# 433Mhz sensor board [V2] - User's manual

You will find here a resource base for playing around with your new home automation sensors. They allow to collect data from up to 3 sensors and send it over radio protocols, while consuming very low power (6µA). With this documentation you can easily hack theses boards to fit your own needs. I will also constantly add new compatible devices, and offering some new possibilities.

Revisions of this document:

| Rev1 | 26/05/2019 | Creation for the Version 2 of the product [WIP] |
|------|------------|------------------------------------------------|
|      |            |                                                |
|      |            |                                                |
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|      |            |                                                |
|      |            |                                                |

## Useful links

Atmel specifications for the ATTiny84:
https://www.microchip.com/wwwproducts/en/ATtiny84
Complete datasheet of the ATTiny84:
http://ww1.microchip.com/downloads/en/DeviceDoc/doc8006.pdf
Programming an ATTiny with an arduino:
https://www.instructables.com/id/Program-an-ATtiny-with-Arduino/

Oregon protocol for sending weather data via radio:
http://wmrx00.sourceforge.net/Arduino/OregonScientific-RF-Protocols.pdf
Implementation of the Oregon protocol (example code, in French):
https://www.tutomotique.fr/fabriquer-ses-propres-sondes-diy/

Website of the spare parts for the sensor:
https://ndsensors.duckdns.org

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# Specifications

## Board general specifications

Power source: you can choose between CR2032 3V lithium primary cell or 14500 3.7V lithium.

Transmitter: You can choose between short range kit (20m indoor and less than 4 walls) which is the default option, or a long range kit (which includes a 19cm antenna, transmits up to 60m and 4 walls).

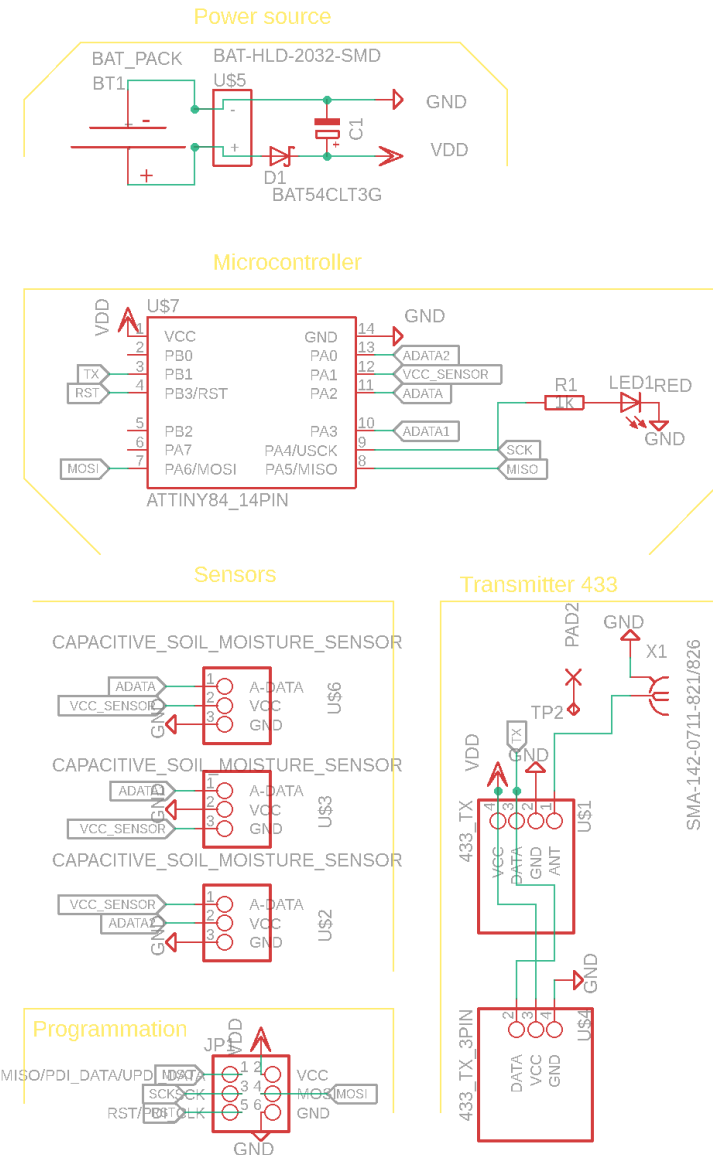Voltage: 2.7V -> 5.5V if you don't want to take an option.

