RAK5005-O WisBlock Base Board Datasheet

WisBlock Overview

RAK5005-O WisBlock Base module is the main board that allows you to attach **WisBlock modules** through the standardized expansion connectors. In addition, the **WisBlock Base** module also comprises a USB port, indicator LEDs, buttons, and extended IO interfaces.

WisBlock modules are flexible building block designs built by RAKWireless for the IoT industry. **WisBlock modules** support dozens of types of CPUs, sensors, and interface circuit boards. This concept allows you to build your own electronic solutions very quickly, using building blocks to materialize your new ideas. Also, through high-speed connectors and easily attachable interconnections, you will be able to composite reliable industrial products.

If you can't find a module that fits your IoT requirements, use the standard connectors of WisBlock to develop your own specific function module. WisBlock supports open-source hardware architecture and you can find tutorials showing how to create your own Awesome WisBlock module.

Applications

- Wireless Sensor Network
- Environmental monitoring
- Wireless data transmission
- Data acquisition in Industrial environment
- Location and tracking of personnel or moving objects
- Extend coverage for wired application by adding wireless interfaces

Main Features

- Flexible building block design, which enables modular function realization and expansion
- With high-speed interconnection connectors in the WisBlock Base board to ensure the signal integrity
- Supports multiple types of low power MCUs
- Supports multiple types of sensors. A single board can support a combination of up to four different types of sensors
- Provides interface for additional extensions
- Low power battery power supply
- Supports lithium battery charging
- Supports solar charging
- Fulfills Industrial level design
- Compact size, the minimum size is: 60 x 30 mm

Typical Application

WisBlock module can be used for quickly building prototypes. It allows you to select and combine different functional modules, sensors to implement a customized products in a very short period of time.

Figure 1: WisBlock Ecosystem

WisBlock series modules are not only for the rapid implementation of engineering prototypes, but it is also designed for massive production-ready applications. The modules can be used together with RAK industrial protective housing to create products ready for industrial environments. Under the unified management of WisDM, a complete end-to-end IoT solution is formed by aggregating data of wireless nodes through the RAK industrial gateways.

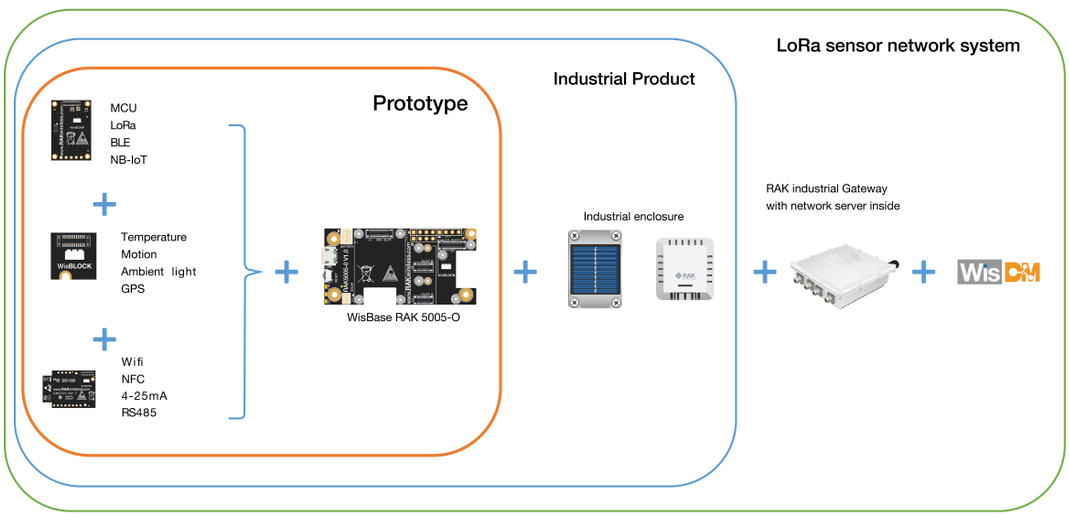


Figure 2: WisBlock Applications

WisBlock Architecture

WisBlock is designed for modularity. In Figure 3, the whole ecosystem is depicted. The objective of the architecture is to allow you to combine different modules to create your own specific solution. A roadmap about the availability of the modules is also shown.

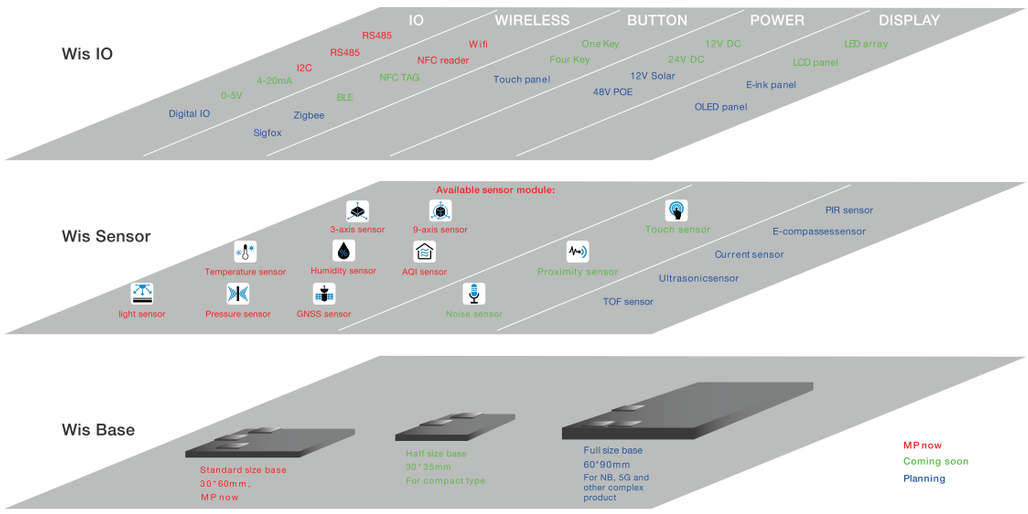


Figure 3: WisBlock Architecture

Specifications

Overview

There are six (6) slots on RAK5005-O WisBlock Base. The **CPU SLOT** is reserved for the WisBLock Core module which has the main MCU. The **IO SLOT** is used for IO extension, for example, RS485 module, 4-20 mA/0-5 V module, Wireless modules. **SLOT A**, **SLOT B**, **SLOT C**, and **SLOT D** are used to connect with the I2C module, while **SLOT A** can be used for GPS board too. Also, there are **2.54 mm pitch connectors** for extension interface, such as **I2C**, **UART**, and **GPIO pins**.

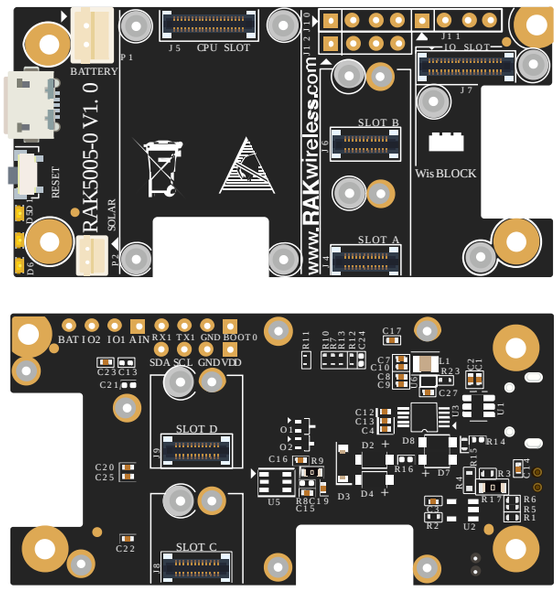


Figure 4: RAK5005-O Top and Bottom View

For convenience, there is a USB connector for debugging. It is connected directly to MCU's USB port (if supported). You can access the internal MCU by connecting to a computer's USB port directly. This USB connector is also used as a battery charging port.

