



OEM100 MODULE

VERSION 1.1

Hardware Manual

HARDWARE MANUAL

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Part # 1390 – OEM100 Module Hardware Manual

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In the interest of product improvement, information and specifications herein are subject to change without notice.

FCC Statement

The H900 equipment 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.

FCC Caution: Any changes or modifications not expressly approved by Sensicast could void the user's authority to operate this equipment.

FCC RF Radiation Exposure Statement: The module complies with FCC's RF exposure requirements and the module must not be co-located or operated in conjunction with any other antenna or transmitter.

FCC Labeling

The module is labeled with its own FCC ID number (RNB-OEM100). If this number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label with the following wording: "Contains FCC ID:RNB-OEM100"

Introduction

This design guide is intended to provide a good understanding of the functionality of the OEM100 module. The intended audience is the engineer responsible for integrating the OEM100 into a product.

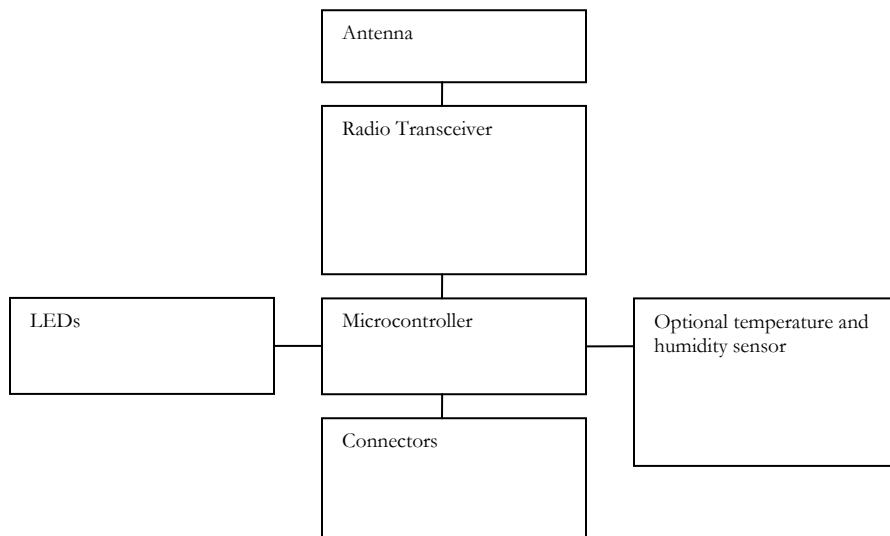
Description and Specifications

The OEM100 is a component of the Sensicast H900 Wireless Sensor Network Platform – a completely self-configuring, self-healing, power managed sensor network.

Powered by SensiNet, Sensicast's proprietary mesh networking software, the OEM100 is the most reliable mesh networking radio module on the market today. It has a range of over 1000 feet (outdoors) and 300 feet (indoors, non-line of site). Furthermore, SensiNet uses frequency diverse radio algorithms to ensure reliable, clear channel communication even in the most harsh radio environments.

In addition, off-the-shelf H900 infrastructure hardware and software for constructing and maintaining your mesh network is available from Sensicast.

Block diagram



Antenna

There is a board mounted antenna on the device. For best performance, care should be taken to keep metal components away from the antenna.

Radio Transceiver

The radio is under control of the OEM100's microcontroller and is contained inside the metal shield.

Microcontroller

The SensiNet software, including the sensor API, runs on this microcontroller. It includes onboard flash memory, RAM, and analog and digital I/O and a 32Khz real time clock.

LEDs

There are three LEDs: red, yellow and green that are firmware controlled.

