# **RAK1901 Quick Start Guide**

# **Prerequisite**

## What Do You Need?

Before going through each and every step on using the RAK1901 WisBlock module, make sure to prepare the necessary items listed below:

## **Hardware**

- RAK1901 WisBlock Temperature & Humidity Sensor
- Your choice of WisBlock Base ☑
- Your choice of WisBlock Core
- USB Cable
- RAK19005 WisBlock Sensor Extension Cable (optional) 
   ☐
- Li-Ion/LiPo battery (optional) ☐
- Solar charger (optional)

## **Software**

#### **Arduino**

- Download and install ArduinoIDE ☑ .
- To add the RAKwireless Core boards on your Arduino Boards Manager, install the RAKwireless Arduino BSP ☐

# **Product Configuration**

# **Hardware Setup**

WisBlock can integrate this module which makes it easy to build up an environmental temperature and humidity data acquisition system.

For more information about the RAK1901, refer to the Datasheet.

The RAK1901 module gives information about:

- Environment Temperature
- Environment Humidity

RAK1901 module can be connected to the sensor's slot of WisBlock Base 1 to communicate with the WisBlock Core, as shown in **Figure 1**. It will work on **SLOT A to F**. Also, always secure the connection of the WisBlock module by using compatible screws.

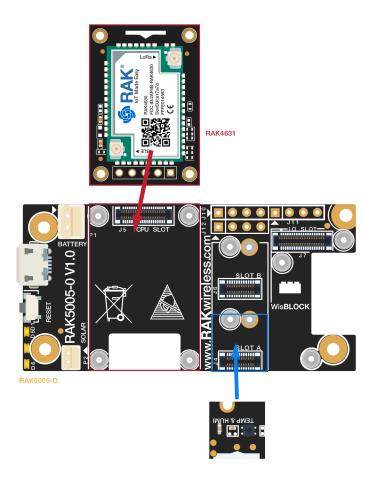


Figure 1: RAK1901 connection to WisBlock Base

# Assembling and Disassembling of WisBlock Modules Assembling

As shown in **Figure 2**, the location for Slot A, B, C, and D are properly marked by silkscreen. Follow carefully the procedure defined in WisBlock Base board module assembly/disassembly instructions of to attach a WisBlock module. Once attached, carefully fix the module with one or more pieces of M1.2 x 3 mm screws depending on the module.

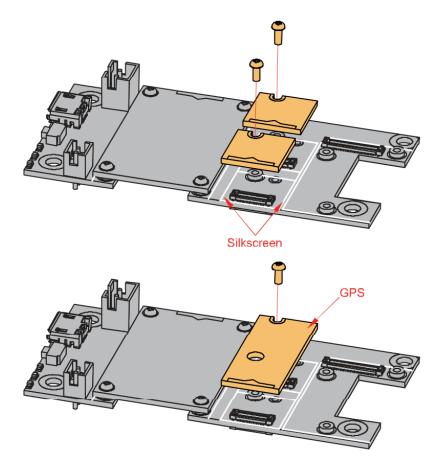


Figure 2: RAK1901 connection to WisBlock Base

# **Disassembling**

The procedure in disassembling any type of WisBlock modules is the same.

1. First, remove the screws.

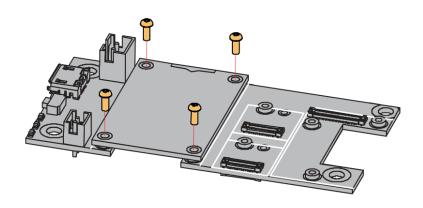


Figure 3: Removing screws from the WisBlock module

2. Once the screws are removed, check the silkscreen of the module to find the correct location where force can be applied.

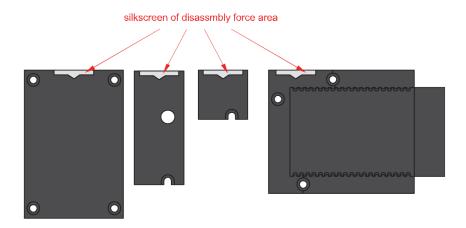


Figure 4: Detaching silkscreen on the WisBlock module

3. Apply force to the module at the position of the connector, as shown in **Figure 5**, to detach the module from the baseboard.