Each module has a method designed to connect and fasten the module easily. These connectors are **high-speed board to board connector**, they provide signal integrity for each data bus. A set of screws are used for attaching

the module under the environment with vibrations.

To avoid electromagnetic interference and heating interference, the sensor connectors on the WisBlock Base are designed to be installed on both sides of the PCB. Also, a sensor module can be attached either on the top layer or the bottom layer of the WisBlock Base board.

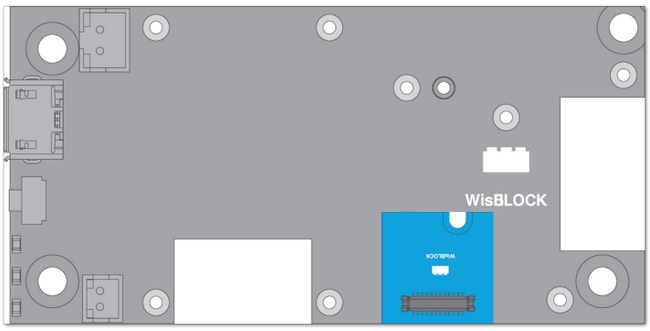


Figure 5: Bottom view of the board with interfaces

For example, it is recommended to attach a temperature sensor outside of the base board, as shown in the Figure 6. It allows to get more accurate measurements, since temperature sensor located in the top layer of the base board could be interfered by the heating introduced by other modules.

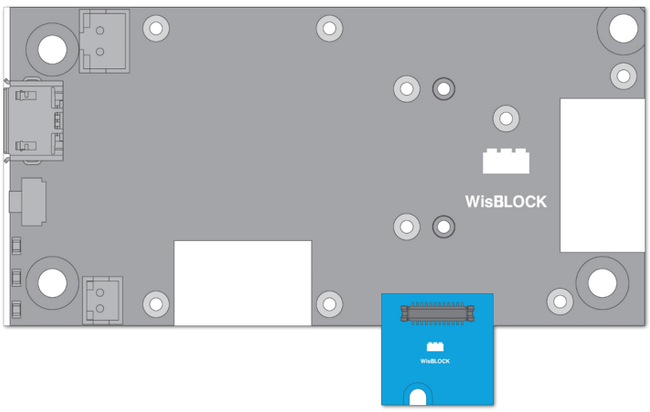


Figure 6: Out of the board Temperature Sensor

Block Diagram

The block diagram is shown in Figure 7 that shows the internal architecture and external interfaces of the RAK5005-O board.

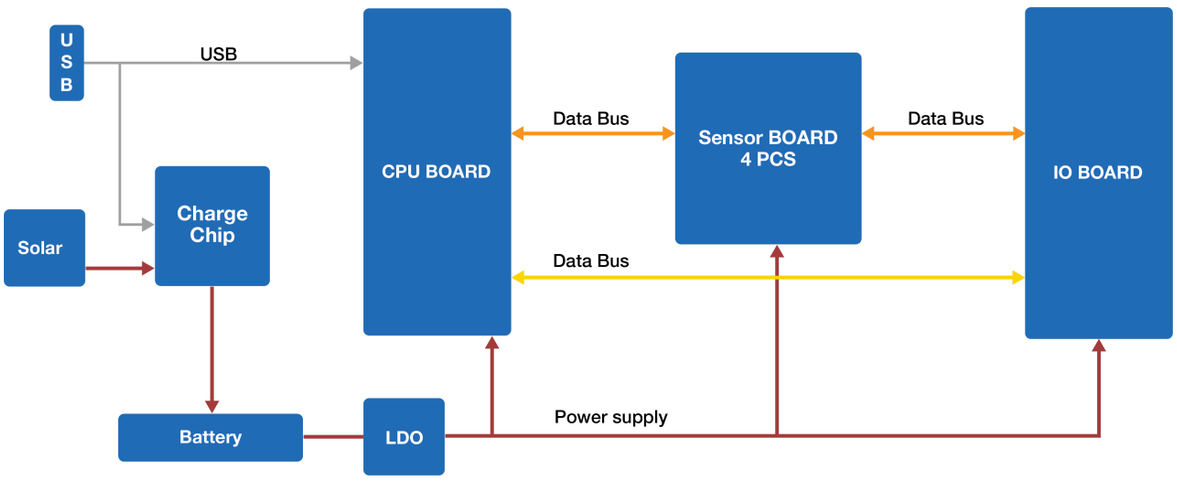


Figure 7: RAK5005-O WisBlock Base block diagram

Hardware

The hardware specification is categorized into six parts. It discusses the interfacing, pinouts, and its corresponding functions and diagrams. It also covers the electrical, mechanical, and environmental parameters that include the tabular data of the functionalities and standard values of the RAK5005-O WisBlock Base Board.

Interfaces

RAK5005-O provides the following **interfaces**, **headers**, **jumpers**, **buttons**, and **connectors**:

- 1 connector for CPU Slot
- 4 connectors for WisBlock Module Slot A to D
- 1 connector for IO Slot
- 1 micro USB connector
- Sets of 4-pin 2.54 mm headers (UART, GPIOS, I2C, power, etc.)
- 2-pin battery interface
- 2-pin solar panel interface
- LEDs
- Reset button

Micro-B USB port

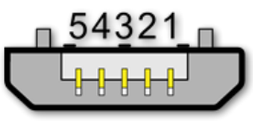


Figure 8: Micro-B USB connector's pinout

The Micro-B USB connector is compliant with the USB2.0 specification. This USB interface directly communicates with the connected **WisBlock Core** module. It is also used as a charging input port for the battery. The Micro-B USB pin definition is shown below:

Pin	Description
1	USB_VBUS (+5 V)
2	USB_DM
3	USB_DP
4	NC
5	GND

J10, J11, J12 Headers

On the WisBlock, there are three pieces of **2.54 mm pitch header** for IO extension. Some data bus and signal from the MCU module are also connected to these headers, such as I2C, UART, ADC, etc.

J10 Pin Definition

Pin	Description
1	- BOOT0 from ST MCU. - The ST MCU will enter boot mode when connector BOOT0 to VDD during reset.
2	GND
3	UART1 TX
4	UART1 RX

J11 Pin Definition

Pin	Description
1	AIN, ADC input signal
2	- IO1 - General purpose IO
3	- IO2 - Used for 3V3_S enable
4	VBAT

J12 Pin Definition

Pin	Description
1	VDD
2	GND
3	I2C clock
4	I2C data

Battery Connector

The GND pin, as shown in Figure 9, is highlighted in a red box

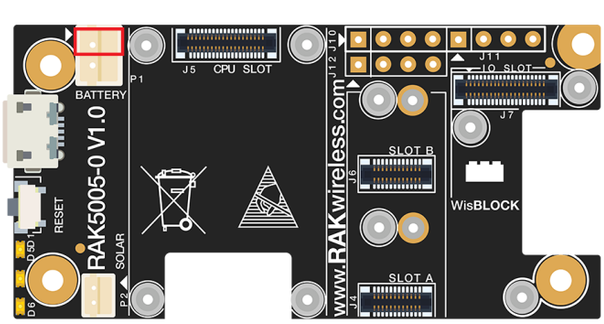


Figure 9: Battery connector GND pin

The pin definition of a Li-ion battery connector is shown in the table below.