Energy: 5.1µA @8MHz WDT enabled

Sensors: up to 3 sensors. 3-pins digital or analogic sensors. Max input current: 20mA per sensor. The sensors are powered directly from the microcontroller pins.

## Microcontroller specifications

## Beware compatibility precautions

# Schematics of the board

### Power source



### Microcontroller



ATTINY84_14PIN

### Sensors

CAPACITIVE_SOIL_MOISTURE_SENSOR

CAPACITIVE_SOIL_MOISTURE_SENSOR

CAPACITIVE_SOIL_MOISTURE_SENSOR

### Transmitter 433



### Programmation



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The following pictures show the complete board pins, and are meant for comprehension. **This is NOT what you will receive** unless you explicitly ask for it. It will only allow you to better understand, and maybe hack the board if you need it. However, when you order on Tindie, you receive a partly assembled product according to your need in terms of transmission range and power.

The board is designed to be optional. If you really have size constraint, you choose to power if with a CR2032 or solder any smaller battery on its pads and then cut the 2 edges of the board. You will need a strong plier for this. It will reduce the board size from 57mm to 36mm.
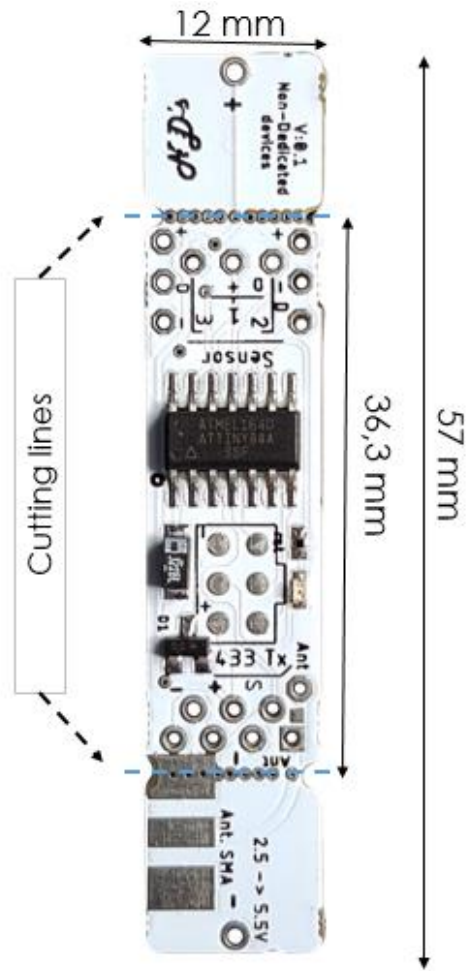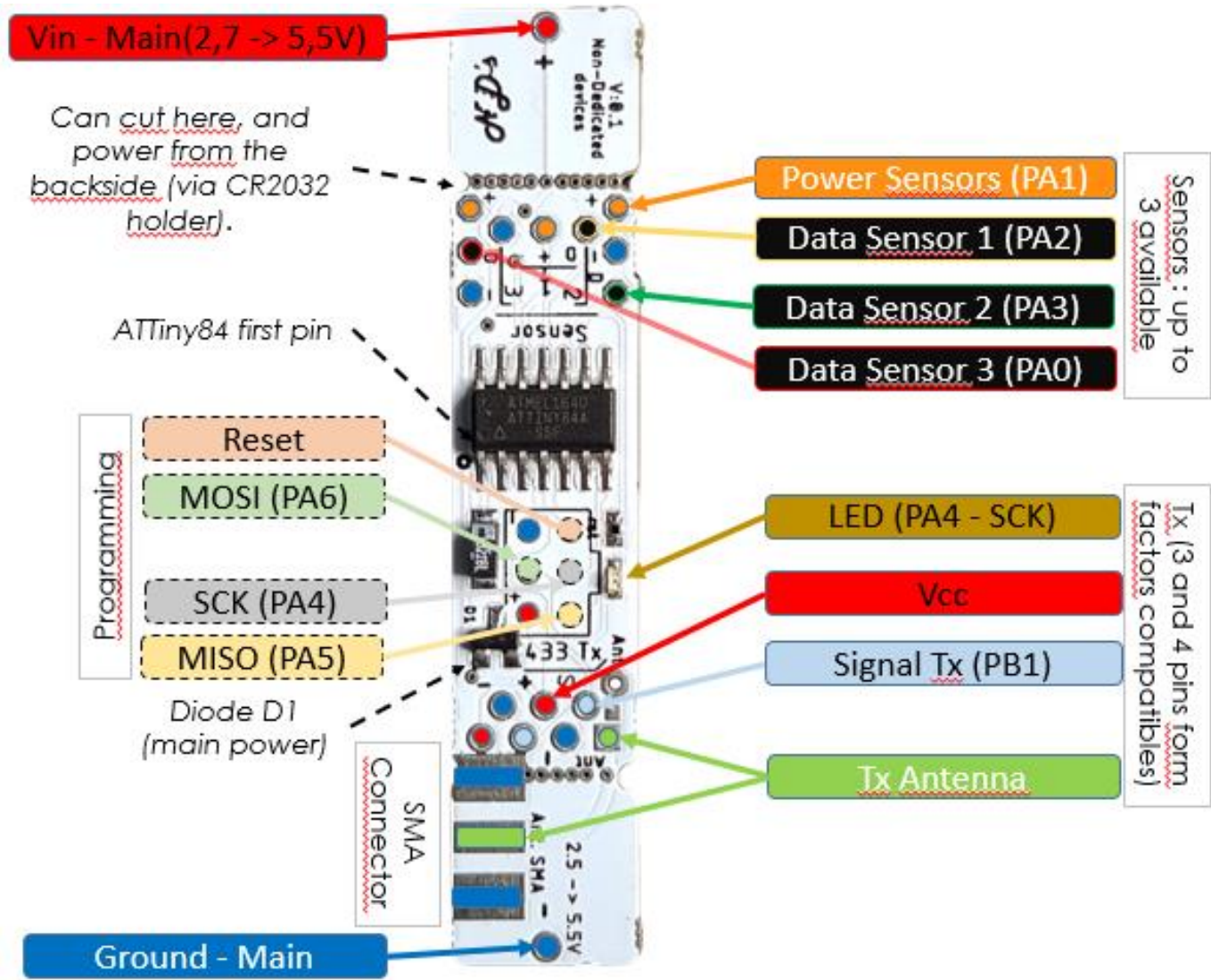
**TOP View (component side)**