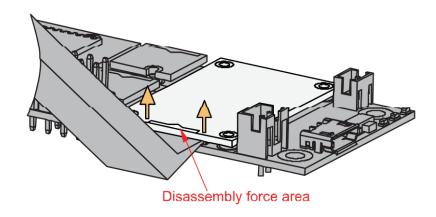


Figure 5: Applying even forces on the proper location of a WisBlock module



If you will connect other modules to the remaining WisBlock Base slots, check on the WisBlock Pin Mapper tool for possible conflicts. RAK1901 uses I2C communication lines, and it can cause possible conflict especially on some IO modules.

After all this setup, you can now connect the battery (optional) and USB cable to start programming your WisBlock Core.

#### **MARNING**

- Batteries can cause harm if not handled properly.
- Only 3.7-4.2 V Rechargeable LiPo batteries are supported. It is highly recommended not to use other types of batteries with the system unless you know what you are doing.
- If a non-rechargeable battery is used, it has to be unplugged first before connecting the USB cable to the USB port of the board to configure the device. Not doing so might damage the battery or cause a fire
- Only 5 V solar panels are supported. Do not use 12 V solar panels. It will destroy the charging unit and eventually other electronic parts.
- Make sure the battery wires match the polarity on the WisBlock Base board. Not all batteries have the same wiring.

# **Software Configuration and Example**

The RAK1901 is a Temperature & Humidity sensor board that contains the SHTC3 chip. The SHTC3 is a digital temperature and humidity sensor designed especially for battery-driven high-volume consumer electronics applications. The device comprises a sensing element and an IC interface which communicates through I2C from the sensing element to the application.

## **Initial Test of the RAK1901 WisBlock Module**

- 1. Install the RAKwireless Arduino BSP for WisBlock by using the package\_rakwireless\_index.json board installation package. The WisBlock Core should now be available on the Arduino IDE.
- 2. You need to select first the WisBlock Core you have.