Pin	Pin Name	Description
1	GND	GND
2	VBAT	Positive of the battery

> 📝 **NOTE**
>
> The voltage of the battery **must not exceed 4.3 V**.

Solar Panel Connector

The GND pin, as shown in Figure 10, is highlighted in a red box

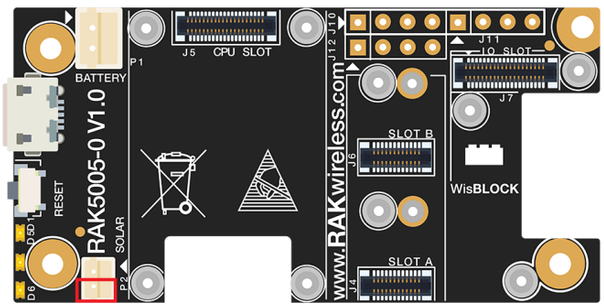


Figure 10: Solar Panel connector GND pin

The pin definition of the solar panel connector is shown in the table below.

Pin	Pin Name	Description
1	GND	GND
2	Vin	Positive of solar panel

> 📝 **NOTE**
>
> The output of the solar panel **must not exceed 5.5 V**. Otherwise, it may cause permanent damage to the board.

LEDs

Three LEDs are used to indicate the operating status. Below are the functions of the LEDs:

- 🔴 **Red LED** - connected to the charger chip to indicate the charger status. When the battery is charging, this red LED is on. When the battery is full, this LED is weak light or off.
- **Green LED** - connected to the MCU module, controlled by MCU defined by the user.
- 🔵 **Blue LED** - connected to the MCU module, controlled by MCU defined by the user.

RESET Push Button

The Reset Push Button is connected to the MCU module. When pushed, it resets the MCU.

Pin Definition

Connector for WisBlock Core

The **MCU module connector** is a 40-pin board to board connector. It is a high-speed and high-density connector, with an easy attaching mechanism.

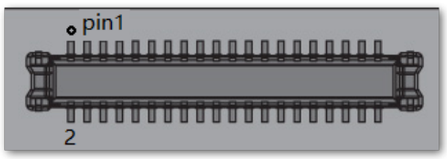


Figure 11: MCU module connector

The table below shows the pinout of the MCU module connector:

Function Name of WisBlock Base	Pin Number	Pin Number	Function Name of WisBlock Base
VBAT	1	2	VBAT
GND	3	4	GND
3V3	5	6	3V3
USB+	7	8	USB–
VBUS	9	10	SW1
TXD0	11	12	RXD0
RESET	13	14	LED1
LED2	15	16	LED3
VDD	17	18	VDD
I2C1_SDA	19	20	I2C1_SCL
AIN0	21	22	AIN1
BOOT0	23	24	IO7
SPI_CS	25	26	SPI_CLK
SPI_MIS0	27	28	SPI_MOSI
IO1	29	30	IO2
IO3	31	32	IO4
TXD1	33	34	RXD1
I2C2_SDA	35	36	I2C2_SCL
IO5	37	38	IO6
GND	39	40	GND

As for the following table, it shows the definition of each pin of WisBlock Core connector:

Pin Number	Pin Name	Type	Description
1	VBAT	S	Power supply from battery
2	VBAT	S	Power supply from battery
3	GND	S	Ground
4	GND	S	Ground
5	3V3	S	3.3 V power supply
6	3V3	S	3.3 V power supply
7	USB+	I/O	USB D+
8	USB–	I/O	USB D–
9	VBUS	S	VBUS for USB
10	SW1	I/O	Switch signal for customer's control
11	TXD0	I/O	MCU UART0 TX signal
12	RXD0	I/O	MCU UART0 RX signal
13	RESET	I	Connected to the reset switch, for MCU reset
14	LED1	I/O	LED for battery charging indication
15	LED2	I/O	LED for custom usage
16	LED3	I/O	LED for custom usage
17	VDD	S	Generated by MCU module for power sensor board if the MCU IO level is not 3.3 V
18	VDD	S	Generated by MCU module for power sensor board if the MCU IO level is not 3.3 V
19	I2C1_SDA	I/O	The first set of I2C data signal
20	I2C1_SCL	I/O	The first set of I2C clock signal
21	AIN0	A	Analog input for ADC
22	AIN1	A	Analog input for ADC
23	BOOT0	I	For ST MCU, set high when reset. The MCU will allow to enter boot mode.

Pin Number	Pin Name	Type	Description
24	IO7	I/O	Not connected
25	SPI_CS	I/O	SPI chip select signal
26	SPI_CLK	I/O	SPI clock
27	SPI_MISO	I/O	SPI MISO signal
28	SPI_MOSI	I/O	SPI MOSI signal
29	IO1	I/O	General purpose IO
30	IO2	I/O	Used for 3V3_S enable
31	IO3	I/O	General purpose IO
32	IO4	I/O	General purpose IO
33	TXD1	I/O	MCU UART1 RX signal
34	RXD1	I/O	MCU UART1 RX signal
35	I2C2_SDA	I/O	The second set of I2C data signal
36	I2C2_SCL	I/O	The second set of I2C data signal
37	IO5	I/O	General purpose IO
38	IO6	I/O	General purpose IO
39	GND	S	Ground
40	GND	S	Ground

Connectors for WisBlock Sensor

The sensor module connector is a a **24-pin board to board connector**.

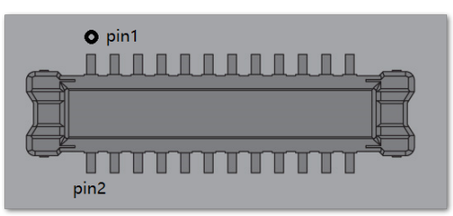


Figure 12: WisSensor module connector

> 📝 **NOTE**
>
> There are four connectors reserved for the sensor modules on the RAK5005-O: **connector A, B, C**, and **D**. The pin definition of **connector A** is different than the definition of the **connector B-D**.

The pinout definition of the WisBlock Modules with 24-pin connector on WisBlock Base varies according to its connector, **from A to D**.

Connector D	Connector C	Connector B	Connector A	Pin Number	Pin Number	Connector A	Co B
NC	NC	NC	TXD1	1	2	GND	GI
SPI_CS	SPI_CS	SPI_CS	SPI_CS	3	4	SPI_CLK	SF
SPI_MISO	SPI_MISO	SPI_MISO	SPI_MISO	5	6	SPI_MOSI	SF
I2C1_SCL	I2C1_SCL	I2C1_SCL	I2C1_SCL	7	8	I2C1_SDA	I2(
VDD	VDD	VDD	VDD	9	10	IO2	IO
3V3_S	3V3_S	3V3_S	3V3_S	11	12	I01	IO
NC	NC	NC	NC	13	14	3V3_S	3V
NC	NC	NC	NC	15	16	VDD	VI
NC	NC	NC	NC	17	18	NC	NC
NC	NC	NC	NC	19	20	NC	NC
NC	NC	NC	NC	21	22	NC	NC
GND	GND	GND	GND	23	24	RXD1	NC

As for the following table, it shows the pin name and description of each pin in the WisSensor module connector.

