

RAK2305 WisBlock WiFi Interface Module Datasheet

Overview

Description

The RAK2305 module, part of the WisBlock IO series, was designed to be part of a production-ready IoT solution in a modular way and must be combined with a WisBlock Core and a Base module.

The RAK2305 module is a 2.4 GHz Wi-Fi and Bluetooth in a single module. The core of the module is an ESP32-WROVER-B, which features a PCB antenna. This module is designed to be part of the Internet-of-Things (IoT) applications. It can function as a master or a slave in a Bluetooth network. Internally it supports SPI/I2C/UART interfaces.

Features

- Wi-Fi + BLE module for Internet-of-Things
- I/O ports: UART/I2C/SPI/GPIO
- 4MB SPI flash and 8MB PSRAM
- Ultra-Low-Power Consumption
- Wi-Fi 802.11 b/g/n
- Module size: 29.5 x 25mm

Specifications

Overview

The overview covers the RAK2305 WisBlock board overview and block diagram. It also shows how to mount the board into to the baseboard.

Board Overview

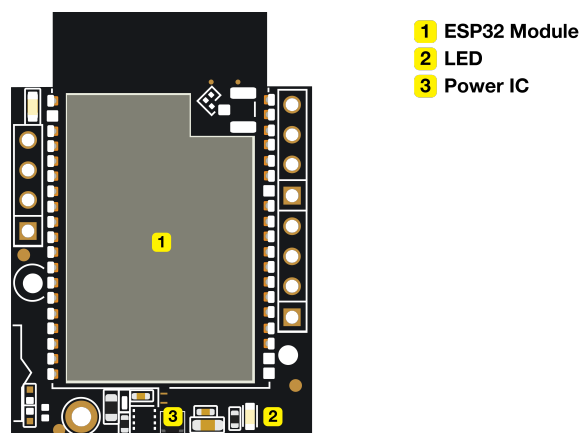


Figure 1: Board Overview

Mounting Sketch

Figure 2 shows how RAK2305 module is integrated with the RAK5005-O baseboard. The mounting sketch is shown.

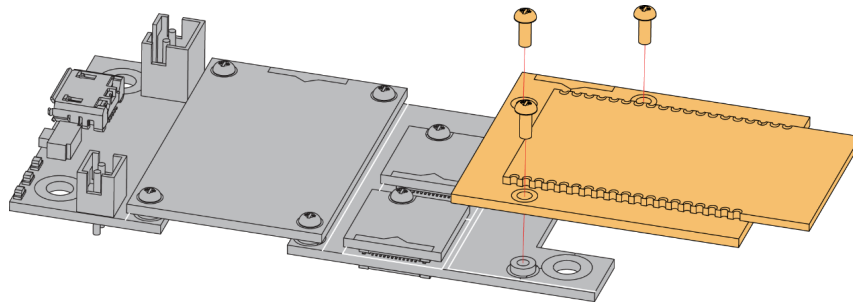


Figure 2: Mounting Sketch

Block Diagram

Figure 3 shows the block diagram of the RAK2305 module.

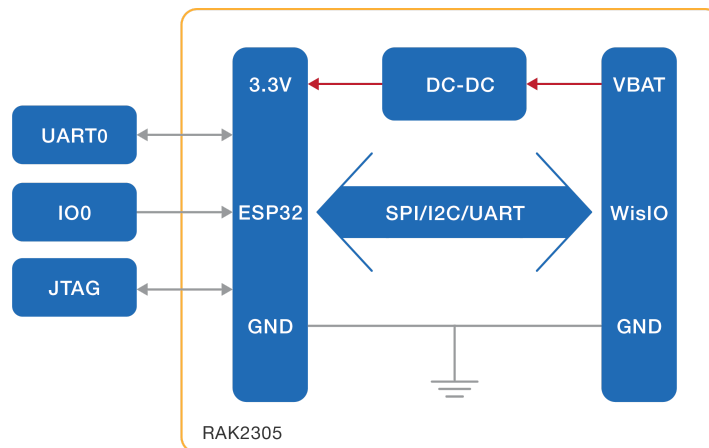


Figure 3: RAK2305 Block Diagram

NOTE

1. VBAT is battery output voltage, the max voltage is 4.2V
2. When IO0 is pulled-down, enter UART download mode, when is pulled-up, enter flash operation mode. Default, the IO0 is pull-up.

