



**Amplified HumPRO™ Series  
Evaluation Module  
Data Guide**

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**All RF products are susceptible to RF interference that can prevent communication.** RF products without frequency agility or hopping implemented are more subject to interference. This module does have a frequency hopping protocol built in, but the developer should still be aware of the risk of interference.

**Do not use any Linx product over the limits in this data guide.** Excessive voltage or extended operation at the maximum voltage could cause product failure. Exceeding the reflow temperature profile could cause product failure which is not immediately evident.

**Do not make any physical or electrical modifications to any Linx product.** This will void the warranty and regulatory and UL certifications and may cause product failure which is not immediately evident.

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## Amplified HumPRO™ Series Evaluation Module

# Data Guide



Figure 1: Amplified HumPRO™ Series Evaluation Module

### Description

The Amplified HumPRO™ Series is a frequency hopping spread spectrum (FHSS) transceiver designed for the reliable transfer of digital data. It has a very fast lock time so that it can quickly wake up, send data and go back to sleep. A high-power 25dBm amplifier gives the module exceptional range.

The Amplified HumPRO™ Series module has several features that make the data transfer reliable. A Carrier Sense Multiple Access (CSMA) routine ensures that the channel is clear before the module begins transmitting data. Automatic acknowledgements ensure that the remote side got valid data. Multiple hopping patterns enable multiple systems to operate in proximity without interference. A standard UART interface is used for module configuration and data transfer.

All modules have a unique 32-bit serial number that can be used as an address. Source and destination addressing support point-to-point and broadcast links. Address masking by the receiving module allows for creating subnets. More advanced networks can also be implemented.

The amplified evaluation module contains the surface mount Amplified HumPRO™ Series transceiver module on a board with through-hole headers. The amplified module offers much greater range than the standard module by itself.

## Ordering Information

Ordering Information	
Part Number	Description
EVM-A-900-PRO-CAS	Amplified HumPRO™ Series Carrier Board, Castellated Connection with an edge-mount RP-SMA connector
EVM-A-900-PRO-UFL	Amplified HumPRO™ Series Carrier Board, U.FL Connector
HUM-A-900-PRO-CAS	Amplified HumPRO™ Series High Power Data Transceiver with Castellated Connection
HUM-A-900-PRO-UFL	Amplified HumPRO™ Series High Power Data Transceiver with U.FL Connector
MDEV-A-900-PRO	Amplified HumPRO™ Series Master Development System
MDEV-PGDOCK	Development System Programming Dock
MDEV-PROTO	Development System Prototype Board
CON-SOC-EVM	EVM Module Socket Kit

Figure 2: Ordering Information

## Absolute Maximum Ratings

Absolute Maximum Ratings				
Supply Voltage $V_{CC}$	-0.3	to	+3.9	VDC
Any Input or Output Pin	-0.3	to	$V_{CC} + 0.3$	VDC
RF Input		+5		dBm
Operating Temperature	-40	to	+85	°C
Storage Temperature	-40	to	+85	°C

Exceeding any of the limits of this section may lead to permanent damage to the device. Furthermore, extended operation at these maximum ratings may reduce the life of this device.

Figure 3: Absolute Maximum Ratings



**Warning:** This product incorporates numerous static-sensitive components. Always wear an ESD wrist strap and observe proper ESD handling procedures when working with this device. Failure to observe this precaution may result in module damage or failure.

## Electrical Specifications

Amplified HumPRO™ Series Transceiver Specifications						
Parameter	Symbol	Min.	Typ.	Max.	Units	Notes
Power Supply						
Operating Voltage	$V_{CC}$	2.7	3.3	3.6	VDC	
TX Supply Current	$I_{CCTX}$					
at +25dBm			380		mA	
at +22dBm			260		mA	1,2
RX Supply Current	$I_{CCRX}$		39		mA	1,2,3
Power-Down Current	$I_{PDN}$		<1		μA	1,2
RF Section						
Operating Frequency Band	$F_C$	902		928	MHz	
Receiver Sensitivity						
@ 19.2kbps RF rate			-108		dBm	5
@ 153.6kbps RF rate			-101		dBm	5
Max Output Power						
@ 19.2kbps RF rate	$P_O$		+25		dBm	6
@ 153.6kbps RF rate	$P_O$		+22		dBm	6
Antenna Port						
RF Impedance	$R_{IN}$		50		Ω	4
Environmental						
Operating Temp. Range		-40		+85	°C	4
1. Measured at 3.3V $V_{CC}$						4. Characterized but not tested
2. Measured at 25°C						5. PER = 1%
3. Input power -60dBm						6. Into a 50-ohm load

Figure 4: Electrical Specifications

Please see the Amplified HumPRO™ Series Transceiver module data guide for full electrical specifications.

