Linx TECHNOLOGIES

HumDT™ Series Evaluation Module Data Guide

Wireless made simple®

Warning: Some customers may want Linx radio frequency ("RF") products to control machinery or devices remotely, including machinery or devices that can cause death, bodily injuries, and/or property damage if improperly or inadvertently triggered, particularly in industrial settings or other applications implicating life-safety concerns ("Life and Property Safety Situations").

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Customers may use our (non-Function) Modules, Antenna and Connectors as part of other systems in Life Safety Situations, but only with necessary and industry appropriate redundancies and in compliance with applicable safety standards, including without limitation, ANSI and NFPA standards. It is solely the responsibility of any Linx customer who uses one or more of these products to incorporate appropriate redundancies and safety standards for the Life and Property Safety Situation application.

Do not use this or any Linx product to trigger an action directly from the data line or RSSI lines without a protocol or encoder/decoder to validate the data. Without validation, any signal from another unrelated transmitter in the environment received by the module could inadvertently trigger the action.

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 not have a frequency hopping protocol built in.

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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HumDT™ Series Evaluation Module

Data Guide

Figure 1: HumDT™ Series Evaluation Module

Description

The HumDT™ Series transceiver is designed for the reliable wireless transfer of serial digital data. It consists of a highly optimized RF transceiver and integrated data and networking protocol. A frequency agile over-the-air protocol provides better link reliability than narrowband solutions while providing faster synchronization and data output than Frequency Hopping Spread Spectrum (FHSS) algorithms.

The frequency agile protocol in the 900MHz version sends the same data on up to 4 channels, providing the noise immunity benefits of FHSS without the overhead of a hopping protocol. A serial command selects the number of channels as well as which specific channels are used. The 868MHz version sends data on a single channel, which is selected with a serial command on the UART.

The module's UART interface is used for module configuration and data transfer. 8 GPIOs can be used for analog and digital functions and are controlled through the UART. The module is available in the 863 to 870MHz and 902 to 928MHz frequency bands.

The evaluation module contains the surface mount HumDT™ Series transceiver module and an MMCX connector on a single board with through-hole headers. This small board simplifies prototyping with the HumDT™ Series module.

Ordering Information

Ordering Information	
Part Number	**Description**
EVM-***-DT	HumDT™ Series Carrier Board
HUM-***-DT	HumDT™ Series Transceiver
MDEV-***-DT	HumDT™ Series Master Development System
MDEV-PGDCK	Development System Programming Dock
MDEV-PROTO	Development System Prototype Board
CON-SOC-EVM	EVM Module Socket Kit

*** = Frequency; 868, 900MHz

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		0		dBm
Operating Temperature	–40	to	+85	ºC
Storage Temperature	–40	to	+85	ºC

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.

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

Electrical Specifications

HumDT™ Series Transceiver Specifications						
Parameter	**Symbol**	**Min.**	**Typ.**	**Max.**	**Units**	**Notes**
Power Supply						
Operating Voltage	V_{CC}	2.0		3.6	VDC	
TX Supply Current	I_{CCTX}					
at +10dBm			38	40	mA	1,2
at 0dBm			20.5	24	mA	1,2
RX Supply Current	I_{CCRX}		22	28	mA	1,2,3
Sleep Current	I_{SLP}		4.5	5	µA	1,2
Power-Down Current	I_{PDN}		0.3	2	µA	1,2
Idle Current	I_{IDL}		4.5	5	µA	1,2
RF Section						
Operating Frequency Band	F_C				MHz	
HUM-900-DT		902		928	MHz	
HUM-868-DT		863		870	MHz	
Data Rate						
RF Data Rate		26		250	kbps	
Serial Data Rate		1.2		115.2	kbps	
Receiver Sensitivity						
@min rate		–98	–101		dBm	5
@max rate		–89	–92		dBm	5
Output Power	P_O	+8.5	+9.5		dBm	6
Antenna Port						
RF Impedance	R_{IN}		50		Ω	4
Environmental						
Operating Temp. Range		–40		+85	ºC	4

1. Measured at 3.3V V_{CC}
2. Measured at 25ºC
3. Input power < -60dBm
4. Characterized but not tested
5. PER = 5%
6. Into a 50-ohm load

