

User Manual

WisBlock

RAK5860 NB-IoT Module

Version V1.1 | June 2020

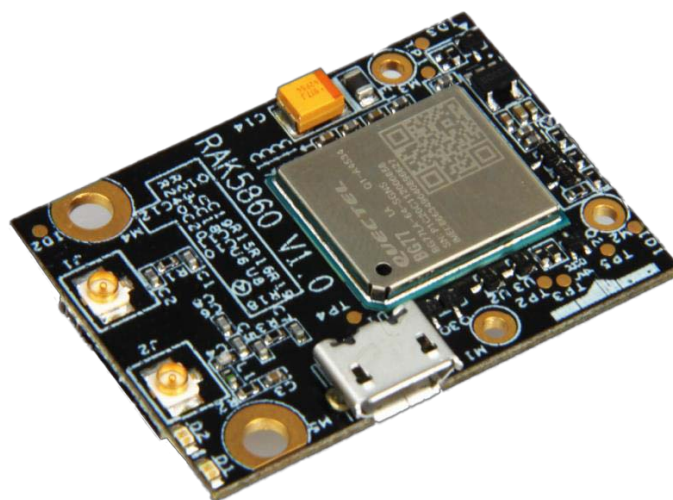


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1 Introduction

This document aims to allow customers to understand quickly the RAK5860 WisIO module. The document covers schematic, electrical and mechanical details, as well as other related information of the RAK5860 module.

2 Overview

2.1 General description

The RAK5860 WisBlock IO module, 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 RAK5860 is a module designed to work with the RAK5005-O baseboard, it provides wireless communication (LTE Cat M1, LTE Cat NB2) to the final application. This module supports LTE-FDD network and supports half- duplex operation in the LTE network. It also provides optional GNSS functionality.

For debugging purposes, a Micro-USB connector is used for sending AT commands, data transmission, and receiving GNSS NMEA output. Once the module is integrated with the RAK5005-O baseboard, the internal UART port of the module is connected through the IO connector to a WisBlock Core module.

2.2 Main Features

- Quectel BG77 with LTE Cat M1, LTE cat NB2 and GNSS
- IPEX connectors for the LTE and GPS antenna
- Micro-USB connector.
- Nano SIM and ESIM options
- Status Indication LEDs.
- Power Supply: 2.6-4.2V, typical supply voltage 3.3V
- Module size: 25mm x 35 mm

2.3 Board Overview

Figures 1 and 2 shows a realistic view and main component description of the RAK5860 Module

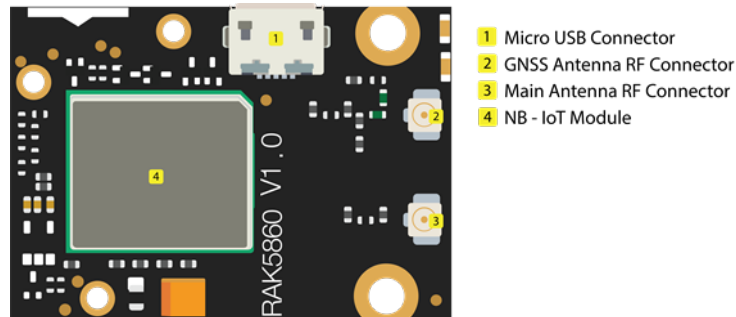


Figure 1: RAK5860 Board Realistic View (Front)

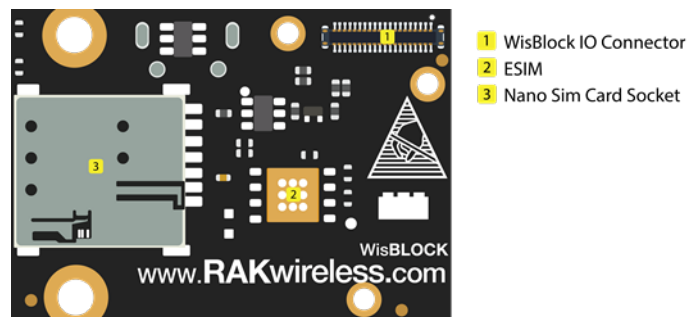


Figure 2: RAK5860 Board Realistic View (Back)

2.4 Mounting Sketch

Figure 3 shows how RAK5860 module (a WisIO module) is integrated with the RAK5005 baseboard. The mounting sketch is shown.