Pin Number	Connector A	Connector B	Connector C	Connector D	Type	Description
1	TXD1	NC	NC	NC	NC	- Not connected - UART TX signal on connector A
2	GND	GND	GND	GND	S	Ground
3	SPI_CS	SPI_CS	SPI_CS	SPI_CS	I/O	SPI chip select signal
4	SPI_CLK	SPI_CLK	SPI_CLK	SPI_CLK	I/O	SPI clock
5	SPI_MISO	SPI_MISO	SPI_MISO	SPI_MISO	I/O	SPI MISO signal
6	SPI_MOSI	SPI_MOSI	SPI_MOSI	SPI_MOSI	I/O	SPI MOSI signal
7	I2C1_SCL	I2C1_SCL	I2C1_SCL	I2C1_SCL	I/O	I2C clock signal
8	I2C1_SDA	I2C1_SDA	I2C1_SDA	I2C1_SDA	I/O	I2C data signal
9	VDD	VDD	VDD	VDD	S	- Generated by CPU module. - Used for power sensor board if MCU IO level is not 3.3V
10	IO2	IO1	IO4	IO6	I/O	- General purpose IO. - IO2 control the power switch of 3V3_S. When 3V3_s function is used, Io2 can not be used as interrupt of the sensor.
11	3V3_S	3V3_S	3V3_S	3V3_S	S	- 3.3 V power supply - Can be shutdown by the CPU module.
12	IO1	IO2	IO3	IO5	I/O	- General purpose IO - IO controls the power switch of 3V3_S. When 3V3_S function is used, IO2 cannot be used as interrupt of the sensor.

Pin Number	Connector A	Connector B	Connector C	Connector D	Type	Description
13	NC	NC	NC	NC	NC	Not connect
14	3V3_S	3V3_S	3V3_S	3V3_S	S	- 3.3 V power supply - Can be shutdown by CPU module
15	NC	NC	NC	NC	NC	Not connect
16	VDD	VDD	VDD	VDD	S	- Generates by CPU module - Use for power sensor board if the MCU IO level is not 3.3V.
17	NC	NC	NC	NC	NC	Not connect
18	NC	NC	NC	NC	NC	Not connect
19	NC	NC	NC	NC	NC	Not connect
20	NC	NC	NC	NC	NC	Not connect
21	NC	NC	NC	NC	NC	Not connect
22	NC	NC	NC	NC	NC	Not connect
23	GND	GND	GND	GND	S	Ground
24	RXD1	NC	NC	NC	NC	- Not connected. - UART RX signal on connector A

Connector for WisBlock IO Slot

The WisBlock Module IO Slot connector, as shown in Figure 13, is a **40-pin board to board connector**.

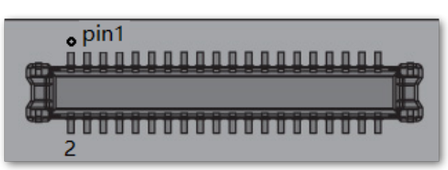


Figure 13: WisBLock IO slot connector

The pinout definition of the WisBlock IO slot module connector is shown in the table below.

Function Name of WisBlock Base	Pin Number	Pin Number	Function Name of WisBlock Base
VBAT	1	2	VBAT
GND	3	4	GND
3V3	5	6	3V3_S
USB+	7	8	USB–
VBUS	9	10	SW1
TXD0	11	12	RXD0
RESET	13	14	LED1
LED2	15	16	LED3
VDD	17	18	VDD
I2C1_SDA	19	20	I2C1_SCL
AIN0	21	22	AIN1
NC	23	24	NC
SPI_CS	25	26	SPI_CLK
SPI_MISO	27	28	SPI_MOSI
IO1	29	30	IO2
IO3	31	32	IO4
TXD1	33	34	RXD1
I2C2_SDA	35	36	I2C2_SCL
IO5	37	38	IO6
GND	39	40	GND

As for the following table, it shows the pin name and description of the WisBlock IO module connector.

Pin Number	Pin Name	Type	Description
1	VBAT	S	Power supply from battery
2	VBAT	S	Power supply from battery
3	GND	S	Ground
4	GND	S	Ground
5	3V3	S	3.3 V power supply
6	3V3_S	S	3.3 V power supply. Can be shutdown by a CPU module.
7	USB+	I/O	USB D+
8	USB–	I/O	USB D–
9	VBUS	S	5 V input for USB
10	SW1	I/O	Switch signal for custom used
11	TXD0	I/O	MCU UART0 TX signal
12	RXD0	I/O	MCU UART0 RX signal
13	RESET	I	Connected to the reset switch, for MCU reset
14	LED1	I/O	LED for battery charge indicator
15	LED2	I/O	LED for custom used
16	LED3	I/O	LED for custom used
17	VDD	S	- Generated by CPU module - Used for power sensor board if the MCU IO level is not 3.3 V
18	VDD	S	- Generated by CPU module - Used for power sensor board if the MCU IO level is not 3.3 V.
19	I2C1_SDA	I/O	The first set of I2C data signal
20	I2C1_SCL	I/O	The first set of I2C clock signal
21	AIN0	A	Analog input for ADC
22	AIN1	A	Analog input for ADC
23	NC	NC	Not connect

Pin Number	Pin Name	Type	Description
24	NC	NC	Not connect
25	SPI_CS	I/O	SPI chip select signal
26	SP_CLK	I/O	SPI clock
27	SPI_MISO	I/O	SPI MISO signal
28	SPI_MOSI	I/O	SPI MOSI signal
29	IO1	I/O	General purpose IO
30	IO2	I/O	Used for 3V3_S enable
31	IO3	I/O	General purpose IO
32	IO4	I/O	General purpose IO
33	TXD1	I/O	MCU UART1 TX signal
34	RXD1	I/O	MCU UART1 RX signal
35	I2C2_SDA	I/O	The second set of I2C data signal
36	I2C2_SCL	I/O	The second set of I2C clock signal
37	IO5	I/O	General purpose IO
38	IO6	I/O	General purpose IO
39	GND	S	Ground
40	GND	S	Ground

Electrical Characteristics

Absolute Maximum Ratings

Shown in the table below are the **Absolute Maximum Ratings** of the device. The stress ratings are the functional operation of the device.

> ⚠**WARNING**
>
> 1. If the stress rating goes above what is listed, it may cause permanent damage to the device.
> 2. Under the listed conditions is not advised.
> 3. Exposure to maximum rating conditions may affect the device reliability.

Ratings	Maximum Value	Unit
Power Supply on the USB port (**Vbus**)	–0.3 to 5.5	V
Battery Voltage (**Vbat**)	–0.3 to 4.3	V
Solar Panel Voltage (**Vconn**)	–0.3 to 5.5	V
IOs of WisConnector	–0.3 to VDD+0.3	V
ESD	2000	V

> 📝 **NOTE**
>
> The RAK5005-O, as any electronic equipment, is sensitive to **electrostatic discharge (ESD)**. Improper handling can cause permanent damage to module.