Hardware

The hardware specification is categorized into four parts. It discusses the interfacing of the module and its 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 RAK2305 WisBlock WiFi Interface Module.

Interfaces

UART Interface

The RAK2305 module provides two UART interfaces: UART0 and UART1. The UART0 can be used for upgrading firmware or to access console output through WisBlock baseboard USB interface. The UART1 is the main communication interface with WisBlock Core module.

SPI Interface

The RAK2305 supports one single SPI Interface. It can be operated either in the master or slave mode, both can be implemented in full-duplex or half-duplex communication modes. The SPI interface supports the following features:

- Four SPI transfer modes, which is defined by the polarity (CPOL) and the phase (CPHA) of the SPI clock.
- An internal FIFO buffer of 64-byte.

I2C Interface

The RAK235 module provides an I2C bus interface. Depending on the user's configuration, it can serve as an I2C master or slave. The I2C interface supports:

- Standard mode (100 Kbit/s) and Fast mode (400 Kbit/s).
- Up to 5MHz, constrained by the SDA pull-up strength.
- 7-bit/10-bit addressing mode. The RAK2305 module allows users to access directly to the registers to control I2C interfaces, which add more flexibility in the design of the final solution.

Download Interface

The RAK2305 module uses the UART0 interface to download customized application code into the ESP32's flash memory. The users can use a USB to UART cable for this purpose. Alternatively, once the RAK2305 is mounted on top of RAK5005-O baseboard, such as the RAK5005, then users can access the UART0 interface through the RAK5005's USB interface instead. The pinout if the USB port of the RAK2305 is shown in Figure 4.

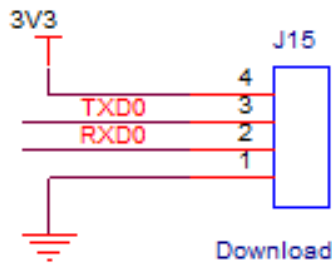


Figure 4: USB/UART0 Interface

⚠ WARNING

Before download, you need to pull down IO0.

Pin Definition

Figure 5 shows the Pin Definition of the RAK2305 WisBlock WiFi Interface Module

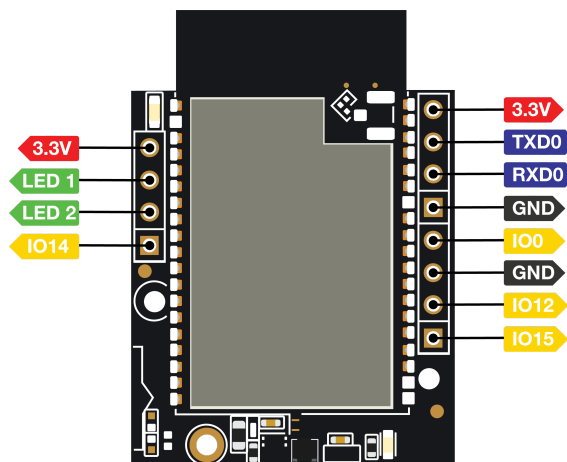


Figure 5: RAK2305 Pin Definition

Electrical Characteristics

Absolute Maximum Ratings

Table below shows the absolute maximum ratings supported by the RAK2305 Module

Symbol	Description	Min	Nom.	Max.	Unit
VBAT	Power Supply For the Module	0.5		4.2	V
Iout	Step Down IC Output Current			1000	mA

Recommended Operating Conditions

Symbol	Description	Min.	Nom.	Max.	Unit
Vbat	Power Supply For the Module	2.6		4.2	V
3v3	3.3V Power Supply		3.3		V

Mechanical Characteristics

Board Dimensions

Figure 6 shows the dimensions and the mechanic drawing of the RAK2305 Module.