You can add a maximum of 3 sensors to the board, or use the pins for anything else. A digital pin (PA1) is initially designed to power the sensors. It implies a limitation in the maximum current the sensor can draw (40mA). You will find next, a zoom on the sensors pins.

A 6 pins ICSP programming pads are available for programming. It is more comfortable to use a USBASP programmer, and a pogo pin programmer.

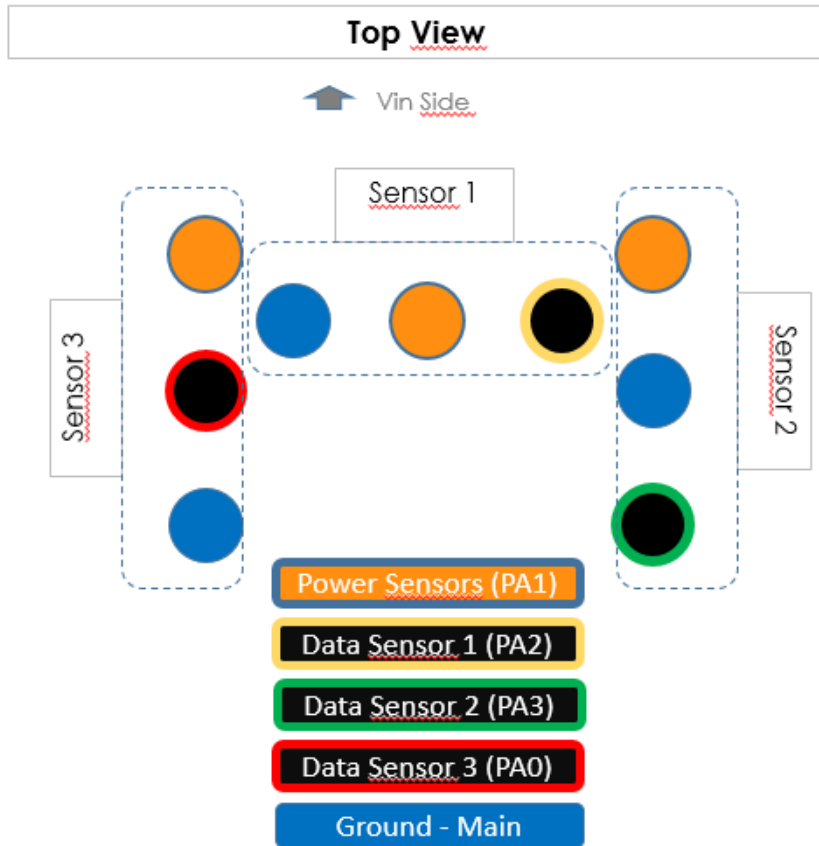You may find this here: https://www.tindie.com/products/16133/

Note: buying with Tindie or my website, you will not have to handle the 433MHz wiring, it is already assembled. But you can order the raw motherboard on my website for more flexibility:

https://ndsensors.duckdns.org/wp/produit/433mhzsensor_motherboard/

Vin - Main(2,7 -> 5,5V)

Can cut here, and power from the backside (via CR2032 holder).

ATTiny84 first pin

Diode D1 (main power)

Programming

Reset
MOSI (PA6)
SCK (PA4)
MISO (PA5)

SMA Connector

Ground - Main

Power Sensors (PA1)
Data Sensor 1 (PA2)
Data Sensor 2 (PA3)
Data Sensor 3 (PA0)

Sensors : up to 3 available

LED (PA4 - SCK)
Vcc
Signal Tx (PB1)
Tx Antenna

Tx (3 and 4 pins form factors compatibles)

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Zoom on the sensor disposition on the TOP View (component side).

**Top View**

Vin Side

Sensor 1

Sensor 3

Sensor 2

Power Sensors (PA1)

Data Sensor 1 (PA2)

Data Sensor 2 (PA3)

Data Sensor 3 (PA0)

Ground - Main

Vin - Main(2,7 -> 5,5V)

Vin - Main(2,7 -> 5,5V)

CR2032 battery holder (SMD)

Ground - Main

Vin - Main(2,7 -> 5,5V)