## Pin Assignments

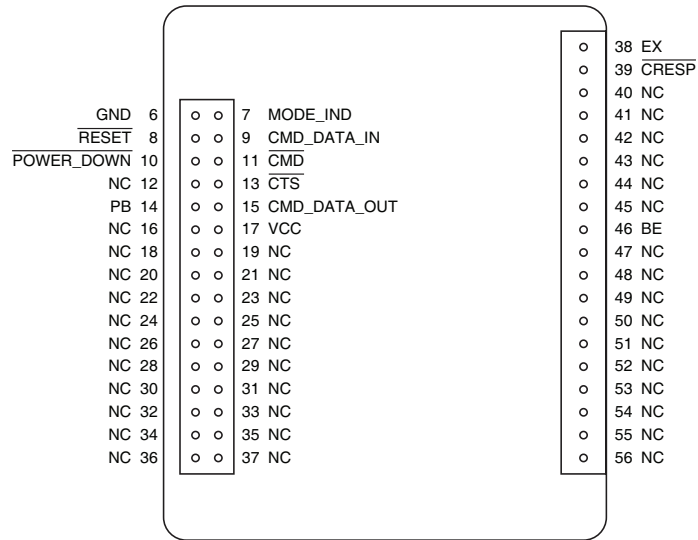


Figure 5: EVM-A-fff-PRO Pin Assignments

## Pin Descriptions

Pin Descriptions			
Pin Number	Name	I/O	Description
6	GND	—	Ground
7	MODE_IND	O	Mode Indicator. This line indicates module activity. It can source enough current to drive a small LED, causing it to flash. The duration of the flashes indicates the module's current state.
8	$\overline{\text{RESET}}$	I	This line resets the module when pulled low. It should be high for normal operation. This line has an internal 10k resistor to supply, so leave it unconnected if not used.
9	CMD_DATA_IN	I	Command Data In. Input line for data ( $\overline{\text{CMD}}$ is high) and serial commands ( $\overline{\text{CMD}}$ is low).
10	$\overline{\text{POWER\_DOWN}}$	I	Power Down. Pulling this line low places the module into a low-power state. The module is not functional in this state. Pull high for normal operation. Do not leave floating.
11	$\overline{\text{CMD}}$	I	Command Input. When this line is low, incoming bytes are command data. When high, incoming bytes are data to be transmitted.

Pin Descriptions			
Pin Number	Name	I/O	Description
12, 18, 19, 21-37, 40-56	NC	—	No Electrical Connection. Do not connect any traces to these lines.
13	$\overline{\text{CTS}}$	O	UART Clear To Send, active low. This line indicates to the host microcontroller when the module is ready to accept data. When CTS is high, the module is busy. When CTS is low, the module is ready for data.
14	PB	I	Push Button input. This line can be connected to Vcc through a normally open push button. Button sequences can reset configurations to default and join modules into a network. <b>Pull low when not in use; do not leave floating.</b>
15	CMD_DATA_OUT	O	Command Data Out. Output line for data and serial commands
17	VCC	—	Supply Voltage
38	EX	O	Exception Output. A mask can be set to take this line high when an exception occurs. The line is lowered when the exception register is read (EXCEPT).
39	$\overline{\text{CRESP}}$	O	Command Response. This line is low when the data on the CMD_DATA_OUT line is a response to a command and not data received over the air.
46	BE	O	Buffer Empty. This line is high when the UART input buffer is empty, indicating that all data has been transmitted. If acknowledgment is active, it also indicates that the receiving module has acknowledged the data or a retry exception has occurred.

