coming soon)<br>EFF6989A3S-19MHF1 (coming soon) | 698-875, 1710-2500 |
| Revie 600 | EFF6060A3S-xxMHF1 | 600-6000 |
| Revie 700 | EFF6989A3S-19MHF1 | 698-6000 |

## ISM/LoRa/ Sigfox Antennas    🌐 webpage

The Revie Pro, Prime and Plex provide PCB solutions.

| Laird Connectivity Family | Part Number | Frequency (MHz) |
|---|---|---|
| Revie Pro | MAF95256 | 868 / 880-960/ 1710-1990 |
| Revie Prime | EPR8221A1-xxUFL | 824-960 / 1710-2170 |
| Revie Plex | EPL8221A1-xxUFL | 824-960 / 1710-2170 |

## Antenna Services

Our decades of experience in antenna integration, opimizing antenna performance, and endless customization make Laird Connectivity THE antenna authority. Internal antenna designs need expert consideration and testing to produce designs that perform and last. Rely on us for the antenna support to deliver the performance you need and products you can depend on.

# Stick Dipoles & Monopoles  🌐 webpage

Range of swivel and fixed dipole and monopole solutions with gain levels up to 6dBi. Extensive options exist for various frequency bands, connector types, fixed vs swivel, and weatherproofing levels. Our most popular are the following:

| Laird Connectivity Family | Wireless Type | Frequency (MHz) | Connector Type | Description |
|---|---|---|---|---|
| DBA6927C1-FSMAM | Cellular | 698-2700 | SMA | LTE Swivel Dipole |
| DBA6927C1-FTNCM | Cellular | 698-2700 | TNC Male | LTE Swivel Dipole |
| DBA6927C1-FRNCM | Cellular | 698-2700 | RP-TNC Male | LTE Swivel Dipole |
| RD2458-5-SMA | Wi-Fi, BT/BLE, Zigbee | 2400-2500 / 5100-5925 | SMA Male | High Performance Swivel Dipole |
| RD2458-5-RSMA | Wi-Fi, BT/BLE, Zigbee | 2400-2500 / 5100-5925 | TNC Male | High Performance Swivel Dipole |
| RD2458-5-RTNC | Wi-Fi, BT/BLE, Zigbee | 2400-2500 / 5100-5925 | RP-TNC Male | High Performance Swivel Dipole |
| 001-0001 | Wi-Fi, BT/BLE, Zigbee | 2400-2500 | RP-SMA Male | Stubby Swivel Dipole |
| 001-0009 | Wi-Fi, BT/BLE, Zigbee | 2400-2500 / 5150-5850 | RP-SMA Male | Stubby Swivel Dipole |
| 001-0010 | Wi-Fi, BT/BLE, Zigbee | 2400-2500 | RP-SMA Male | Stubby Swivel Dipole (IP67) |
| 001-0012 | Wi-Fi, BT/BLE, Zigbee | 2400-2500 / 4910-5850 | RP-SMA Male | Stubby Swivel Dipole (IP67) |
| EXD312SM | ISM 315 | 312-318 | SMA | Stubby Flexible Monopole |
| EXD420SF* | ISM 433 | 420-450 | SMA Female | Stubby Flexible Monopole |
| EXD420SM* | ISM 433 | 420-450 | SMA Male | Stubby Flexible Monopole |
| EXC821SM* | ISM868 | 821-902 | SMA Male | Flexible Monopole |
| EXE821SM * | ISM868 | 821-902 | SMA Male | Flexible Monopole |
| 001-0002 | ISM 915 | 902-928 | RP-SMA Male | Swivel Dipole |
| 001-0011 | ISM 915 | 902-928 | RP-SMA MALE | Swivel Dipole |
| EXC902SM* | ISM 915 | 902-960 | SMA | Flexible Monopole |

* Various connector options available

# Gar Multiport Antennas  🌐 webpage

Laird Connectivity's Gar VFx69383x antenna is a multiport, multiband solution to support a complete communications hub. The Gar family offers up to 5 different port assignments including, MIMO and multiple ports of LTE, WiFi, GNSS & GPS. It features an attractive IP67 low-profile aerodynamic housing that makes it a fantastic choice for any outdoor application such as haulage, transportation or remote monitoring.