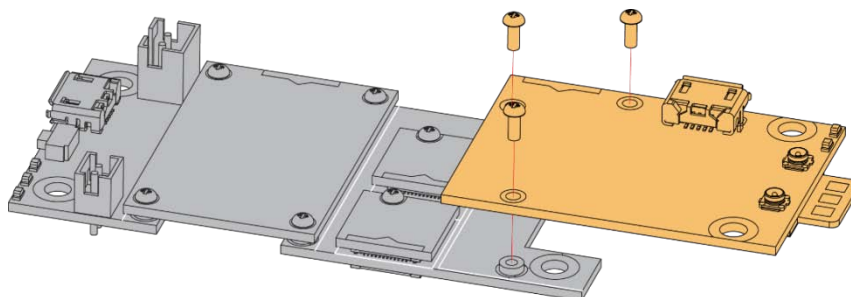


Figure 3: Mounting Sketch

2.5 IO Connector

The RAK5860 only uses a subset of all the pins available in the IO connector. These are shown in the Table below:

Name	Description	Comment
VBAT	BG77 power supply	MAX 4.2V
3V3_S	3.3V for GNSS antenna	
3V3	3.3V for voltage-level translator.	
WIS_PWRKEY	Turn on/off BG77	Active high
WIS_TX	UART TXD	BG77 MAIN_RX, 1.8V power domain
WIS_RX	UART RXD	BG77 MAIN_TX, 1.8V power domain

2.6 IO Connector Pin order

Figure 4 shows the IO connector's pin order. The connector is located in the bottom layer of the RAK5860 module.

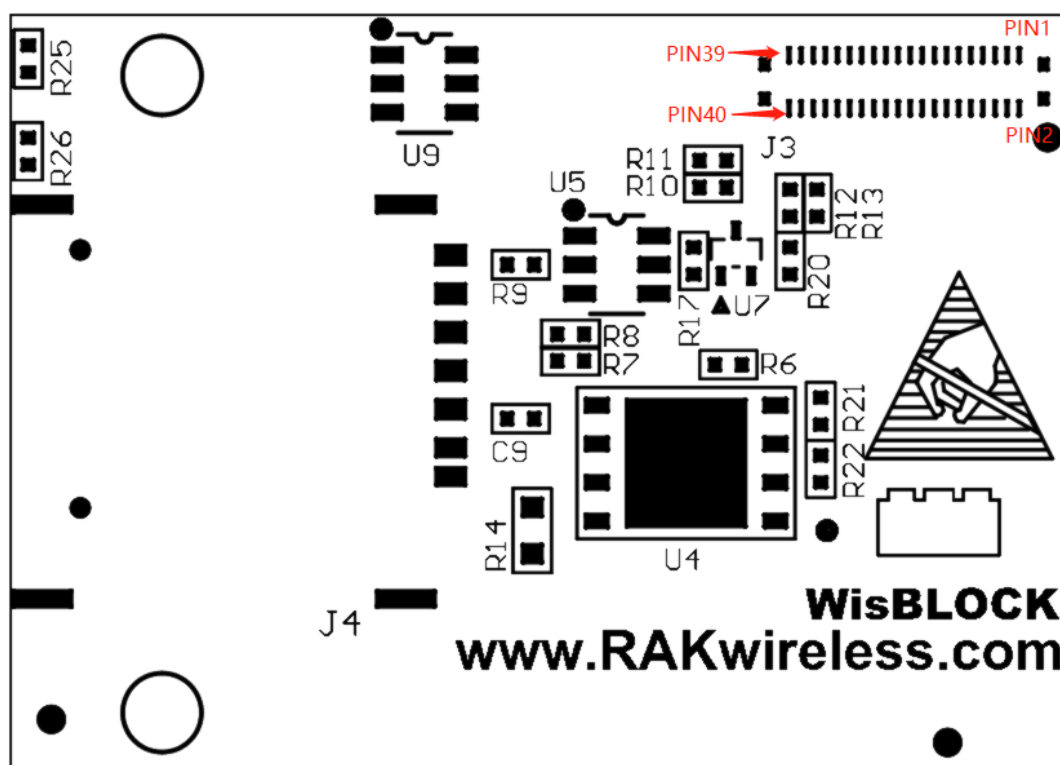


Figure 4: IO Connector Pin Order

3 Electrical Characteristics

3.1 Absolute Maximum Ratings

Table below shows the absolute maximum ratings of the RAK5860 module.