Current Consumption

The RAK5005-O designs for **low power IoT products** and the power supply uses a low grounding current regulator. When there is no module on RAK5005-O, the **leakage current is lower than 2 µA**. With MCU and sensor on it, the sleep current is **lower than 10 µA**. When the LoRa module is transmitting, the current may reach to **130 mA**.

Conditions	Current	Unit
Leakage current, without any module on RAK5005-O	2	µA
Idle current, with MCU and sensor are in sleep mode	10	µA
Working current, with LoRa module is transmitting	130	µA

Battery and Solar Panel Specification

The RAK5005-O WisBlock Base Board can be powered by a battery, connected to the **P1 connector**. The nominal operating voltage of the battery should be within the range showed in the following table. The matching connector for the battery wires is an JST PHR-2 2 mm pitch female

Minimum	Typical	Maximum	Unit
3.3	3.7	4.3	V

If a rechargeable battery is used, the USB connector is used as a charging port. The voltage and current fed to the battery through the port should not exceed its charging limits, as shown in the table below.

Parameter	Value
Charging Voltage	4.5 – 5.5 V
Charging Current	500 mA

A suitable Li-Ion battery should have the following parameters as shown in the table below:

Parameter	Value
Standard Voltage	3.7 V
Charging Voltage	4.2 V
Capacity	As required
Discharge current	At least 500 mA

> 📝 **NOTE**
>
> If a non-rechargeable battery is connected to the RAK5005-O, rework the hardware by removing the R17 on the bottom of RAK5005-O to disconnect the charger circuit. Otherwise, the USB port with try to charge the battery, and will damage the non-rechargeable battery, might damage the board, and is considered a fire or explode hazard.

Solar Panel Connector

A 5 V Solar panel can be connected to the board via the **P2 connector** to also serve the purpose of charging the battery. The matching connector for the solar panel wires is an JST ZHR-2 1.5 mm pitch female

Mechanical Characteristics

Board Dimensions

Figure 14 shows the detailed mechanical dimensions of RAK5005-O.

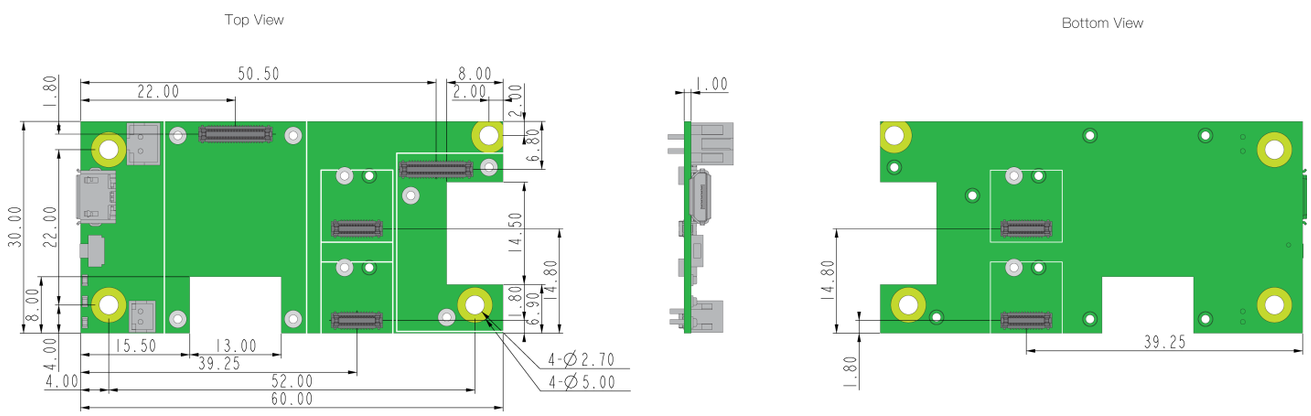


Figure 14: Mechanical Dimensions

Figures 15 and 16 show the mounting holes location and diameter of RAK5005-O Board.