#### RAK4631 Board

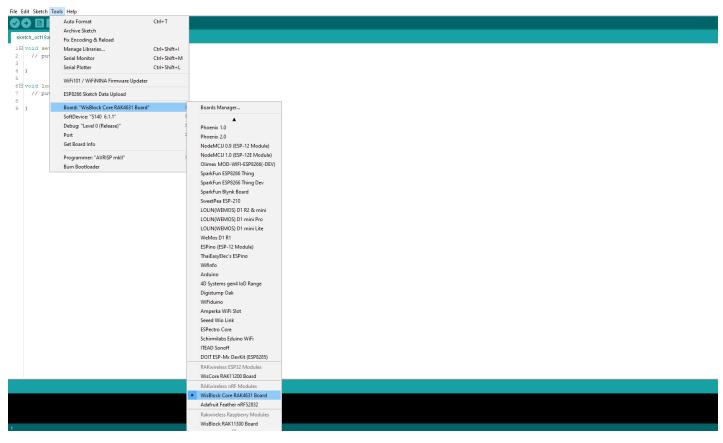


Figure 6: Selecting RAK4631 as WisBlock Core

### RAK11200 Board

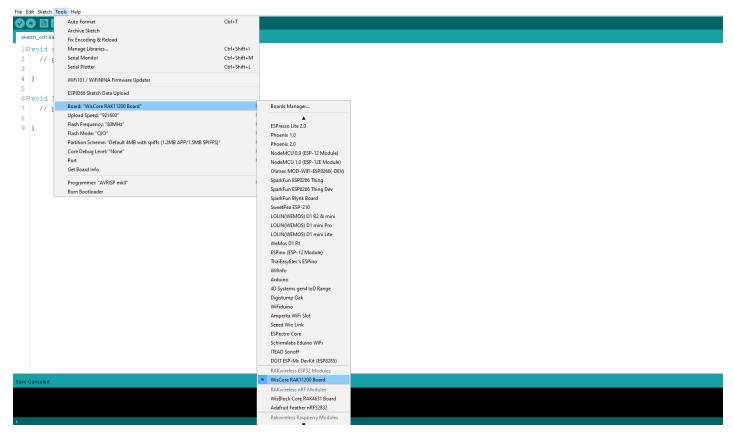


Figure 7: Selecting RAK11200 as WisBlock Core

#### RAK11310 Board

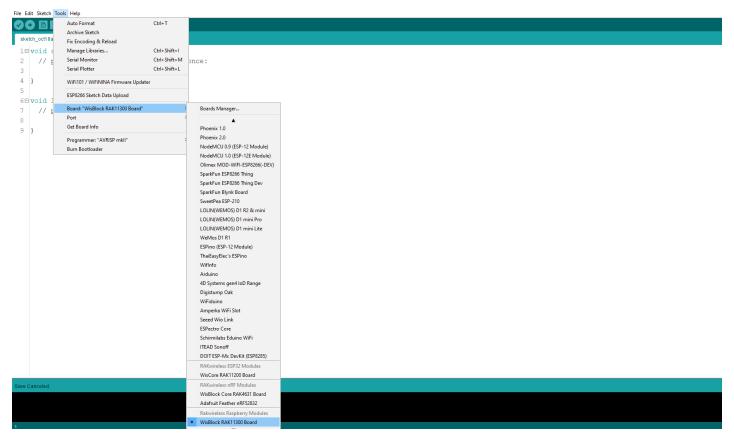


Figure 8: Selecting RAK11310 as WisBlock Core

- 3. Next, copy the following sample code into your Arduino IDE:
  - ► Click Here to View Example Code



If you experience any error in compiling the example sketch, check the updated code for your WisBlock Core Module that can be found on the RAK1901 WisBlock Example Code Repository ☑ and this sample code in Github will work on all WisBlock Core.

3. Once the example code is open, install the SparkFun SHTC3 ☐ library by clicking the yellow highlighted link, as shown in Figure 9 and Figure 10.

```
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Figure 9: Accessing the library used for RAK1901 Module

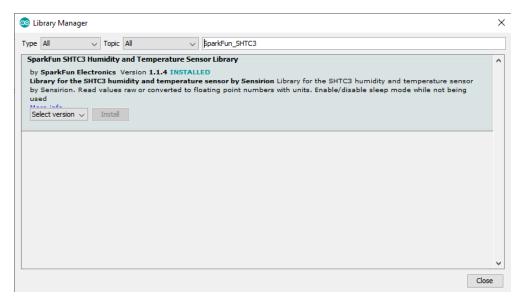


Figure 10: Installing the compatible library for RAK1901 Module

4. After successful installation of the library, you can now select the right serial port and upload the code, as shown in **Figure 11** and **Figure 12**.

#### **NOTE**

If you are using the RAK11200 as your WisBlock Core, the RAK11200 requires the **Boot0** pin to be configured properly first before uploading. If not done properly, uploading the source code to RAK11200 will fail. Check the full details on the RAK11200 Quick Start Guide ...

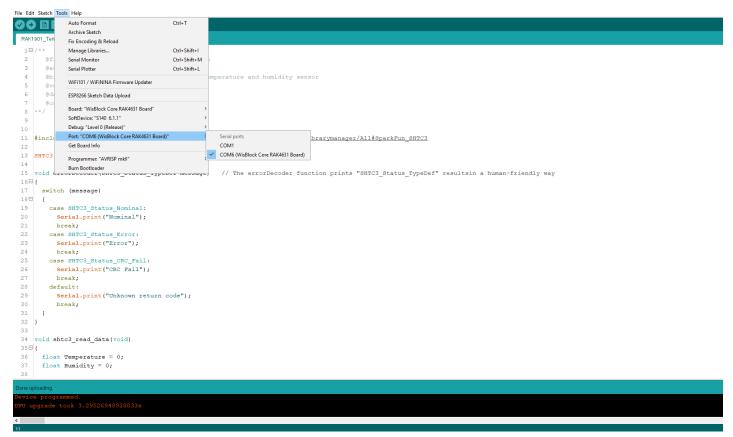


Figure 11: Selecting the correct Serial Port

```
MONING_Innermark_Nursing_NHC3

| ## Stick RadisOl_Responsature_Nundity_SHC2.inc
| ## S
```

Figure 12: Uploading the RAK1901 example code

5. When you successfully uploaded the example sketch, open the Serial Monitor of the Arduino IDE to see the sensor's reading logs. If you see the logs, as shown in **Figure 13**, then your RAK1901 is properly communicating to the WisBlock core.