Symbol	Description	Min.	Nom.	Max.	Unit
VBAT	Power supply for the module	-0.5	-	4.2	V
USB_VBUS	USB connection detection	1.3	-	1.8	V
Voltage at Digital Pins		-0.3	-	2.09	V

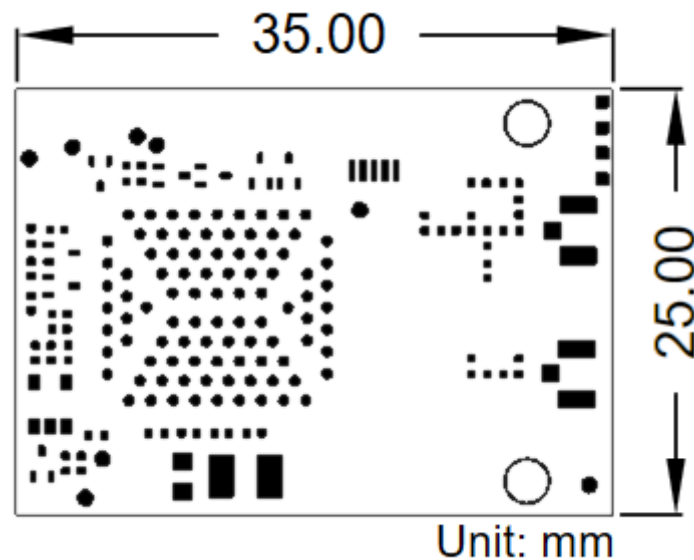
3.2 Recommended Operating Conditions

Table below shows the recommended operating conditions of the RAK5860 module.

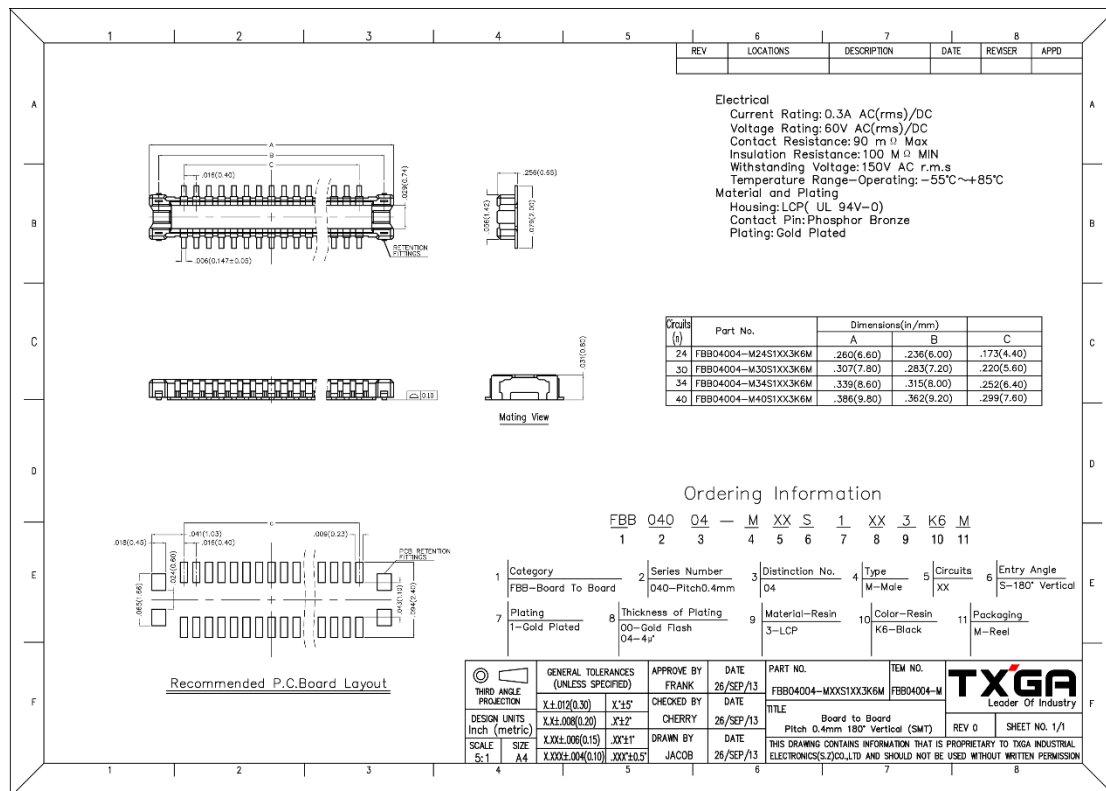
Symbol	Description	Min.	Nom.	Max.	Unit
VBAT	Power supply for the module	2.6	3.3	4.2	V
USB_VBUS	USB connection detection	1.3	-	1.8	V
USBPHY_3P3	Power for USB PHY circuit	-	3.3	-	V

4 Mechanical Characteristics

4.1 Board Dimensions



4.2 WisConnector PCB Layout



5 Certification Information

FCC Caution:

Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This device 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.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

IMPORTANT NOTE:

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

6 Revision History

Revision	Description	Date
1	Initial version	2020/6/3
1.1	Review the details	2020/6/13

7 Document Summary

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