Figure 6: EVM-A-fff-PRO Pin Descriptions

## Schematic

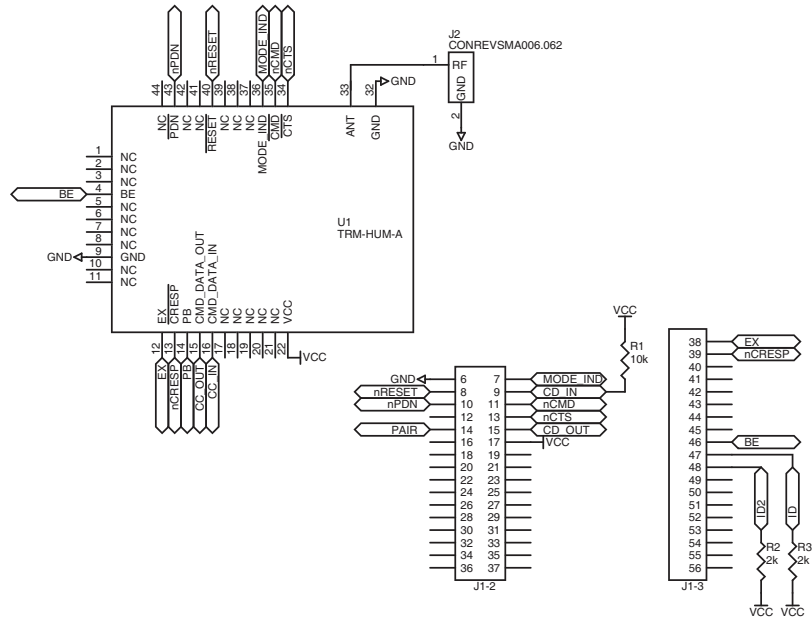


Figure 7: EVM-A-fff-PRO Schematic

## Module Dimensions

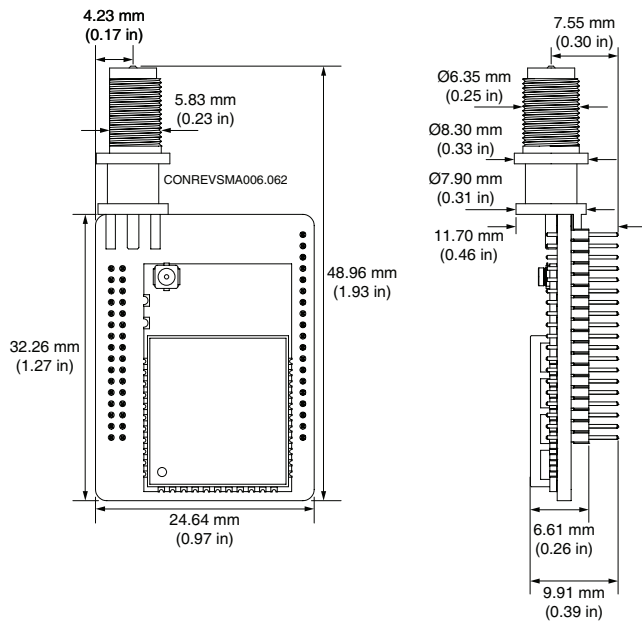


Figure 8: EVM-A-fff-PRO Dimensions

## Pad Layout

Figure 9 shows the recommended PCB layout for the evaluation module.

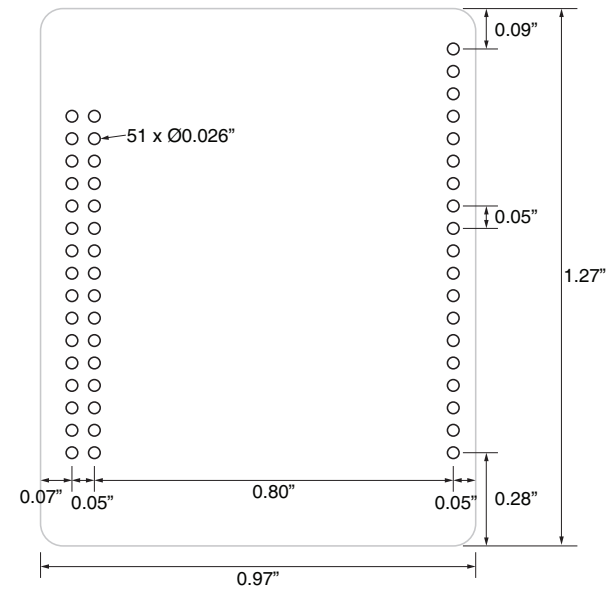


Figure 9: EVM-A-fff-PRO PCB Layout Dimensions

## Power Supply Requirements

The transceiver incorporates a precision low-dropout regulator which allows operation over a wide input voltage range. Despite this regulator, it is still important to provide a supply that is free of noise. Power supply noise can significantly affect the module's performance, so providing a clean power supply for the module should be a high priority during design.

Consider the module's max supply current of 380mA when designing the power delivery network. Thin traces for the supply and ground connections may not be able to supply enough current and may degrade the module's performance.



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