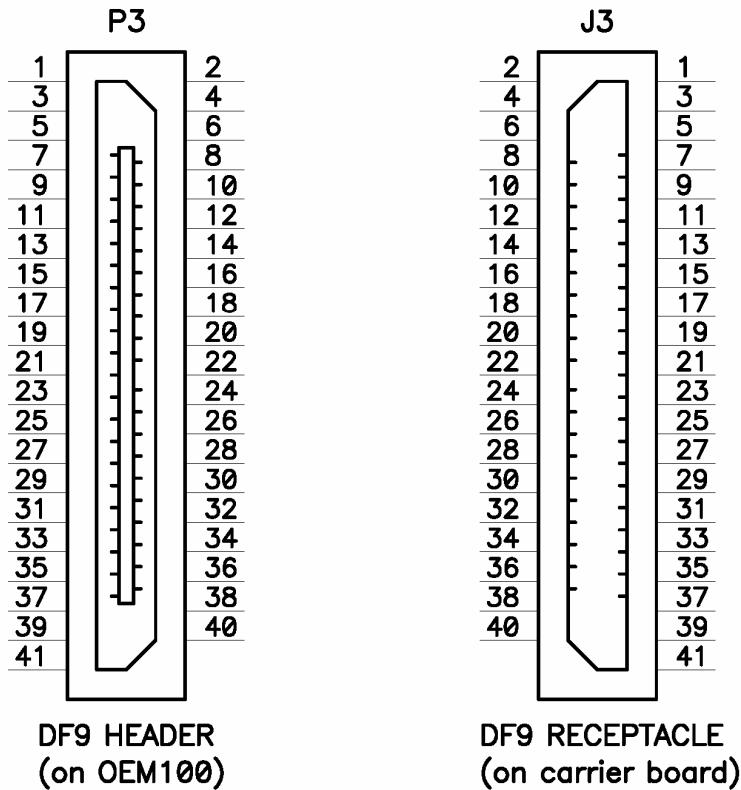
Optional temperature and humidity sensor

The OEM100 can be preloaded with a temperature and humidity sensor. Please contact Sensicast for temperature and humidity specifications.

Connectors

The primary interconnection is P3, the 41 position board to board, header (Hirose p/n DF9A-41P-1V(20); mates with: Hirose p/n DF9A-41S-1V(20)) on the bottom of the assembly.

Optionally, power can be brought to the board through P5, a two position, right angle wire to board, header (JST p/n S2B-PH-K-S, mate: JST p/n PHR-2). Here is a schematic drawing of P3 and a list of signal descriptions for both connectors:



J3 Pin	OEM100 Signal	Type	OEM100 Description
1	GND	Ground	Ground
2	GND	Ground	Ground
3	VCC	Power	Power
4	VCC	Power	Power
5	GND	Ground	Ground
6	DIG2/EXTINT2	I/O	General I/O / external interrupt
7	SPARE1	I/O	General I/O
8	DIG1/EXTINT1	I/O	General I/O / external interrupt
9	SPARE0	I/O	General I/O
10	DIG0/EXTINT0	Input	Initialization
11	AN1	Input	Analog In
12	SDA	I/O	Two-wire interface data
13	AN0	Input	Analog In

14	DIG3/CNT3	I/O	General I/O / external interrupt / counter in
15	GND	Ground	Ground
16	RTS	Output	UART RTS
17	RESET#	Input	Reset (active low)
18	CTS	Input	UART CTS
19	TCK	Input	JTAG programming
20	SCK	I/O	Two-wire interface clock
21	TMS	Input	JTAG programming
22	SPARE1	I/O	General I/O
23	TDI	Input	JTAG programming
24			Reserved
25	TDO	Output	JTAG programming
26			Reserved
27			Reserved
28	TXD1	Output	UART transmit data
29			Reserved
30	RXD1	Input	UART RX
31			Reserved
32			Reserved
33			Reserved
34	FLAG0	Output	Initialization
35			Reserved
36			Reserved
37			Reserved
38	VSUPPLY	Power	Power
39	VSUPPLY	Power	Power
40	GND	Ground	Ground
41	GND	Ground	Ground

J5 Pin	OEM100 Signal	Type	OEM100 Description
1	VSUPPLY	Power	Power
2	GND	Ground	Ground

Functional descriptions

Power: The module is powered by a DC power source from 2.0V to 3.3V. The absolute maximum voltage that should be applied is 3.6V. VCC and VSUPPLY are connected through a zero ohm resistor on the module. The power plane is attached directly to VCC. P3 can carry 100mA per pin; P5 can carry 500mA per pin.

Ground: These are attached to the ground plane of the module. P3 can carry 100mA per pin; P5 can carry 500mA per pin.

General I/O: These are bidirectional, CMOS level, digital signals running between VCC and GND.

