

# **OBee User Manual**

D&H Global Enterprise LLC

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## 2 Overview

This manual describes the hardware of the OBee module running ONE-NET firmware.

### 2.1 Summary

The OBee is an Open Hardware module running the Open-Source ONE-NET protocol. The OBee designed to operate in the 916MHz ISM band of the United States. With the ONE-NET firmware, the OBee is capable of ONE-NET’s star, P2P, or mesh configurations. The OBee has the footprint and pinout of other common ISM radio modules and has similar configuration methods through its serial connection.

### 2.2 Certifications

The OBee carries a modular certification from the United States’ FCC. See the Agency Certifications sections for more details.

## 2.3 Specifications

Specification	Value
Transmit Power	9.65dBm
Receive Sensitivity	-104dBm
Supply Voltage	3.3V
Operating Current, Transmitting	48mA
Operating Current, Receiving	39mA
Power-down Current	2.25mA
Operating Frequency	903.0MHz to 927.0MHz
Channels	1 - 25
Channel Spacing	1.0MHz
Modulation	Frequency-Shift Keying
FSK Deviation	240.3KHz
Dimensions	33.5mm X 24.5mm X 8.25mm
Operating Temperature	-40°C to 85°C
Antenna Interface	u.fl

## 2.4 Pinouts

The following table describes the pinouts of the OBee module. Note: as of release not all functions are implemented.

Pin	Function
1	Vcc = 3.3V
2	Dout
3	Din
4	DIO12
5	<i>RESET</i>
6	PWM0/RSSI/DIO10
7	PWM1/DIO11
8	Reserved
9	<i>DTR</i> /SLEEP_RQ/DIO8
10	GND
11	AD4/DIO4/TDO
12	<i>CTS</i> /DIO7
13	ON/ <i>SLEEP</i> /DIO9
14	VREF
15	ASSOC/DIO5/AD5
16	<i>RTS</i> /DIO6
17	AD3/DIO3
18	AD2/DIO2
19	AD1/DIO1
20	AD0/DIO0/COMMIS

## 3 Detailed Description

### 3.1 Hardware

The OBee module consists of two integrated circuit (IC) chips. The Analog Devices ADF7025 transceiver IC handles the reception and transmission of radio frequency (RF) signals in the range of 903 to 927MHz. The other IC, the Atmel ATXmega256A3B, controls the transceiver, the ONE-NET protocol stack, serial port communication and other peripheral activities. The whole module operates at a nominal 3.3V and has an operating voltage range from 2.3V to 3.6V. As of first release, the currently functional peripheral pins are the DIN and DOUT for serial communication with a host processor and DIO0, DIO1, DIO2, and DIO3 as digital I/O. The |RESET| can be used to put the module into a low-power reset state. Additionally, JTAG programming pins for programming the ATXmega256A3B have been broken out as indicated in the pinout table. All other pins and additional pin functionality have not yet been added to the OBee application code and should be left unconnected or pulled up to Vcc through high-value resistors.

### 3.2 Firmware

The firmware running in the OBee is the ATXmega port of the ONE-NET code. ONE-NET has its own manual that can be found here:

[http://one-net.info/index.php?option=com\\_content&view=category&layout=blog&id=9&Itemid=6](http://one-net.info/index.php?option=com_content&view=category&layout=blog&id=9&Itemid=6)

## 4 Agency Certifications

### 4.1 United States FCC

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Any changes or modifications to OBee modules not expressly approved by D&H Global Enterprise, LLC may void your authority to operate those modules.

To comply with United States' FCC regulations, a label must be permanently affixed to the outside of any device that contains an OBee module if the OBee module is not visible when it is installed. The label should state: "Contains FCC ID: N8M-OBEE00"

Or similar wording that expresses the same meaning.

### 4.2 Approved Antennas

The following is a list of approved antennas that have been certified to comply with agency regulations when used with the OBee.

Part Number	Description
W1063	3DBi, 50Ω, $\frac{1}{4}$ wave dipole, RP-SMA male, articulated
HLX-G2-007	2dBi, 50Ω, RP-SMA male, articulated
ANT-916-CW-RH	-1.31dBi, 50Ω, $\frac{1}{4}$ wave helical, RP-SMA male, straight

## 5 Safety

### 5.1 Radiation Exposure

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment can be in direct contact with the body of the user under normal operating conditions. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

## 6 Installation

### 6.1 Installation Instructions

The OBee module is certified with a limited modular approval and shall only be installed by D&H Global Enterprise, LLC into approved devices. For more information, please contact D&H Global Enterprise, LLC.