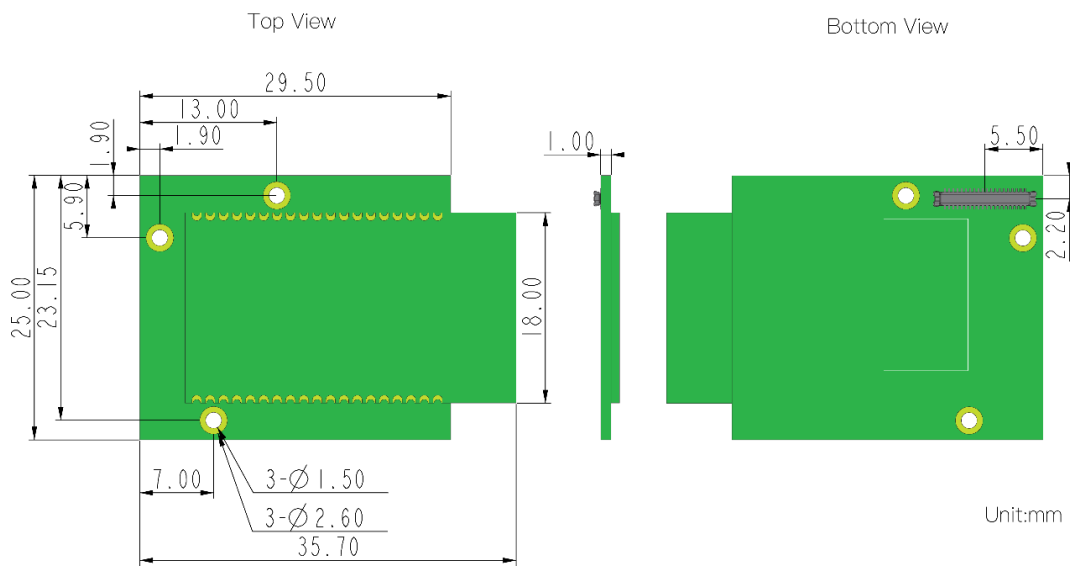


Figure 6: RAK2305 Module Dimensions

WisConnector PCB Layout

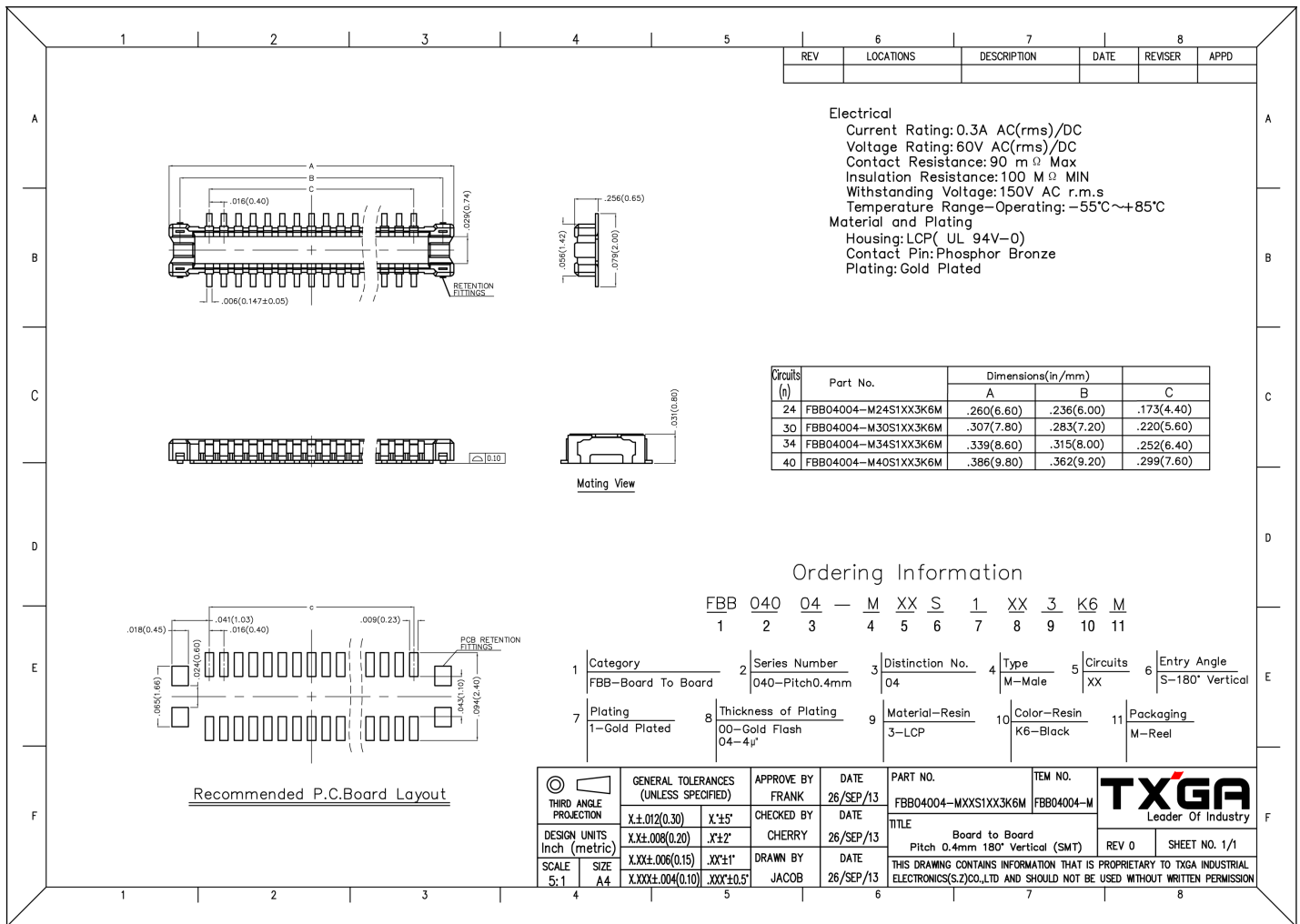


Figure 7: WisConnector PCB footprint and recommendations

Schematic Diagram

The following sections describes the schematic of the RAK2305 module.

Power Supply