General I/O / external interrupt: These are bidirectional, CMOS level, digital signals running between VCC and GND. They can also be configured as external, hardware interrupts.

General I/O / external interrupt / counter in: This is a bidirectional, CMOS level, digital signal running between VCC and GND. It can be configured as external, hardware interrupt or as an input to a counter.

Analog In: These are analog inputs.

Initialization: These pins are digital inputs and outputs used during the initialization of the module.

Two-wire interface: Both SDA and SCK have 10K ohm pull-ups to VCC. The module acts as the master on the bus.

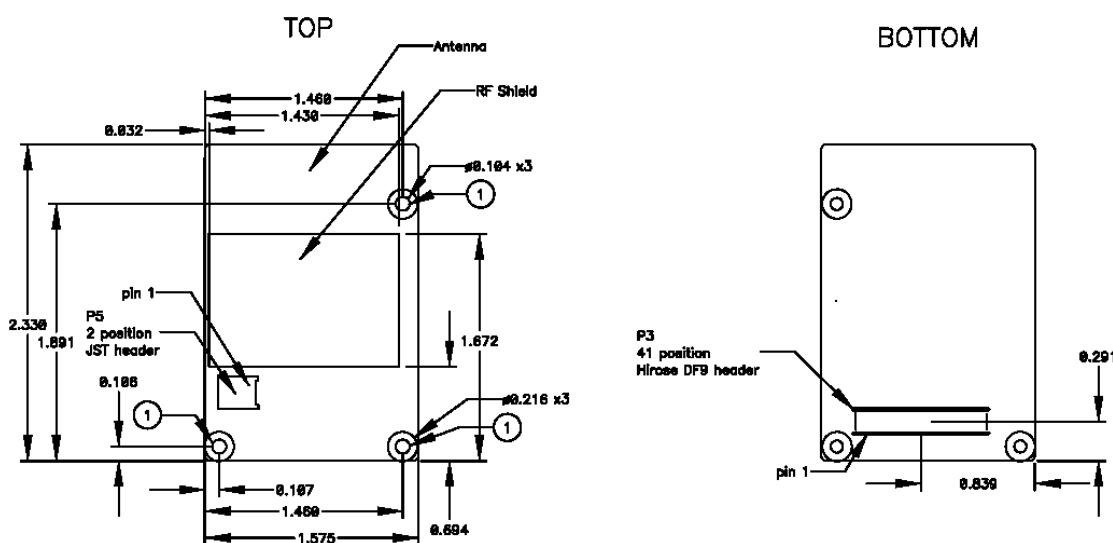
UART: Two wire (RX/TX) or four wire (RX/TX/CTS/RTS) logic level interface. Runs at 9600 baud, 8 data bits, no parity, 1 stop bit.

Reset: An active low signal (RESET#) to reset the microcontroller. Used during debug and test of the module.

JTAG Programming: These provide a four wire interface into JTAG controller on the modules microcontroller. These are used during debug and test of the module.

Mechanical interface

(all dimensions in inches unless otherwise noted)