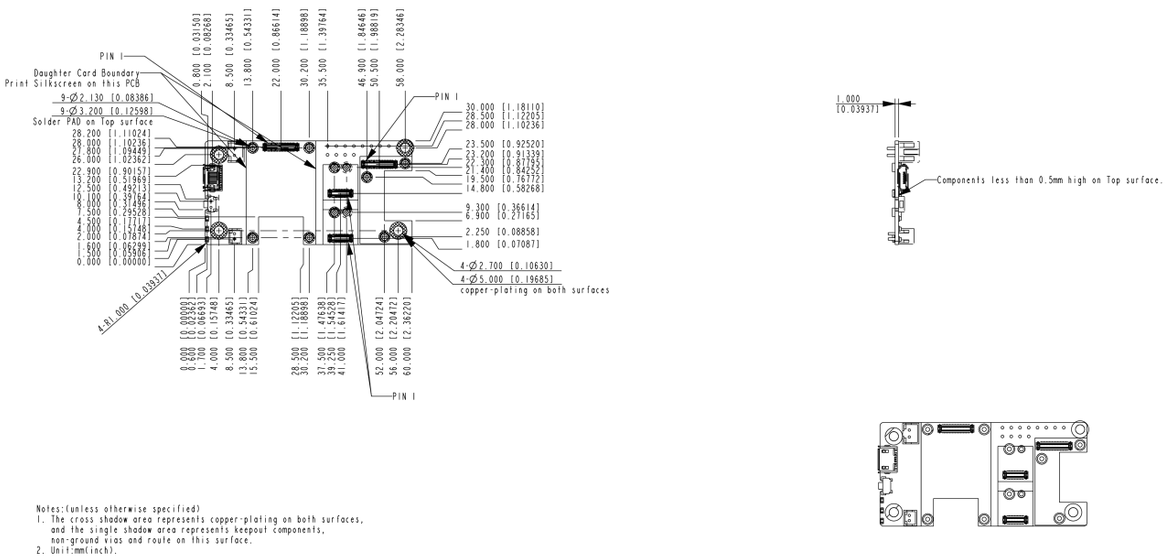


Figure 15: RAK5005-O Mounting Holes location and diameter

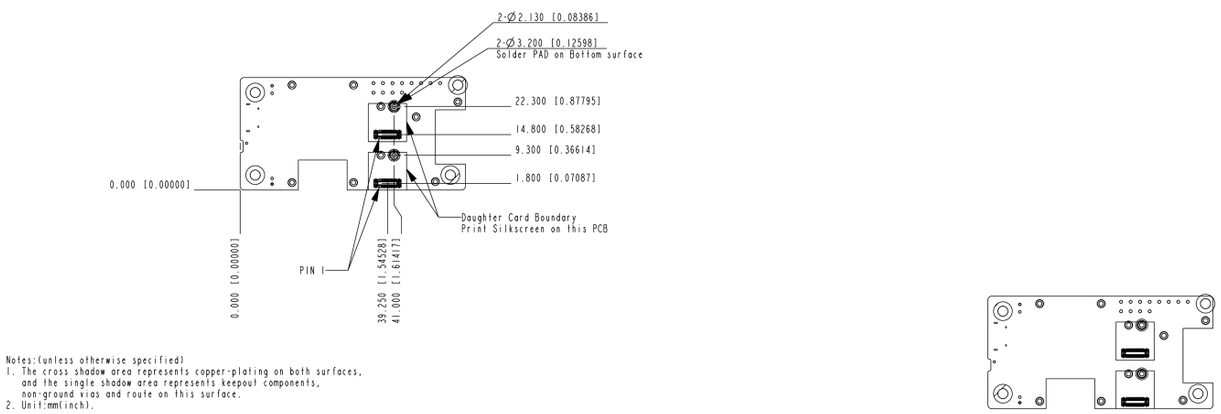
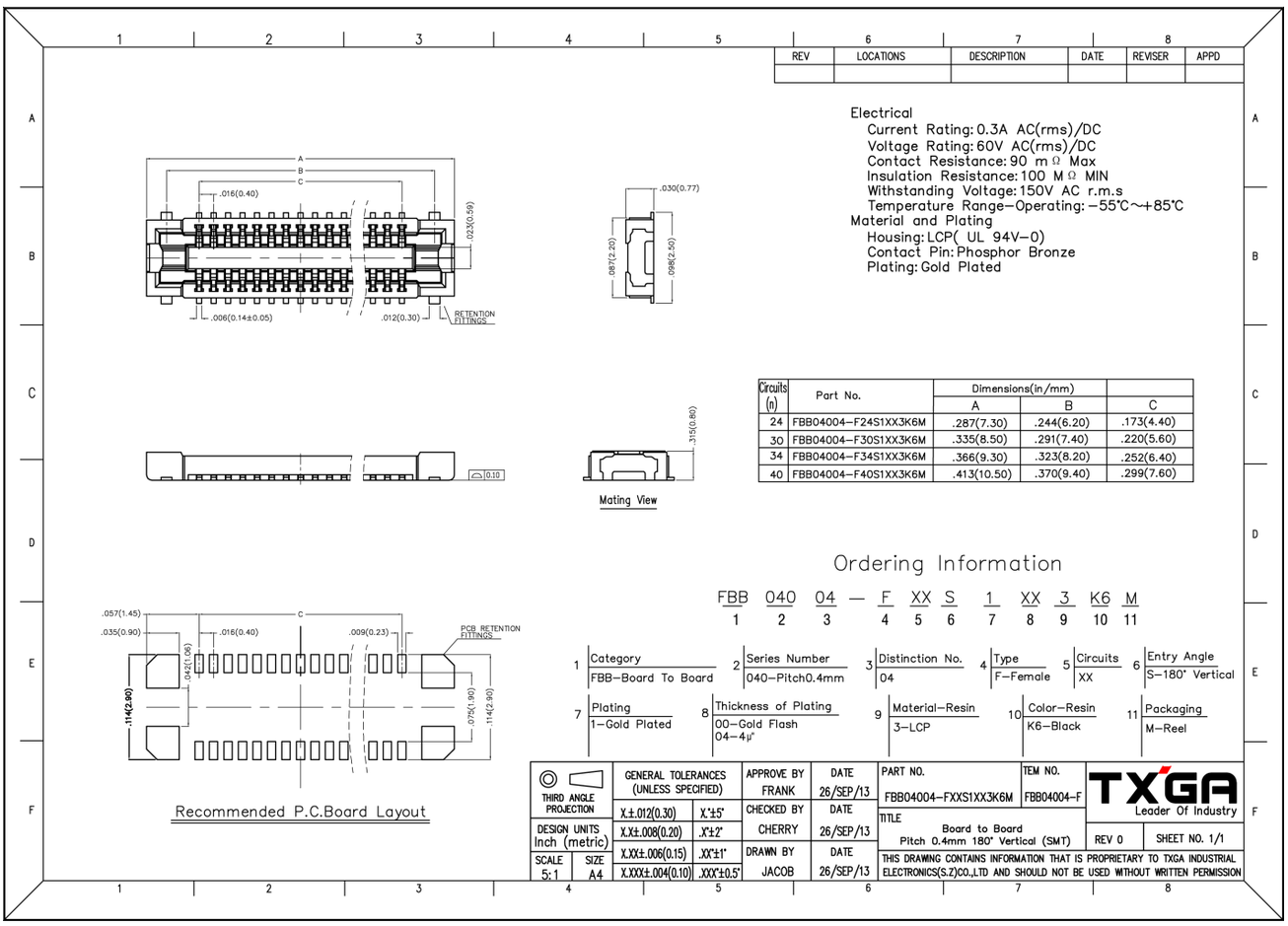


Figure 16: RAK5005-O Mounting Holes location and diameter

WisConnector PCB Layout



Circuits (n)	Part No.	Dimensions(in/mm) A	B	C
24	FBB04004-F24S1XX3K6M	.287(7.30)	.244(6.20)	.173(4.40)
30	FBB04004-F30S1XX3K6M	.335(8.50)	.291(7.40)	.220(5.60)
34	FBB04004-F34S1XX3K6M	.366(9.30)	.323(8.20)	.252(6.40)
40	FBB04004-F40S1XX3K6M	.413(10.50)	.370(9.40)	.299(7.60)

Figure 17: WisConnector PCB footprint and recommendations

Environmental Characteristics

The table below lists the operation and storage temperature requirements of RAK5005-O:

Parameter	Minimum	Typical	Maximum
Operational Temperature Range	–35 ºC	+25 ºC	+75 ºC
Extended Temperature Range	–40 ºC	+25 ºC	+80 ºC
Storage Temperature Range	–40 ºC	+25 ºC	+80 ºC

Schematic Diagram

The component schematics diagram of the RAK5005-O are shown in Figures 18 and 19:

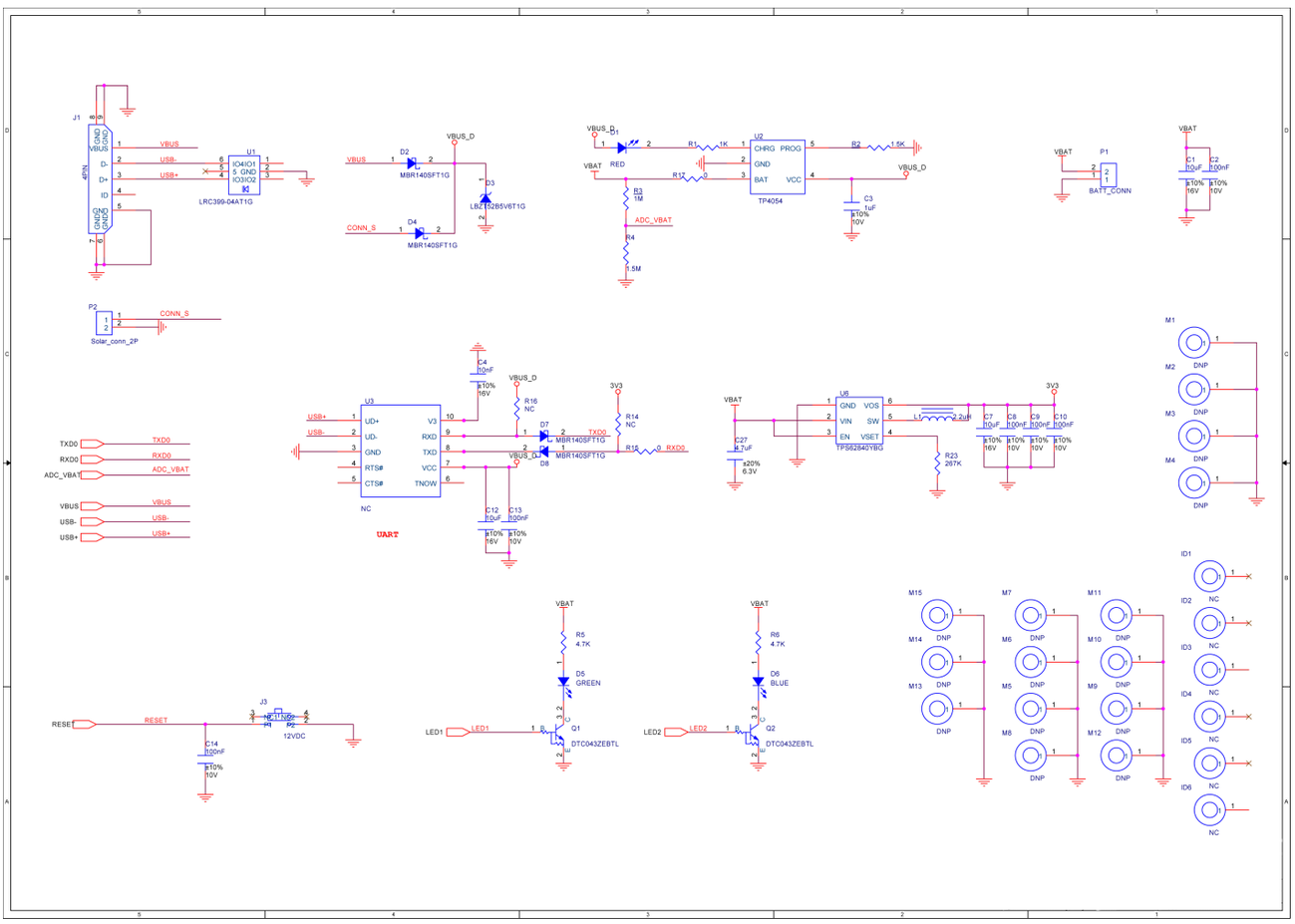


Figure 18: RAK5005-O Schematic Diagram

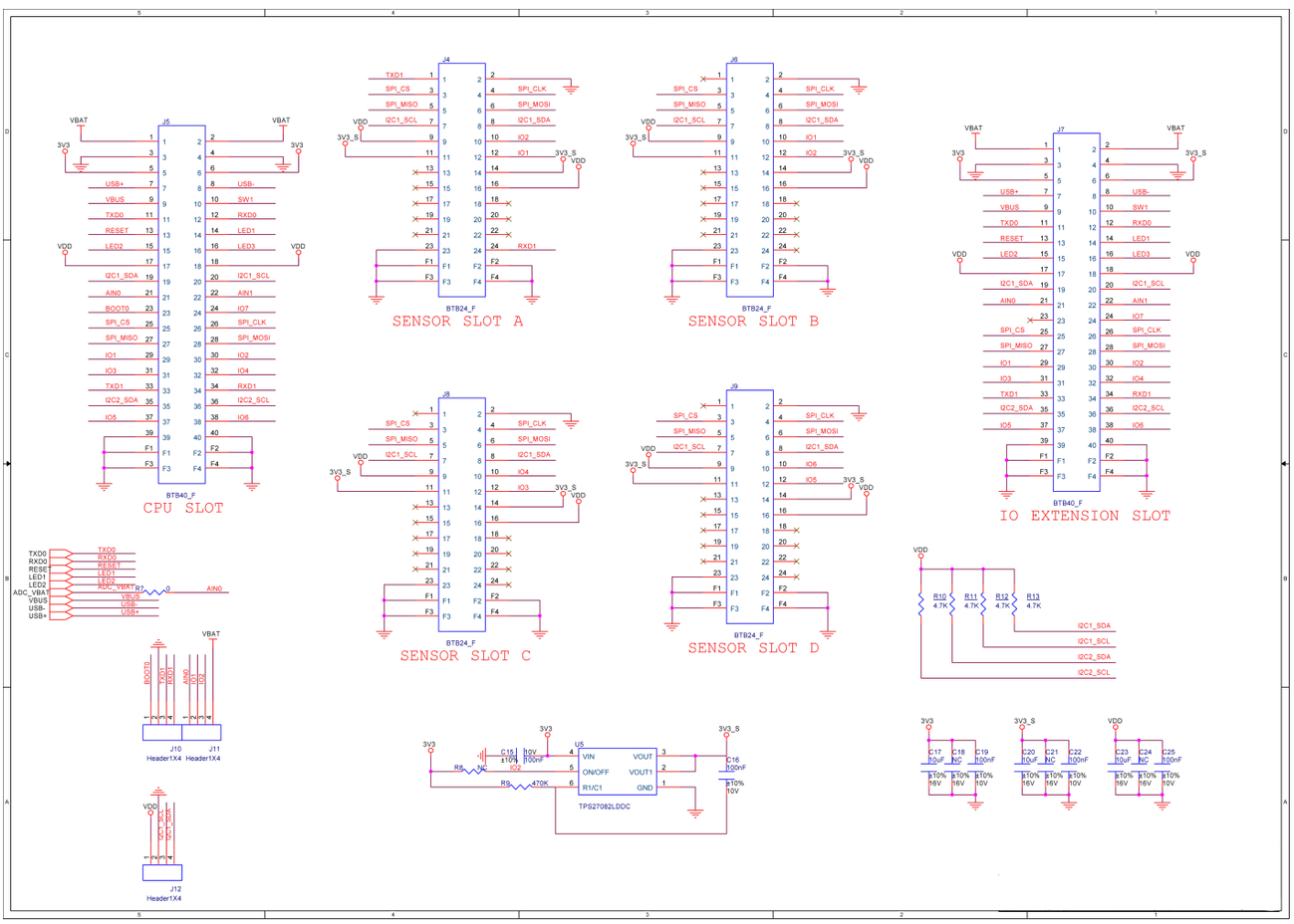


Figure 19: RAK5005-O Schematic Diagram

Module Supported

This section discusses a brief introduction to the WisBlock module. It helps you to understand and choose the module you want. About the detail of each module, refer to the reference manual of the respective module.

WisBlock Module in Production

RAK5005-O supports different kind of modules, according to the function and its the position on the RAK5005-O. WisBlock series modules are divided in the following categories:

- WisBlock Core

WisBlock Core module is the core computing and wireless connectivity unit within the WisBlock series. It integrates an MCU, a LoRa, a WiFi-BLE, or other wireless transceiver modules in a single package. The data collected by sensors are processed by the MCU and sent to the cloud through LoRa or WiFi wireless links. The BLE interface can also be used for short-range communication and indoor positioning function. The table below shows the WisBlock Core modules:

The table below shows the [WisBlock Core modules:

P/N	RAK module on it	Function	Chipset
RAK4631	RAK4630	BLE+LoRa	Nordic nRF52840 + SX1262
RAK11200	--	MCU+WiFi+BLE	Espressif ESP32 WROVER

- WisBlock Wireless

WisBlock Wireless modules extend the communication capabilities of WisBlock with the offered Wi-Fi and cellular modem modules. These modules can fit into the IO slot of the WisBlock Base Boards. The table shows the WisBlock Wireless modules:

P/N	Function	Chipset
RAK2305	WiFi Interface Module	Espressif ESP32 WROVER
RAK5860	NB-IoT Interface Module	Quectel BG77

- WisBlock Sensor

WisBlock Sensor offers a range of sensors for sensing environmental conditions (temperature and humidity), location, and movement conditions (GNSS location and accelerometer). The table below shows the WisBlock Sensor modules:

P/N	Function	Chipset
RAK1901	Temperature & Humidity Sensor	Sensirion SHTC3
RAK1902	Pressure Sensor	ST LPS22HB
RAK1903	Ambient Light Sensor	TI OPT3001DNPR
RAK1904	3-axis Sensor	ST LIS3DH
RAK1906	Environmental Sensor	BOSCH BME680
RAK1910	GPS Sensor	U-BLOX MAX-7Q
RAK12003	Infrared Temperature Sensor	MLX90632
RAK18000	PDM Stereo Microphone Module	ST MP34DT06

- WisBlock Interface

WisBlock Interface modules provide your application with interfaces to other systems using digital and analog inputs and industry standards like RS485 or 4-20 mA communication.