| Laird Connectivity Family | No. of Ports | Port Type | Frequency (MHz) | VSWR | Isolation (dB) | Peak Gain (dBi) | Cable Type (Length) * | Connector | Color |
|---|---|---|---|---|---|---|---|---|---|
| VFP69383x22JN-518x | 5 | LTE1/ LTE2 | 698-960/ 1690-3800 | 2.5/2.1 | -11/-14 | 1.6/7.2 | LMR100 (0.3m/1ft); LMR195 (4.9m/16ft) | J or L- SMA male N- Mini UHF | B - Black W - White |
| | | WiFi1/ WiFi2 | 2400-2500/ 4900-6000 | 2.0/2.0 | -14/-32 | 3.1/7.5 | LMR100 (0.3m/1ft); LMR195 (4.9m/16ft) | J- SMA male L- RPSMA male N- RPTNC male | |
| | | GNSS | 1559-1606 | 2.0 | -41 | 30 | RG174 (5.2m/17ft) | J or L- SMA male N- TNC male | |
| VFQ69383x21JN-518L | 4 | LTE1/ LTE2 | 698-960/ 1690-3800 | 2.5/2.0 | -10/-14 | 1.8/7.4 | LMR100 (0.3m/1ft); LMR195 (4.9m/16ft) | SMA- male | B - Black W - White |
| | | WiFi 1 | 2400-2500/ 4900-6000 | 2.0/2.1 | -14/-35 | 3.1/7.0 | LMR100 (0.3m/1ft); LMR195 (4.9m/16ft) | RPSMA- male | |
| | | GNSS | 1559-1606 | 2.0 | -39 | 32 | RG174 (5.2m/17ft) | SMA- male | |
| VFT69383x11JN-518L | 3 | LTE1 | 698-960/ 1690-3800 | 2.5/2.0 | -41/-24 | 2.3/7.3 | LMR100 (0.3m/1ft); LMR195 (4.9m/16ft) | SMA- male | B - Black W - White |
| | | WiFi 1 | 2400-2500/ 4900-6000 | 2.0/2.0 | -24/-35 | 3.9/5.4 | LMR100 (0.3m/1ft); LMR195 (4.9m/16ft) | RPSMA- male | |
| | | GNSS | 1559-1606 | 2.0 | -41 | 32 | RG174 (5.2m/17ft) | SMA- male | |
| VFT69383x2NJN-518Q | 3 | LTE1/ LTE2 | 698-960/ 1690-3800 | 2.5/2.1 | -10/-17 | 2.2/7.5 | LMR100 (0.3m/1ft); LMR195 (4.9m/16ft) | SMA- male | B - Black W - White |
| | | GNSS | 1559-1606 | 2.0 | -33 | 32 | RG174 (5.2m/17ft) | | |
| VFD69383x1NJN-518Q | 2 | LTE1 | 698-960/ 1690-3800 | 2.5/2.1 | -38/-26 | 2.0/7.0 | LMR100 (0.3m/1ft); LMR195 (4.9m/16ft) | SMA- male | B - Black W - White |
| | | GNSS | 1559-1606 | 2.0 | | 32 | RG174 (5.2m/17ft) | | |
| VFD69383x2NNN-518R | 2 | LTE1/ LTE2 | 698-960/ 1690-3800 | 2.5/2.1 | -11/-16 | 2.1/7.2 | LMR100 (0.3m/1ft); LMR195 (4.9m/16ft) | SMA- male | B - Black W - White |

* LMR or equivalent.

# Disk Puck Multi-Port

Our Disk Puck antennas come in a mechanically robust, impact and UV resistant radome and are IP67-rated. These antennas provide excellent coverage for both fleet and fixed applications.