```
21:11:18.133 -> RH = 69.28% (checksum: pass), T = 31.74 deg C (checksum: pass)
21:11:19.164 -> RH = 69.32% (checksum: pass), T = 31.68 deg C (checksum: pass)
21:11:20.148 -> RH = 69.44% (checksum: pass), T = 31.58 deg C (checksum: pass)
21:11:21.179 -> RH = 69.59% (checksum: pass), T = 31.52 deg C (checksum: pass)
21:11:22.210 -> RH = 69.73% (checksum: pass), T = 31.46 deg C (checksum: pass)
21:11:23.182 -> RH = 69.90% (checksum: pass), T = 31.44 deg C (checksum: pass)
21:11:24.213 -> RH = 70.08% (checksum: pass), T = 31.36 deg C (checksum: pass)
21:11:25.245 -> RH = 70.24% (checksum: pass), T = 31.32 deg C (checksum: pass)
21:11:26.222 -> RH = 70.38% (checksum: pass), T = 31.25 deg C (checksum: pass)
21:11:27.248 -> RH = 70.51% (checksum: pass), T = 31.21 deg C (checksum: pass)
21:11:28.270 -> RH = 70.68% (checksum: pass), T = 31.14 deg C (checksum: pass)
21:11:29.255 -> RH = 70.84% (checksum: pass), T = 31.11 deg C (checksum: pass)