Figure 8 shows the schematic of the power supply of the RAK2305 module. In the diagram, VBAT is the battery voltage supplied from the WisBlock base board RAK5005.

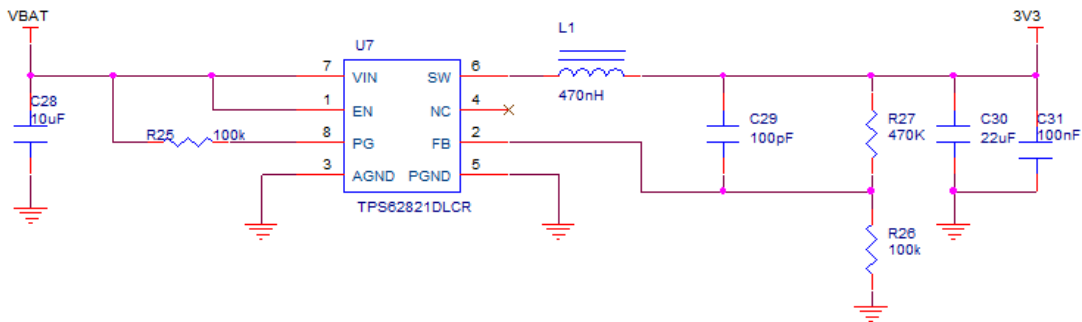


Figure 8: Power Supply

IO Connector

Figure 9 shows the pin definition of IO connector.