VH/VL Series - Optimum performance.  🌐 webpage
VM Series - Wi-Fi Multiport/MIMO solutions  🌐 webpage
LPS Series - LTE SISO Low profile puck style antennas  🌐 webpage

| Laird Connectivity Family | No. of Ports | Port Type | Frequency (MHz) | VSWR | Isolation (dB) | Peak Gain (dBi) | Cable Type (Length) * | Connector | Color |
|---|---|---|---|---|---|---|---|---|---|
| LPS69223NT-61xxxx | 1 | LTE | 698-960/ 1710-2170 | < 3.0:1 | * | 2.4/4.5 | RG316 (0.61 m/ 2ft) | SMAM - SMA male RTNM - RTNC male | Black |
| LPS69273NT- 61xxxx | 1 | LTE | | | * | 2.1/5.4 | | | |
| LPS69863NT-61xxxx | 1 | LTE | 698-960/ 1690-2700 | | * | 4.0/6.6 | LMR100 (0.61 m/ 2ft) | | |
| VHP69273x22G-518A | 5 | 2x LTE | 698- 960/ 1710- 2700 | < 2.0:1 | -14 | 4.1/5.9 | LMR 195M (5.18 m/17.0 ft) | SMA- male | B - Black W - White |
| | | 2x WiFi | 2300- 2700/ 4900- 5900 | | -18 | 6.2/6.5 | | | |
| | | GPS | 1575.42 (GPS L1) | | * | 30 | RG174 (5.18 m/17.0 ft) | | |
| VLQ69273x22N-518A | 4 | 2x LTE | 698- 960/ 1710- 2700 | < 2.0:1 | -14/-19 | 3.2/4.5 | LMR 195M (5.18 m/17.0 ft) | SMA- male | B - Black W - White |
| | | 2x WiFi | 2300- 2700/ 4900- 5900 | | -20/-26 | 5.5/6.3 | | RPSMA- male | |
| VLQ69273x21G-518A | 4 | 2x LTE | 698- 960/ 1710- 2700 | < 2.0:1 | -14/-20 | 3.3/4.6 | LMR 195M (5.18 m/17.0 ft) | SMA- male | B - Black W - White |
| | | WiFi | 2300- 2700/ 4900- 5900 | | -23/-27 | 5.0/5.3 | | RPSMA- male | |
| | | GPS | 1575.42 (GPS L1) | | * | 30 | RG174 (5.18 m/17.0 ft) | SMA- male | |
| VLT69273x2NG-518A | 3 | 2x LTE | 698- 960/ 1710- 2700 | < 2.0:1 | -15/-20 | 2.6/4.7 | LMR 195M (5.18 m/17.0 ft) | SMA- male | B - Black W - White |
| | | GPS | 1575.42 (GPS L1) | | * | 30 | RG174 (5.18 m/17.0 ft) | | |
| VLQ24593xN4N-518x | 4 | 4x WiFi | 2400- 2500/ 4900- 5925 | <2.0:1 | -20/-26 / -21/-26 / -20/-26 / -20/-26 | 2.2/3.5 | LMR 195M (5.18 m/17.0 ft) | B - RPSMA male G - SMA male | B - Black W - White |
| VMT24493RSM-366 | 3 | 3x WiFi | 2400- 2500/ 4900- 5875 | <2.0:1 | * | 4.5/5.4 | LMR 195 (3.65m/12 ft) | RPSMA- male | Black |
| VMG24493RSM-518 | 3 | 2x WiFi | 2400- 2500/ 4900- 5875 | <2.0:1 | * | 1.5/3.0 | LMR240 (5.18 m/17.0 ft) | RPSMA- male | Black |
| | | GPS | 1575.42 (GPS L1) | | * | 26 | RG174 (5.18 m/17.0 ft) | | |
| VMD24493RSM-366 | 2 | 2x WiFi | 2400- 2500/ 4900- 5900 | <2.0:1 | * | 3.0 | LMR240 (3.65m/12 ft) | RPSMA- male | Black |

* Various connector options available

# MIMO Phantom  🌐 webpage

The 2-Port MIMO Phantom antenna is a multi-protocol, wide-bandwidth antenna designed to support the latest and most demanding IoT applications. Supports 2x2 MIMO – choose from cellular, Bluetooth, ISM 868 and 900, Sigfox, LoRaWAN and 2.4GHz – under an omnidirectional IP67 radome. The Laird MIMO Phantom offers excellent omni-directional gain with minimum uptilt to optimize coverage, even when installed on small or no ground-plane devices.

