

# HumPRO™ Series Frequency Hopping Digital Data Transceiver Module



At below \$10 in volume, the Hummingbird platform is the lowest cost complete wideband transceiver with microcontroller module on the market today. The HumPRO™ is built on this platform and is designed for robust data transfer. It includes an LBT + AFA protocol at 868MHz and a Frequency Hopping Spread Spectrum (FHSS) protocol at 900MHz with a common footprint and pin-out.

**Low Cost:** Linx designed the Hummingbird platform with cost in mind from the start. It uses advanced System on Chip (SoC) technology to minimize the footprint and the number of components. The module is designed for high volume production, leading to a price that is nearly half that of similar modules, and making it cost competitive with discrete designs.

**Frequency Hopping:** The 900MHz module has a FHSS protocol that typically locks in under 30ms at 115kbps and 60ms at 9.6kbps. This allows it to quickly wake up, send data and go back to sleep, saving power in battery-operated applications that have strict power budgets. It handles all protocol functions automatically.

**LBT + AFA:** The 868MHz HumPRO meets all of the ETSI requirements for LBT + AFA, allowing a max duty cycle of 64%. The module handles all transmitter timing required by the regulations.

**Secure:** The HumPRO™ Series supports 128-bit AES encryption as an option. It also provides a unique Join process that makes setting up a network in the field as simple as a few button presses.

**Ease of Implementation:** The user can configure a wide variety of settings through a standard UART interface. For point-point applications, the modules can be configured once, then send and receive data without need for further commands. For larger networks, commands support selective addressing and group broadcasting. The simple interface significantly reduces firmware development.

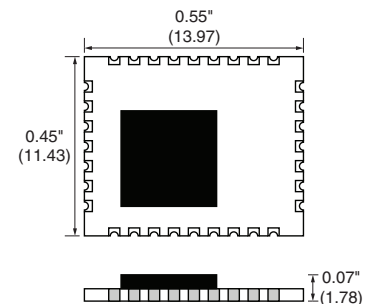
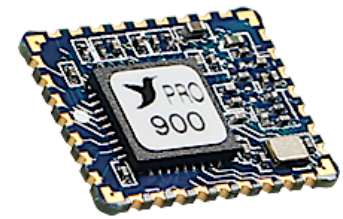
**Addressing:** All HumPRO™ modules have a unique 32-bit serial number that can be used as an address. Additional addressing modes support customer-assigned 16 or 32 bit source and destination addressing, enabling point-to-point and broadcast messages. Address masking by the receiving module allows for creating subnets. Advanced networks can be implemented with an external microcontroller.

**Small Size:** Like its namesake, Hummingbird modules are tiny. At 11.5mm by 14.0mm, it is less than one quarter the size of similar competitive modules.

**Low Power:** Linx designed the Hummingbird platform for battery powered applications. It operates as low as 2.0 volts and has low transmit current of 40mA, receive current of 25mA and a typical standby current under 1µA.

**Ample Range:** The HumPRO™ outputs up to 10dBm, resulting in a line-of-sight range of up to 1,600m (1.0 mile), depending on the antenna implementation.

**Certification:** The 900MHz HumPRO is available in a non-certified version and in pre-certified versions with an RF connector or castellated connection. ETSI does not support modular certification, so the 868MHz version cannot be pre-certified.



| Specifications              |                      |
|-----------------------------|----------------------|
| Operating Voltage           | 2.0 to 3.6VDC        |
| TX Supply Current           |                      |
| @ 10dBm                     | 40.5mA               |
| @ 0dBm                      | 22mA                 |
| RX Supply Current           | 23.5mA               |
| Power Down Current          | 0.7µA typ            |
| RX Sensitivity              |                      |
| Max rate                    | -94dBm               |
| Min rate                    | -101dBm              |
| Lock Time                   | <30ms typ at 115kbps |
| Operating Temperature Range | -40 to +85°C         |

**Custom Modules:** In high volume applications, Linx can provide custom firmware to meet the needs of a specific application, removing the firmware design burden.