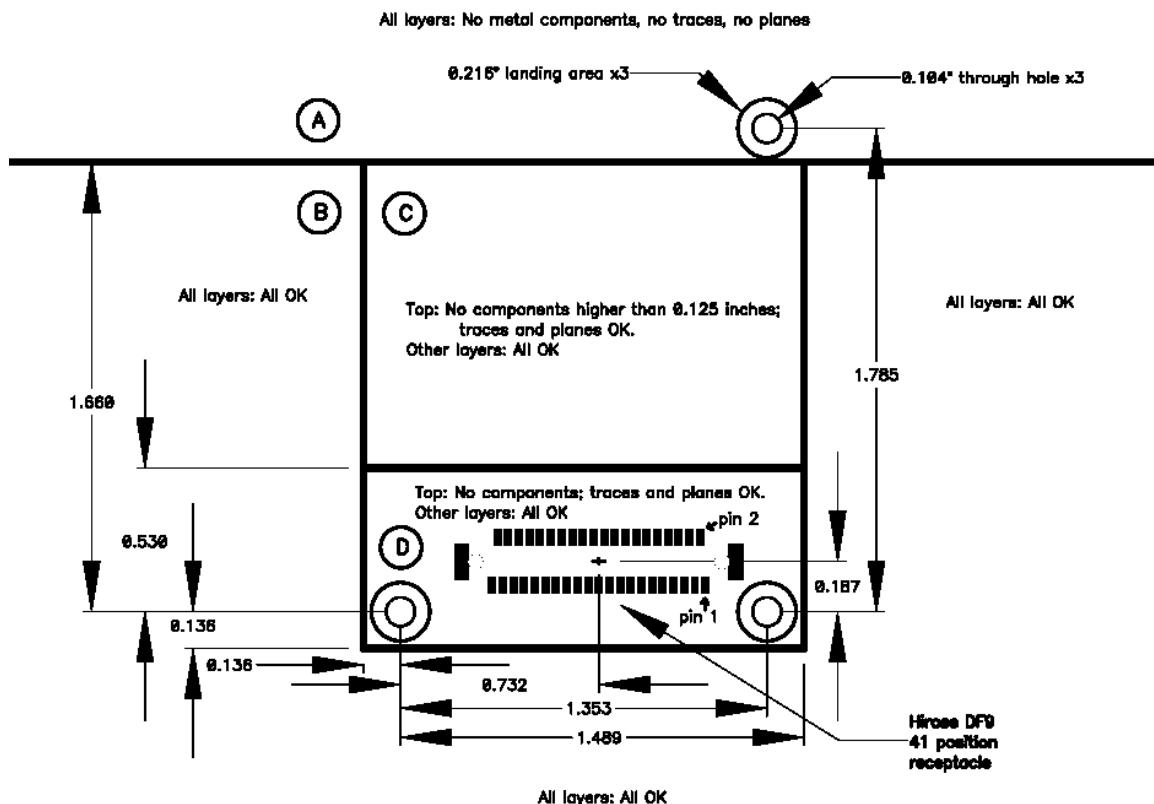


Top side module height: max 0.250"

Bottom side module height: max 0.169"

The OEM100 is a printed circuit board (PCB) assembly with two connectors (P3 and P5) and three mounting holes. The primary interconnection is P3, the 41 position board to board, connector on the bottom of the assembly. When loaded into its mating connector on a carrier board, the bottom of the OEM100's PCB will be 4.3mm (0.169 inches) from the top of that carrier board. The mounting holes are designed to accommodate 4mm tall, board to board, plastic, stacking posts also on the bottom side (e.g. Richco p/n MDLSP1-04M-01). Alternatively, #2, nylon fasteners may be used.

Recommended PCB Layout



The OEM100 occupies 2.35" by 1.58" and is designed to plug into a PCB mounted, 41 position, Hirose DF9 receptacle (Hirose p/n DF9A-41S-1V(20)). Please refer to Hirose's documentation for more information about this connector. There are three mounting holes designed to accommodate 4mm plastic stacking posts (Richco p/n MDLSP1-04M-01).

There are four distinct areas of the carrier board PCB:

- This is reserved for the OEM100's radio signals, and this area should be kept clear of all metal components including traces and planes. Note, this zone extended above and below the PCB.
- In this area there are no restrictions on component placement or height.
- On the top layer, components should be limited to 0.125" in height to fit below the OEM100. On all other layers there are no restrictions.
- On the top layer, the only component should be the Hirose receptacle. On all other layers there are no restrictions.

Product Labeling Information

Please see important FCC labeling information at the beginning of this manual.

Each module is programmed with a unique address. This address is printed on the barcode label on the back of the module. In most applications it is helpful to reproduce this label on the outside of the final product packaging.

Technical Specifications

Radio frequency	902-928MHz Frequency Hopping Spread Spectrum
Radio power	+10dBm (10mW) nominal

Battery life	Up to 3 years with a 2/3A Lithium battery using a 2 minute report interval (sensor dependent)
Range	Up to 1000° (outdoors, line of sight) Up to 300° (typical indoor conditions)
Connector options	Two (2) analog input lines Six (6) digital I/O lines Two wire interface bus UART (TX, RX, RTS and CTS)
Duty cycle	Remotely user-adjustable (default 3 minutes)
Antenna	Board mounted, omni-directional antenna included
LEDs	3 diagnostic LEDs (red, yellow and green)