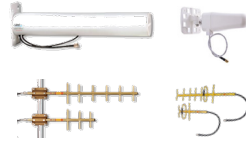| Laird Connectivity Family | Frequency (MHz) | VSWR | Peak Gain (dBi) | Cable Type (Length) | Connector | Color |
|---|---|---|---|---|---|---|
| MTRA61274Cx2 | 617-960MHz & 1350-2700MHz | <2.5:1 | 4.2 | LMR 195M (610mm / 24 in) | SMA Male | B - Black W - White |

* Various connector options available

# High Gain Directional and Omnis

Laird Connectivity has a range of infrastructure antennas to establish your IoT network. The families below cover point to point, omnidirectional, directional or sectorial, ceiling and canister antennas.

## Yagi Antennas  🌐 webpage

Our line of high-performance infrastructure Yagi antennas are perfect for building out the backbone of your IoT deployment. Optimized for long range and reliable connection, they're a robust and reliable antenna for the harshest of environments.

| Laird Connectivity Family | Frequency (MHz) | Description |
|---|---|---|
| PC2415N | 2400-2500 | Yagi, Enclosed, 13.9 dBi. |
| PC9013N | 902-928 | Yagi, 13 dBi, 13 element. |
| YA9-13 | 860-960 | Yagi, 13 dB, 15 element. |

## High Gain Outdoor Omni Antennas  🌐 webpage

Our high gain line of omnidirectional baton antennas pushes infrastructure connectivity to wide-reaching outdoor areas, providing broad coverage for remote locations. Offered with gain as high at +13 dBi.

| Laird Connectivity Family | Frequency (MHz) | Description |
|---|---|---|
| OD24M-12 | 2400-2485 | 13dBi Omni, 7 deg. BW, 10 watt. |
| OD35M-10 | 3400-3600 | 10dBi Omni, 14 deg. BW, 10 Watt. |
| OD9-11 | 860-960 | 11dBi Omni, 7 deg. BW, 100 Watt. |
| OF86315 | 863-876 / 902-928 | 5.3 / 5.6 dBi Omni, 28/28 deg BW. |
| FG9023 | 902-928 | 5dBi Omni, 70 deg. BW, 200 Watt. |
| OC24527-FNF | 2400-2500 / 5150-5875 | 4/7 dBi Omni, 28/15 deg BW, 10W. |

## Directional Panel Antennas  🌐 webpage

Expand your network coverage with high performance directional antennas. Ideal for applications such as university campus, stadiums, retail and warehousing.

| Laird Connectivity Family | Frequency (MHz) | Description |
|---|---|---|
| PDM245115 | 2400-2500 / 5150-5900 | WLAN Panel, 4-Port MIMO, 15dBi |
| PSQ24495 | 2400-2490 / 4900-6000 | WLAN Panel, 4-Port MIMO, +/-45 deg. X-POL, |
| MD24-12 | 2400-2485 | 12dBi Dir., 4"x4"x4". |
| PAV692780 | 698-960 / 1710-2700 | 7/8 dBi LTE Dir. Panel, |

## Multi-Port Canister and Ceiling Mount Antennas

Industry leading low profile ceiling mount and canister antennas create reliable infrastructure networks for your IoT coverage.

| Laird Connectivity Family | Frequency (MHz) | Description |
|---|---|---|
| CMD69423 | 698 - 4200 | LTE 2x2 MIMO, Ceiling Mt., |
| OP24516 | 2400-2500 / 5150-5875 | 6-Port WLAN, Canister, |
| S2451DBT | 2400-2500 / 5150-5850 | 6-Port WLAN, Ceiling Mt. Omni. |

# Phantom Series  🌐 webpage

Laird Connectivity's single and multi-band Phantom antennas are known industry-wide for their IP67 enclosure, rugged construction and excellent performance. They're the antenna of choice whether you need cellular, LTE M/NB-IoT, ISM868/915, UHF, or Wi-Fi. These antennas offer excellent performance with superior gain across the horizon vs competitor antennas. Many Phantoms are available for small and no-ground-plane applications.

