



HumDT™ Series
Evaluation Module
Data Guide

Wireless made simple®

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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 not have a frequency hopping protocol built in.

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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 | °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.

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 | °C | 4 |

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

Figure 4: Electrical Specifications

Pin Assignments

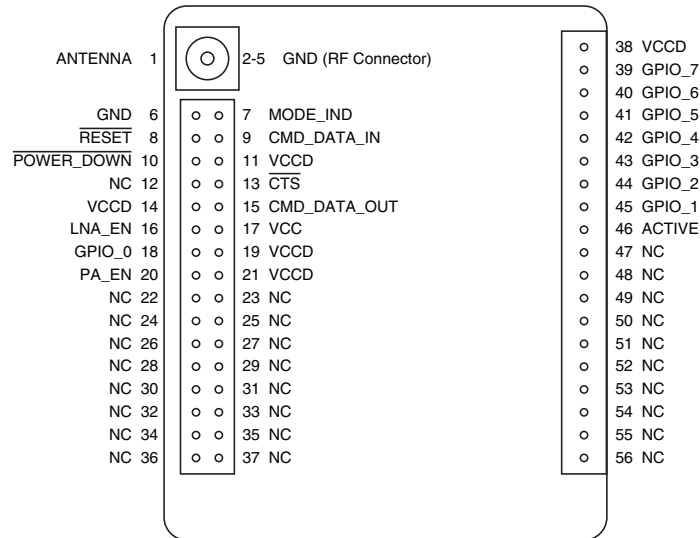


Figure 5: EVM-xxx-DT Pin Assignments

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 | 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 POWER_DOWN to minimize current consumption. |
| 10 | 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 | 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. |
| 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.

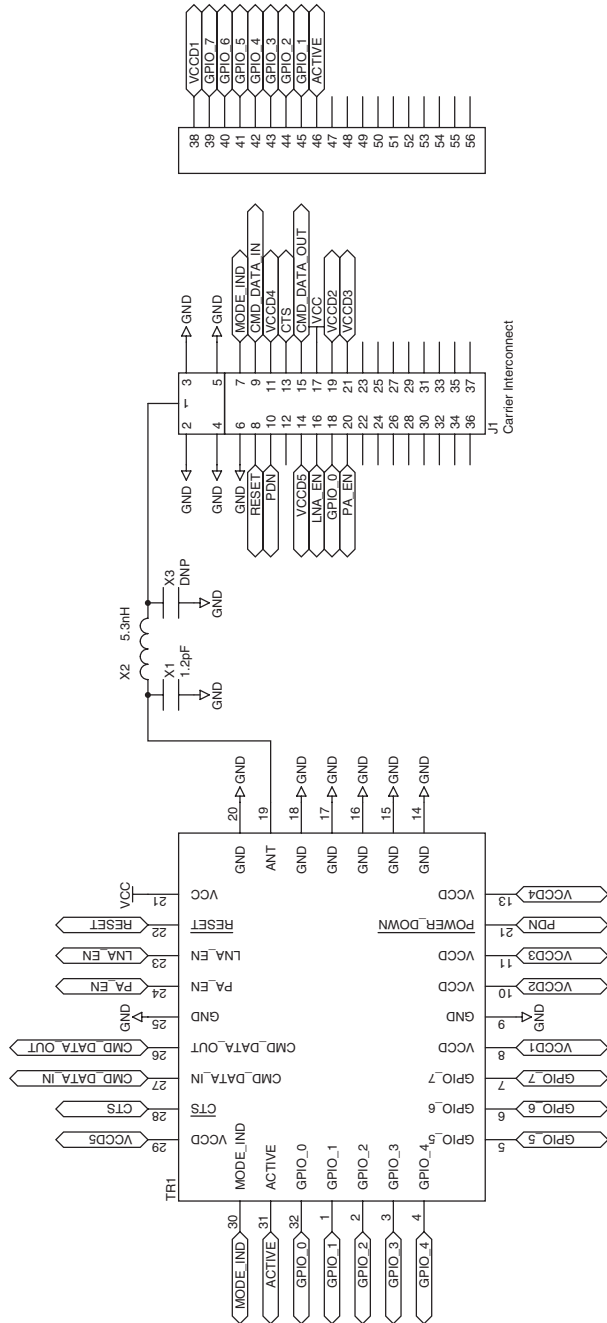


Figure 7: EVM-xxx-DT Schematic

Pad Layout

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

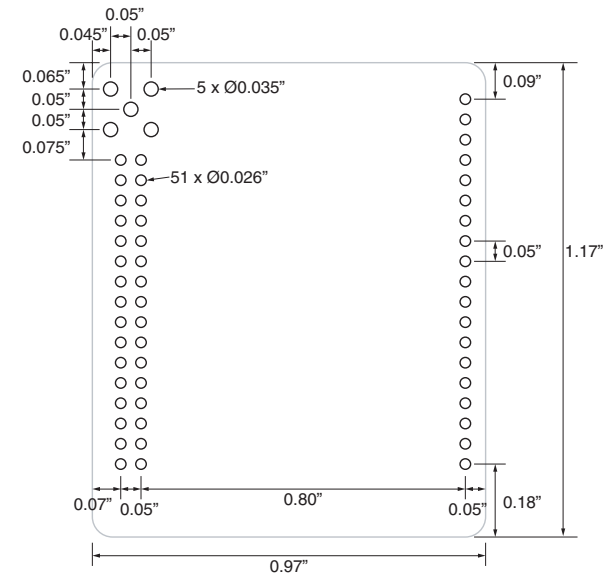


Figure 8: EVM-xxx-DT PCB Layout Dimensions

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.

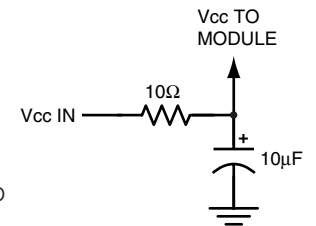


Figure 9: Supply Filter

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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