P/N	Function
RAK1920	Sensor Adapter Module
RAK5801	4-20 mA Interface Module
RAK5802	RS485 Interface Module
RAK5804	Interface Extension Module
RAK5811	0-5 V Interface Module

- WisBlock Display

WisBlock Display modules add visual display options to WisBlock. WisBlock Display offers graphic displays and LED's for WisBlock solutions. The table below shows the WisBlock Display modules:

P/N	Function	Chipset
RAK1921	WisBLock OLED Display	SSD1306
RAK14000	WisBLock E-Ink Display	

- WisBlock Extra

WisBlock Extra modules are add-ons for WisBlock. This category includes extension cables, real-time clock, and other useful modules.

P/N	Function	Chipset
RAK18001	WisBlock Buzzer Module	MLT-5020

- WisBlock Storage

WisBlock Storage extends the memory capabilities of WisBlock solutions with different storage options like Flash, EEPROM, or SD-Card slots. The table below shows the WisBlock Storage modules:

P/N	Function	Chipset
RAK15000	EEPROM Module	Microchip AT24CM02
RAK15001	Flash Module	Gigadevice GD25Q16CNIG

- WisBlock Power

WisBlock Power modules extend the power supply options available for WisBlock. Whether you need wireless charging or want to use an alternative green energy resource, the WisBlock Power Modules offer you such solutions. Moreover, a power supply option for external sensors is available as well. The table below shows the WisBlock Power module:

P/N	Function	Chipset
RAK19002	WisBlock Boost Module	TPS61046

WisBlock: Function and Data Bus Supported

WisBlock Core Function and Data Bus

RAK4631 Pin Definition	RAK11200 Pin Definition	Function Name of WisBlock Base	Pin Number	Pin Number	Function Name of WisBlock Base	RA De
VBAT	NC	VBAT	1	2	VBAT	VB
GND	GND	GND	3	4	GND	G
3V3	3V3	VDD	5	6	VDD	3V
USB+	USB_DP	USB+	7	8	USB–	US
VBUS	NC	VBUS	9	10	SW1	P1
UART1_TX1	TXD0	TXD0	11	12	RXD0	RX
MCU_RST	EN	RESET	13	14	LED1	LE
LED2/P1.04	IO2	LED2	15	16	LED3	P0
3V3	3V3	VDD	17	18	VDD	3V
I2C1_SDA1/P0.13	IO4	I2C1_SDA	19	20	I2C1_SCL	I2
AIN3/P0.05	SENSOR_VP/IO36	AIN0	21	22	AIN1	AI
NC	IO0	BOOT0	23	24	IO7	P0
P0.26/QSPI_CS	IO32	SPI_CS	25	26	SPI_CLK	P0
P0.29/QSPI_DIO1	IO35	SPI_MISO_1	27	28	SPI_MOSI	P0
P0.17	IO14	IO1	29	30	IO2	P1
P0.21	IO26	IO3	31	32	IO4	P0
P0.16	IO21	TXD1	33	34	RXD1	P0
P0.24	IO15	I2C2_SDA	35	36	I2C2_SCL	P0
P0.09/NFC1	IO13	IO5	37	38	IO6	P0
GND	GND	GND	39	40	GND	G

WisBlock Sensor Function and Data Bus

Type 4	Type 3	Type 2	Type 1	D	C	B	A
RXD	NC	NC	NC	NC	NC	NC	TX
NC	NC	NC	NC	SPI_CS	SPI_CS	SPI_CS	SPI
NC	NC	NC	NC	SPI_MISO	SPI_MISO	SPI_MISO	SPI
NC	I2C1_SCL	I2C1_SCL	I2C1_SCL	I2C1_SCL	I2C1_SCL	I2C1_SCL	I2C
NC	VDD	VDD	VDD	VDD	VDD	VDD	VDI
3V3_S	NC	NCN	NC	3V3_S	3V3_S	3V3_S	3V3
1PPS	INT1	INT	NC	NC	NC	NC	NC
RESET	INT2	NC	NC	NC	NC	NC	NC
NC	I2C1_SDA	I2C1_SDA	I2C1_SDA	NC	NC	NC	NC
NC	NC	NC	NC	NC	NC	NC	NC
NC	NC	NC	NC	NC	NC	NC	NC
GND	GND	GND	GND	GND	GND	GND	GN

> 📝 **NOTE**
>
> Sensor Module Pinout Definition:
>
> - Type 1
> - Type 2
> - Type 3
> - Type 4

The WisSensor data bus is divided into four type. The relationship is shown in the table below:

Sensor Type	WisSensor	Description
Type 1	RAK1901	Temperature & Humidity Sensor
	RAL1906	Environmental Sensor
Type 2	RAK1902	Pressure Sensor
	RAK1903	Ambient Light Sensor
	RAK1905	9-axis Sensor
Type 3	RAK1904	3-axis Sensor
Type 4	RAK1910	GPS Sensor

WisBlock IO Function and Data Bus

RAK2305	RAK2705	RAK5802	RAK5801	Function Name of WisBlock Base	Pin Number	Pin Number	Fun Nan Wis Bas
ESP32	NFC	RS485	4-20 mA				
VBAT	VBAT	VBAT	VBAT	VBAT	1	2	VBA
GND	GND	GND	GND	GND	3	4	GNI
NC	NC	NC	NC	3V3	5	6	3V3
NC	NC	NC	NC	USB+	7	8	USI
NC	NC	NC	NC	VBUS	9	10	SW
TXD0	NC	NC	NC	TXD0	11	12	RXI
NC	NC	NC	NC	RESET	13	14	LEI
LED2	NC	NC	NC	LED2	15	16	LEI
NC	NC	NC	NC	VDD	17	18	VDI
I2C1_SDA	NC	I2C1_SDA	I2C1_SDA	I2C1_SDA	19	20	I2C
NC	NC	AIN0	AIN0	AIN0	21	22	AIN
NC	NC	NC	NC	NC	23	24	NC
SPI_CS	SPI_CS*	NC	NC	SPI_CS	25	26	SPI
SPI_MISO	SPI_MISO*	NC	NC	SPI_MISO	27	28	SPI
NC	NC	NC	NC	IO1	29	30	IO2
NC	SPI_CS	NC	NC	IO3	31	32	IO4
RXD1	RXD1	RXD1	NC	TXD1	33	34	RXI
NC	NC	NC	NC	I2C2_SDA	35	36	I2C
NC	SPI_MISO	NC	NC	IO5	37	38	IO6
GND	GND	GND	GND	GND	39	40	GNI

> 📝 **NOTE**
>
> - Can be supported by reworking the hardware.

Certification

Last Updated: 9/21/2021, 4:25:59 AM