| Laird Connectivity Family | Frequency (MHz) | VSWR | Peak Gain (dBi) | Color |
|---|---|---|---|---|
| TRA(B)3803P | 380-400 | <2.0:1 | 0.0 | |
| TRA(B)4103P | 410-430 | <2.0:1 | 3.0 | |
| TRA(B)4303P | 430-450 | <2.0:1 | 3.0 | |
| TRA(B)4503P | 450-470 | <2.0:1 | 3.0 | |
| TRA(B)4703P | 470-490 | <2.0:1 | 3.0 | |
| TRA(B)4903P | 490-512 | <2.0:1 | 3.0 | |
| TRA(B)8213P | 821-896 | <2.0:1 | 3.0 | B - Black |
| TRA(B)8903P | 890-960 | <2.0:1 | 3.0 | No B - White |
| TRA(B)9023P | 902-928 | <2.0:1 | 0.0 | |
| TRA(B)18503P | 1850-1990 | <2.0:1 | 3.0 | |
| TRA(B)58003P | 4900-6000 | <2.0:1 | 3.0 | |
| TRA(B)806/17103P | 806-960 / 1575.42 / 1710-2500 | <2.0:1 | 5.9/5.1/4.4 | |
| TRA(B)821/18503P | 821-896 / 1850-1990 | <2.0:1 | 3.0/3.0 | |
| TRA(B)24/49003P | 2400-2500 /4900-5850 | <2.0:1 | 5.7 | |
| TRA6927M3Px-001 | 698-960 / 1710-2700 | <2.5:1 | 3.5/5.5 | |
| TRA6927M3Px-002 | 698-960 / 1710-2700 | <2.5:1 | 3.5/5.5 | |
| TRA6927M3Px-003 (No Logo) | 698-960 / 1710-2700 | <2.5:1 | 3.5/5.5 | B - Black, W - White |
| TRA6927M3PxN-001 | 698-960 / 1710-2700 | <2.5 / <2.0 | 0 / 2.9 | |
| TRA8063M3Px-001 | 806-896 / 1850-1990 / 2500-2700 | <2.0:1 | 4.0/3.5/3.0 | |
| HCF69273xN-60A | 698-2700 | <2.6 / <2.0 | 1.5 / 3.8 | |

# Cable Assemblies and Accessories  🌐 webpage

Laird Connectivity's coaxial cable assemblies are engineered for peak performance up to 6 GHz. They are manufactured in one of our state-of-the-art production facilities in either Penang Malaysia or Schaumburg Ill. They are tested 100% and certified to meet performance specifications. Equipment manufacturers require certified cable assemblies to minimize system losses to within known parameters and these cable assemblies meet those requirements.

| Laird Connectivity Family | Frequency | Cable Type | Connector Options | Description |
|---|---|---|---|---|
| MicroCoax | DC to 6GHz | 0.81mm Dia., 1.13mm Dia., and others. | u.FL/MHF1; w.FL/MHF4; SMA, RP-SMA, Bulkhead | -40 to +85 C; Waterproof models available. |
| CA178 | 700 MHz- 6 GHz | LMR100-Equiv., RG58/U, RG178, LMR400-Equiv. | N-Fem., N-Male(Bulkhead), SMA, RP-SMA, TNC, R/A-SMA, U.FL, MCX, and others. | -40 to +125 C; Waterproof models available. |
| CA195, CAN, CAS | 450 MHz- 6 GHz | RG-58 "Ultralink", LMR195-Equiv., RG316, WBC240 (LMR240-Equiv.) | N-Male, N-Male (Bulkhead), SMA, RP-SMA, BNC, and others. | High Performance, Extensive combinations available. |

# Connected. No Matter What.

Laird Connectivity simplifies wireless connectivity with market-leading modules, antennas, IoT devices, and customer-specific wireless solutions. **THE** Antenna Authority whose products are trusted by companies around the world for their performance and reliability. With best-in-class support and comprehensive design services, we reduce your risk and improve your time-to-market. When you need unmatched wireless performance to connect your applications with security and confidence, Laird Connectivity Delivers – No Matter What.

**Laird**™

**CONNECTIVITY**

# **THE** Antenna Authority

## lairdconnect.com