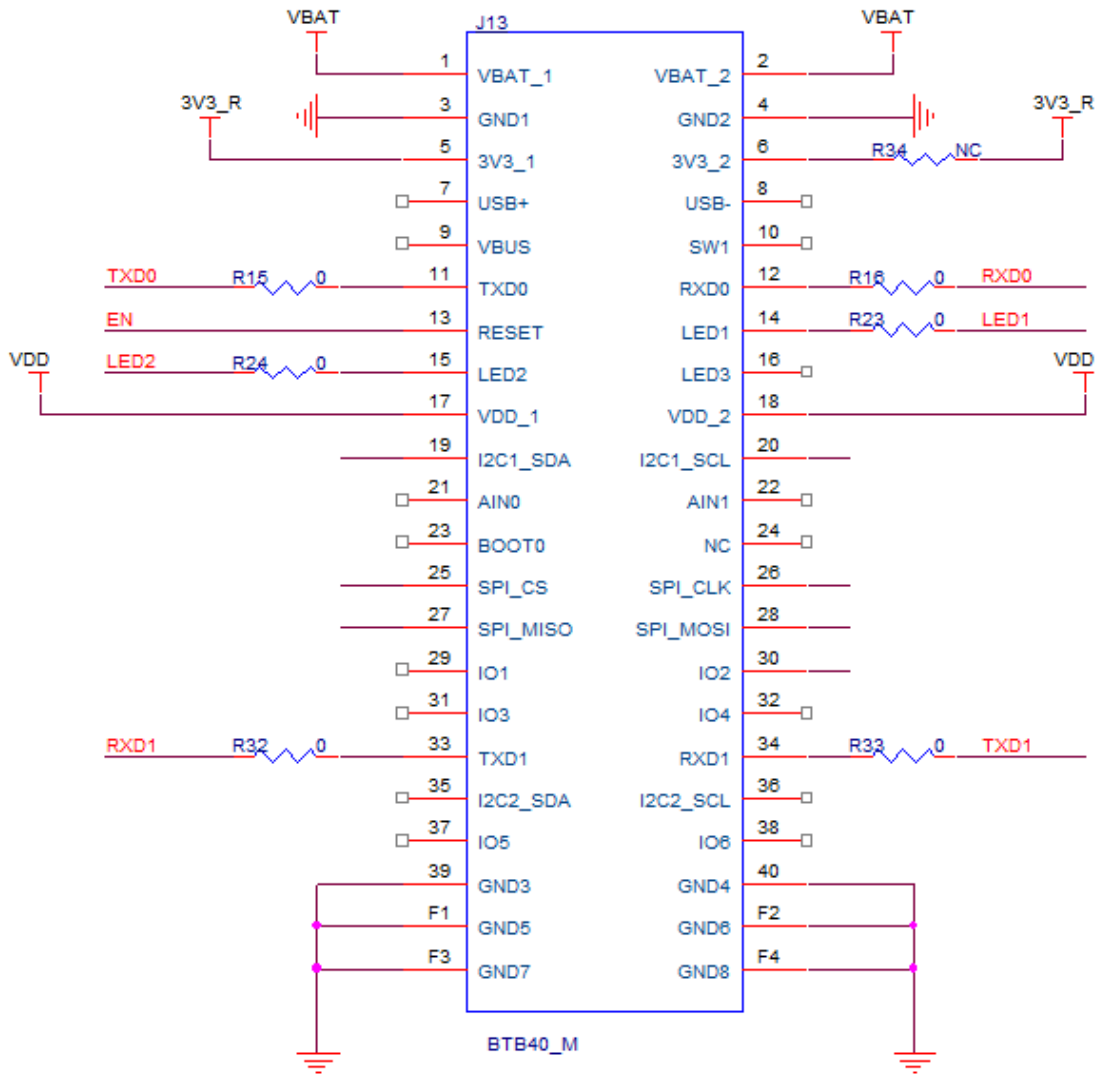


Figure 9: IO Connector

Name	Description	Comment
VBAT	Battery Output Voltage	Max 4.2V
3V3_R	WisBlock Base Board 3.3V	By Default, Not Connected
VDD	3.3V	By Default, Not Connected
TXD0/RXD0	UART0 interface	Interface for firmware download and log output
TXD1/RXD1	UART1 interface	Main serial communication interface
LED1/LED2	LED interface	To control the base board's LED
EN	ESP32 module Enable	Active High

Connector Pin Order

Figure 10 shows IO connector and its pin order. This connector is located on the bottom side of the module.