## Applications

- Remote data transfer
- Internet of Things (IoT)
- Machine to Machine (M2M)
- Consumer wireless
- Wireless sensor networks
- Home automation
- Remote status monitoring
- Industrial automation
- Robotics
- Data acquisition

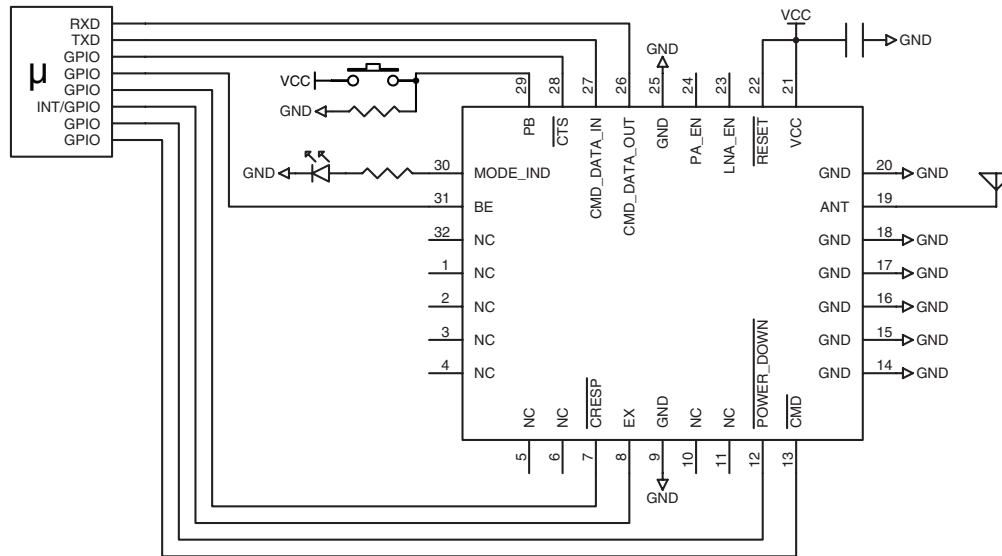
The HumPRO™ Series wireless UART module is a completely integrated RF transceiver and processor designed to transmit digital data across a wireless link. It has a built-in frequency hopping over-the-air protocol that manages all of the transmission and reception functions. It takes data in on its UART and supplies the data out of a UART on the remote module.

## Networking

The HumPRO™ Series modules have three addressing modes that support point-to-point and broadcast messages with 16 or 32-bit addresses. With no internal address or routing tables, the module does not limit the number of directly addressed or broadcast receivers within the operating range of the transmitter. Routing can be performed by an external microcontroller that is sized for memory and speed appropriate for the desired network size. Linx can provide guidance for establishing networks using the HumPRO™ Series modules. Contact us for details.

## Typical Application Circuit

The figure below shows a typical circuit that connects the HumPRO™ Series module to a microcontroller. Only three lines are required; CMD\_DATA\_IN, CMD\_DATA\_OUT and  $\overline{\text{CMD}}$ . The rest offer additional feedback or control, but can also be accessed through the serial interface.



### Ordering Information

| Part Number     | Description   |
|-----------------|---|
| HUM-***-PRO     | HumPRO™ Series Data Transceiver   |
| HUM-***-PRO-CAS | HumPRO™ Series Data Transceiver with Castellation Connection                |
| HUM-***-PRO-UFL | HumPRO™ Series Data Transceiver with u.FL Connector                         |
| EVM-***-PRO     | HumPRO™ Series Carrier Board  |
| EVM-900-PRO-CAS | HumPRO™ Series Carrier Board with Certified module, Castellation Connection |
| EVM-900-PRO-UFL | HumPRO™ Series Carrier Board with Certified module, u.FL Connector          |
| MDEV-***-PRO    | HumPRO™ Series Master Development System                                    |

\*\*\* = Frequency; 868, 900MHz