Figure 4: Electrical Specifications

Pin Assignments

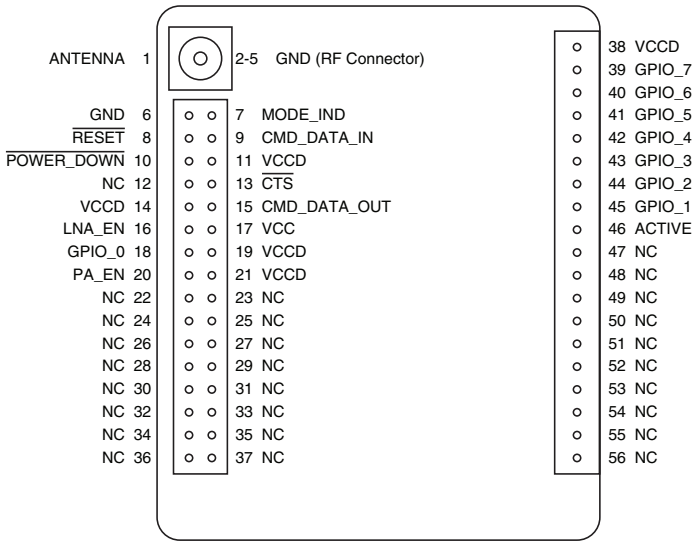

Figure 5: EVM-xxx-DT Pin Assignments

Pin Descriptions

Pin Descriptions

Pin Number	Name	I/O	Description
1	ANTENNA	—	50-ohm RF Antenna Port
2, 3, 4, 5, 6	GND	—	Ground
7	MODE_IND	O	This output goes high when the module is sending or receiving data over the air. This line can directly drive an LED for visual indication of activity.
8	$\overline{\text{RESET}}$	I	This line resets the module when pulled low. It should be pulled 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 the serial interface commands. If serial control is not used, this line should be tied to VCC or $\overline{\text{POWER\_DOWN}}$ to minimize current consumption.
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.

Pin Descriptions

Pin Number	Name	I/O	Description
11, 14, 19, 21, 38	VCCD	—	These lines are inputs that are pulled to supply internally. They can be left unconnected, but boards in noisy environments or with noisy components in the same product are recommended to pull these lines to V_{CC}. The potential exists for random noise to affect the line and cause unexpected operation. This risk is reduced in simple, battery powered applications, but should be considered in all designs.
12, 22–37, 47-56	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 $\overline{\text{CTS}}$ is high, the module is busy. When $\overline{\text{CTS}}$ is low, the module is ready for data.
15	CMD_DATA_OUT	O	Command Data Out. Output line for the serial interface commands
16	LNA_EN	O	Low Noise Amplifier Enable. This line is driven high when receiving. It is intended to activate an optional external LNA.
17	VCC	—	Supply Voltage
18, 39-45	GPIO_0–GPIO_7	I/O	General Purpose I/O Lines. Each line can be configured as either an analog input, a digital input or a digital output. The digital inputs can be configured to have either a 20kΩ pull up or pull down resistance or high impedance (no resistors).
20	PA_EN	O	Power Amplifier Enable. This line is driven high when transmitting. It is intended to activate an optional external power amplifier.
46	ACTIVE	O	This output goes high when the module is powered on and functional. This line can directly drive an LED for visual indication of activity.

Figure 6: EVM-xxx-DT Pin Descriptions

Schematic

Figure 7 shows the schematic diagram for the evaluation module.