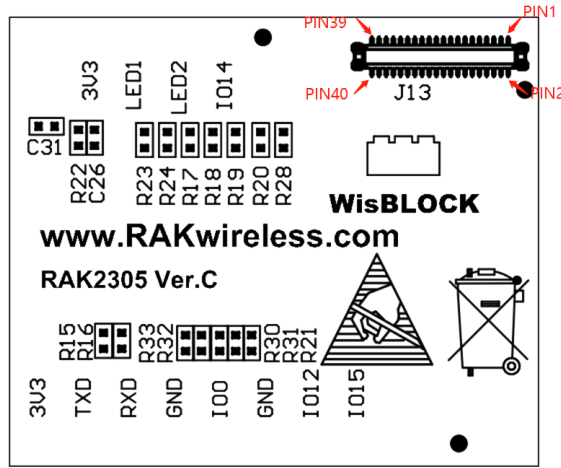


Figure 10: IO Connector Pin Order

Core Module

The core components inside of the RAK2305 module is the ESP32-WROVER-B, which comes with a PCB antenna. The module is designed to work with 3.3V supplied by the baseboard. In order to prevent any instability on EN (Enable pin), a RC delay circuit is added to this pin, and the EN pin is pulled up to 3.3V by default. Figure 11 shows the section of the schematic that involves the ESP32-WROVER-B component.

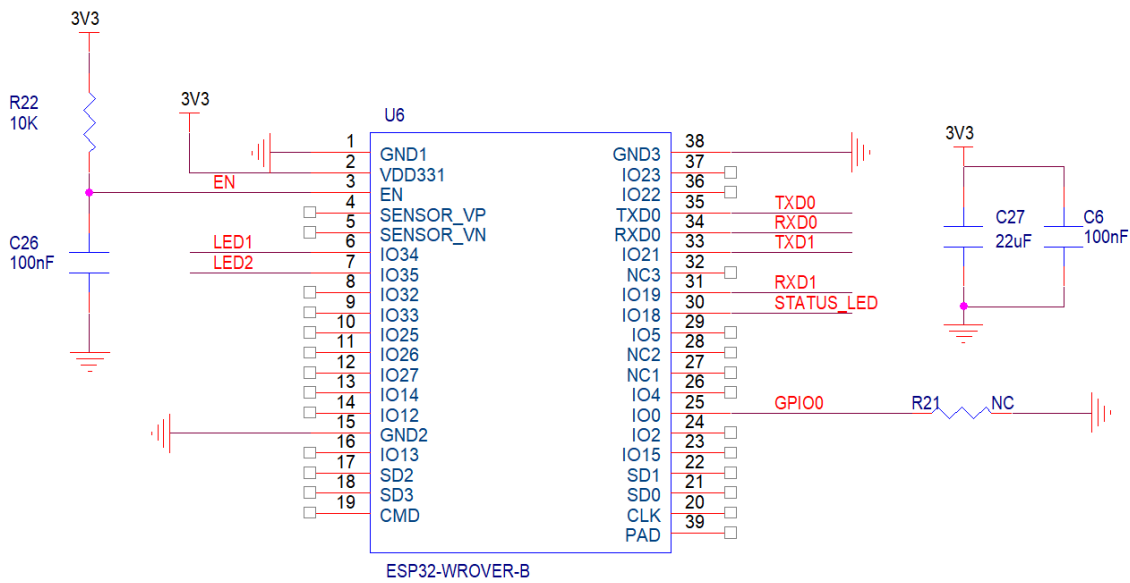


Figure 11: RAK2305 Core Component's Schematic

Name	Description	Comment
3.3V	Power Supply	3.3V
GND	Ground	
TXD1/RXD1	UART1 interface	Main communication interface
TXD0/RXD0	UART0 interface	Interface for firmware update or log output
LED1/LED2	LED interface	Baseboard LED control
EN	ESP32 Module Enable	Active High
STATUS_LED	LED on module	Active Low
GPIO0	BOOT0	Low: UART Download Mode High: FLASH Operation Mode

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