SMA Connector

Ground - Main

Back side, with the CR2032 holder location →
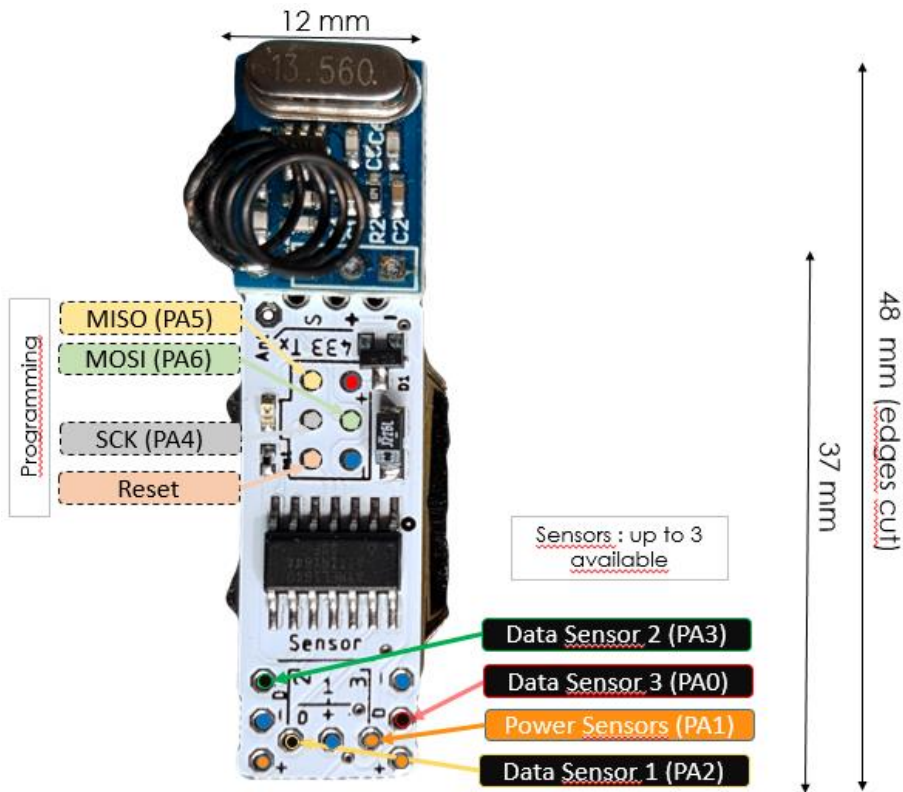
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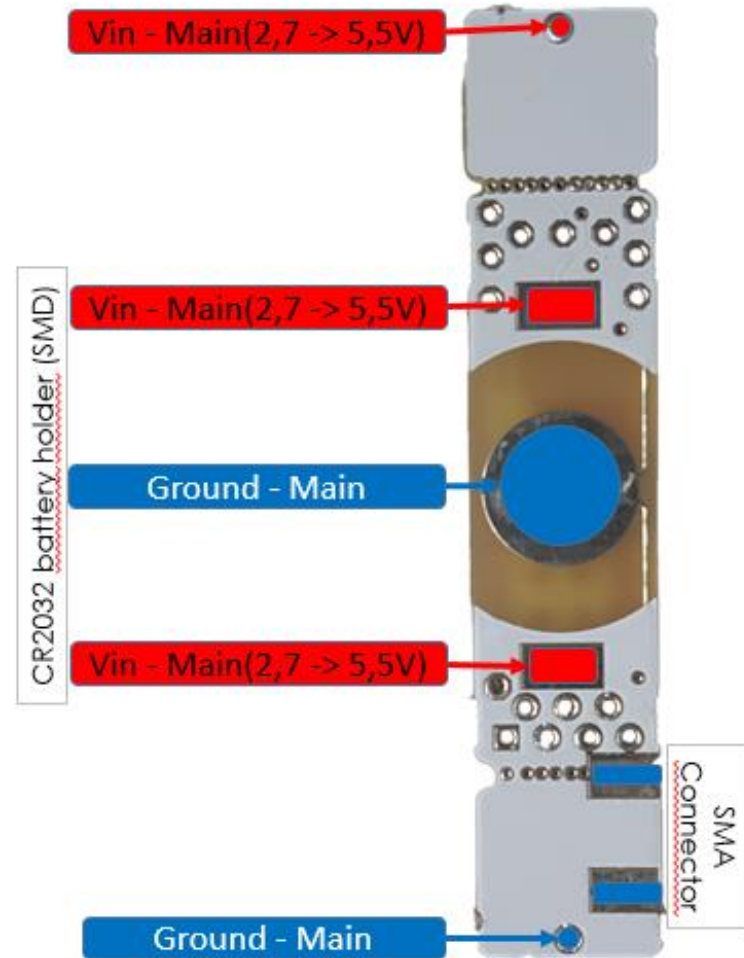
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What you will receive out of the box

The board comes partly preassembled:

- 433MHz transmitter is assembled with the range you chose (long range with a SMA connector, or short range).
- Battery holder is assembled only if it is a CR2032 holder, because it doesn't bother the soldering of the sensor. With a 14500 battery holder, if no sensor is added, the holder won't come soldered.



12 mm

48 mm (edges cut)

37 mm

Programming

MISO (PA5)

MOSI (PA6)

SCK (PA4)

Reset

Sensor

Sensors : up to 3 available

Data Sensor 2 (PA3)

Data Sensor 3 (PA0)

Power Sensors (PA1)

Data Sensor 1 (PA2)

# Assembling a board from scratch

**Disclaimer**: if you do not follow this guide, you may be in the incapability of properly solder any additional component. As some parts are stacked up, you need to think to what you will be doing <u>before</u> you start the assembly.

### Assembly order

### Example of realizations