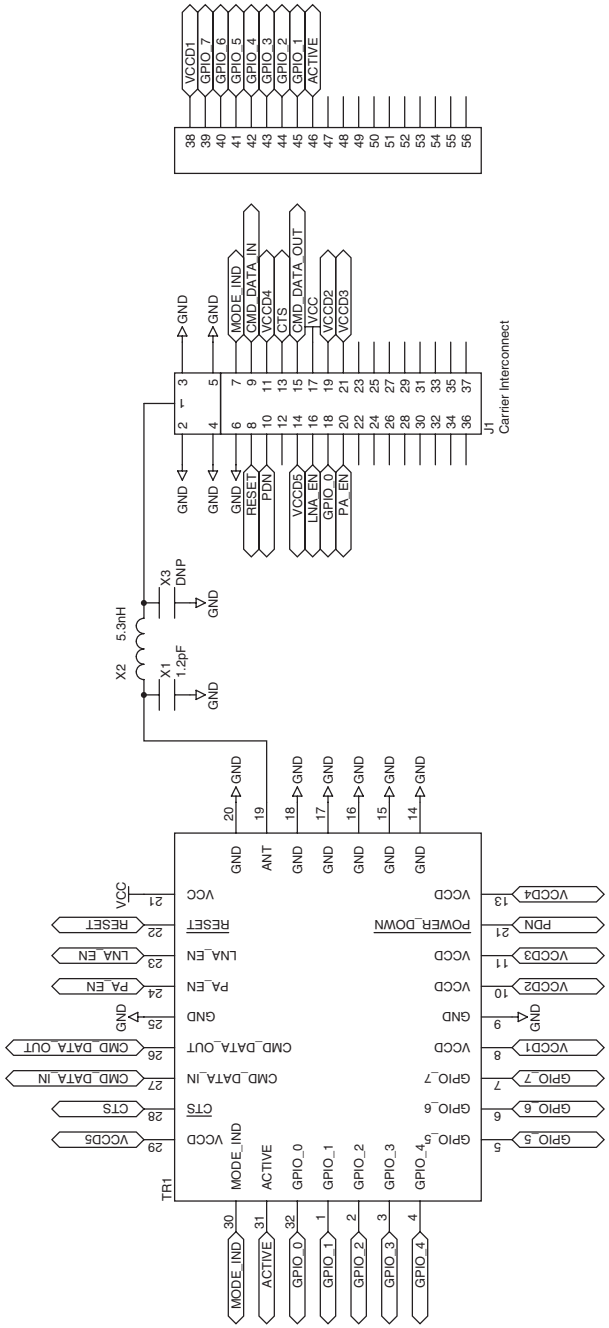

Figure 7: EVM-xxx-DT Schematic

Pad Layout

Figure 8 shows the recommended PCB layout for the evaluation module.

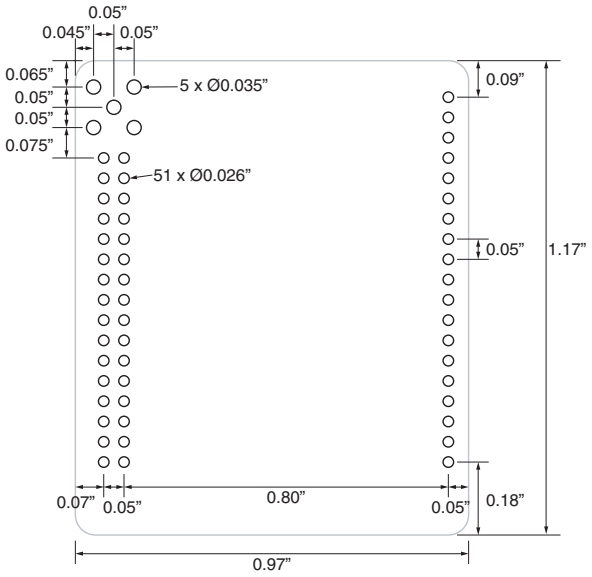

Figure 8: EVM-xxx-DT PCB Layout Dimensions

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.

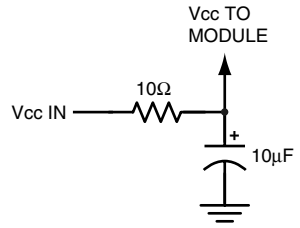

Figure 9: Supply Filter

A 10Ω resistor in series with the supply followed by a 10µF tantalum capacitor from V_{CC} to ground helps in cases where the quality of supply power is poor (Figure 9). This filter should be placed close to the module’s supply lines. These values may need to be adjusted depending on the noise present on the supply line.

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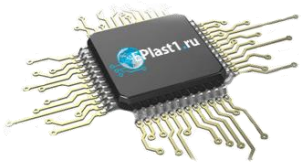

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