□ Autoscroll ☑ Show timestamp

□ Both NL &CR ☑ 115200 baud ☑ Clear output
□ Autoscroll ☑ Show timestamp

□ Autoscroll ☑ Show timestamp
□ Both NL &CR ☑ 115200 baud ☑ Clear output
□ Clear output
```

Figure 13: RAK1901 temperature and humidity data logs

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# RAK1901 WisBlock Temperature and Humidity Sensor Datasheet

## **Overview**





Figure 1: RAK1901 WisBlock Sensor

# **Description**

RAK1901 is a WisBlock Sensor that extends the WisBlock system with a Sensirion SHTC3 temperature and humidity sensor. A ready-to-use SW library and tutorial make it easy to build up an environmental temperature and humidity data acquisition system.

### **Features**

• Temperature sensor accuracy: ±2.0 °C

• Temperature range: -40 °C to +125 °C

• Humidity sensor accuracy:±2.0% RH

• Humidity range:0 to 100%

• Voltage Supply: 3.3 V

• Current Consumption: 0.3 uA to 270 uA

Chipset: Sensirion SHTC3Module size: 10 x 10 mm

# **Specifications**

# **Overview**

# **Mounting**

**Figure 1** shows the mounting mechanism of the RAK1901 module on a WisBlock Base ☐ board. The RAK1901 module can be mounted on the slots: **A, B, C, D, E, & F**.

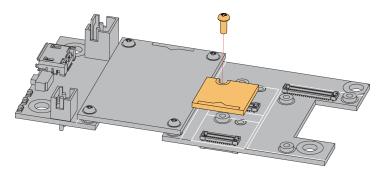


Figure 2: RAK1901 WisBlock Sensor Mounting

# Hardware

The hardware specification is categorized into six parts. It shows the chipset of the module and discusses the pinouts, sensors, and the corresponding functions and diagrams. It also covers the electrical and mechanical parameters that include the tabular data of the functionalities and standard values of the RAK1901 WisBlock Temperature and Humidity Sensor.

# **Chipset**

Vendor	Part number	
Sensirion	SHTC3	

## **Pin Definition**

The RAK1901 WisBlock Temperature and Humidity Sensor comprises a standard WisBlock connector. The WisBlock connector allows the RAK1901 module to be mounted to a WisBlock Base board. The pin order of the connector and the pinout definition is shown in **Figure 2**.

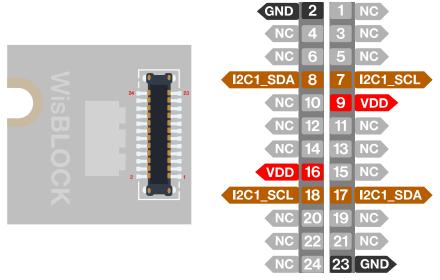


Figure 3: RAK1901 WisBlock Sensor Pinout Diagram

**NOTE**:

Only the I2C related pins, VDD and GND are connected to this module.

If a 24-pin WisBlock Sensor connector is used, the IO used for the output pulse depends on what slot the module is plugged in. The following table shows the default IO used for different slots:

SLOT A	SLOTB	SLOT C	SLOT D	SLOT E	SLOT F	
WB_IO1	WB_IO2	WB_IO3	WB_IO5	WB_IO4	WB_IO6	

## **Sensors**

# **Temperature Sensor**

Parameter	Conditions	Value	Units
Accuracy Tolerance	Тур.	±0.2	°C
Repeatability	-	0.1	°C
Resolution	-	0.01	°C
Specified Range	-	-40 to +125	°C
Response Time	τ 63%	<5 to 30	S
Long-term Drift	Тур.	<0.2	°C/y

# **Humidity Sensor**

Parameter	Conditions	Value	Units
Accuracy Tolerance	Тур.	±2.0	%RH
Repeatability	-	0.1	%RH
Resolution	-	0.01	%RH
Hysteresis	-	±1	%RH
Specified Range	extended	0 to 100	%RH
Response Time	τ 63%	8	S
Long-term Drift	Тур.	<0.25	%RH/y

# **Electrical Characteristics Recommended Operating Conditions**

Symbol	Description	Min	Nom.	Max	Unit
$V_{DD}$	Power supply for the module	1.6	3.3	3.6	V
I <sub>sleep</sub>	Sleep current	-	0.3	-	uA
I <sub>DD</sub>	Measure current (normal mode)	-	430		uA
I <sub>DD</sub>	Measure current (low-power mode)	-	270	-	uA

# **Mechanical Characteristics Board Dimensions**

Figure 3 shows the dimensions and the mechanic drawing of the RAK1901 module.

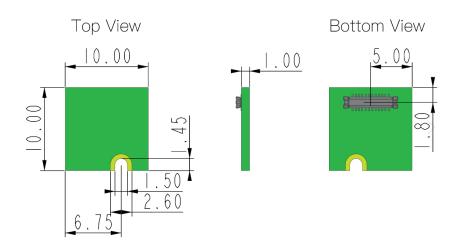


Figure 4: RAK1901 WisBlock Sensor Mechanic Drawing

# **WisConnector PCB Layout**

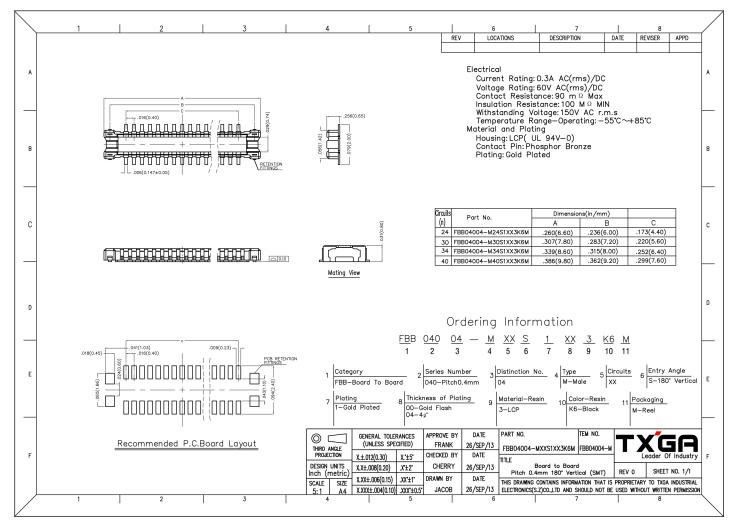
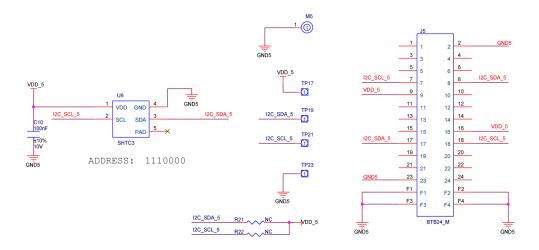


Figure 5: WisConnector PCB footprint and recommendations

# **Schematic Diagram**

Figure 5 shows the schematic of the RAK1901 module.



Humidity and Temperature Sensor

Figure 6: RAK1901 WisBlock Sensor schematics