RAK12009 WisBlock MQ3 Alcohol Gas Sensor Module Datasheet

Overview

Description

The RAK12009 is an Alcohol Gas Sensor module, part of the RAKWireless WisBlock Sensor Series. The sensor used in this module is the MQ-3B from Zhengzhou Winsen Electronics. This sensor is capable of detecting alcohol gas in the air with an alcohol concentration detection range of 25 to 500 ppm.

Features

- MQ-3B Alcohol Gas Sensor
- Alert Function
- I2C Interface, 7-bit I2C Address: 0x54
- Detection Range: 25 to 500 ppm (Alcohol Gas)
- 3.3 V or VBAT Power Supply
- Chipset: Winsen MQ-3B
- **Module size**: 25 x 35 mm

Specifications

Overview

Mounting

The RAK12009 WisBlock MQ3 Alcohol Gas Sensor Module can be mounted to the IO slot of the WisBlock Base board. **Figure 1** shows the mounting mechanism of the RAK12009 on a WisBlock Base module.

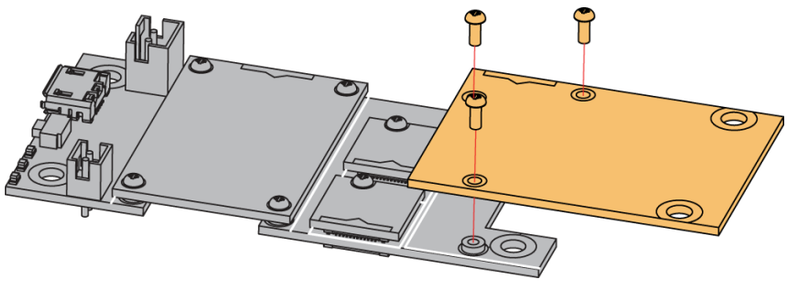


Figure 1: RAK12009 WisBlock MQ3 Alcohol Gas Sensor Mounting

Hardware

The hardware specification is categorized into five parts. It shows the chipset of the module and discusses the pinouts 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 RAK12009 WisBlock MQ3 Alcohol Gas Sensor Module.

Chipset

Vendor	Part number

Vendor	Part number
Winsen	MQ-3B

Pin Definition

The RAK12009 WisBlock MQ3 Alcohol Gas Sensor Module comprises a standard WisBlock connector. The WisBlock connector allows the RAK12009 module to be mounted to a WisBlock Base board. The pin order of the connector and the pinout definition is shown in **Figure 2**.

> 📝 **NOTE:**
>
> - **I2C** related pins, **ALERT**, **EN**, **VBAT**, **3V3**, and **GND** are connected to WisConnector.
> - **VBAT** is the battery voltage input, max voltage is 4.2 V.

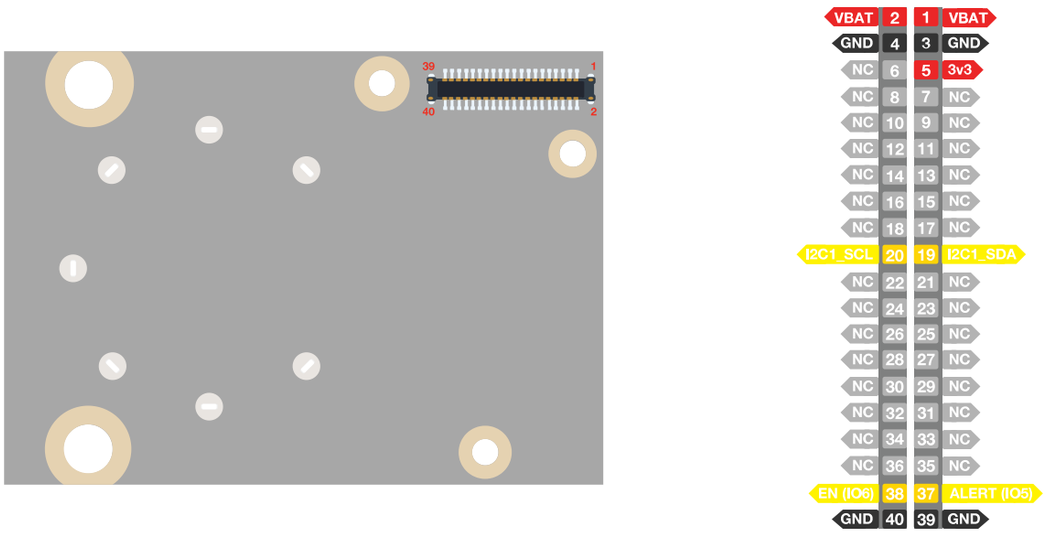


Figure 2: RAK12009 WisBlock MQ3 Alcohol Sensor Pinout

Electrical Characteristics

Recommended Operating Conditions

Symbol	Description	Min.	Nom.	Max.	Unit
VBAT	Supply Voltage	2.8	-	4.2	V
VCCIO	Digital IO Power Supply	-	3.3	-	V
VCC	ADC to I2C Chip Power Supply	-	5	-	V

Mechanical Characteristics

Board Dimensions

Figure 3 shows the dimensions and the mechanic drawing of the RAK12009 module.

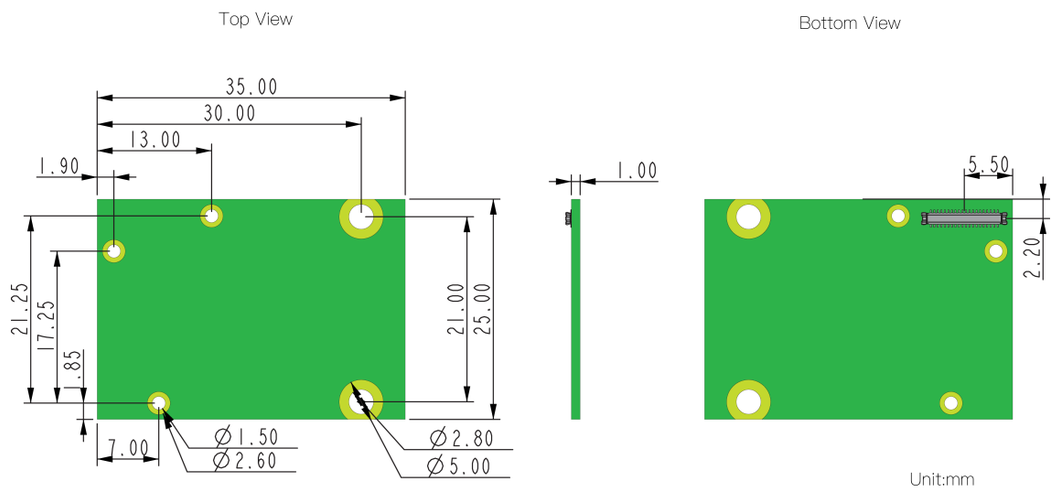
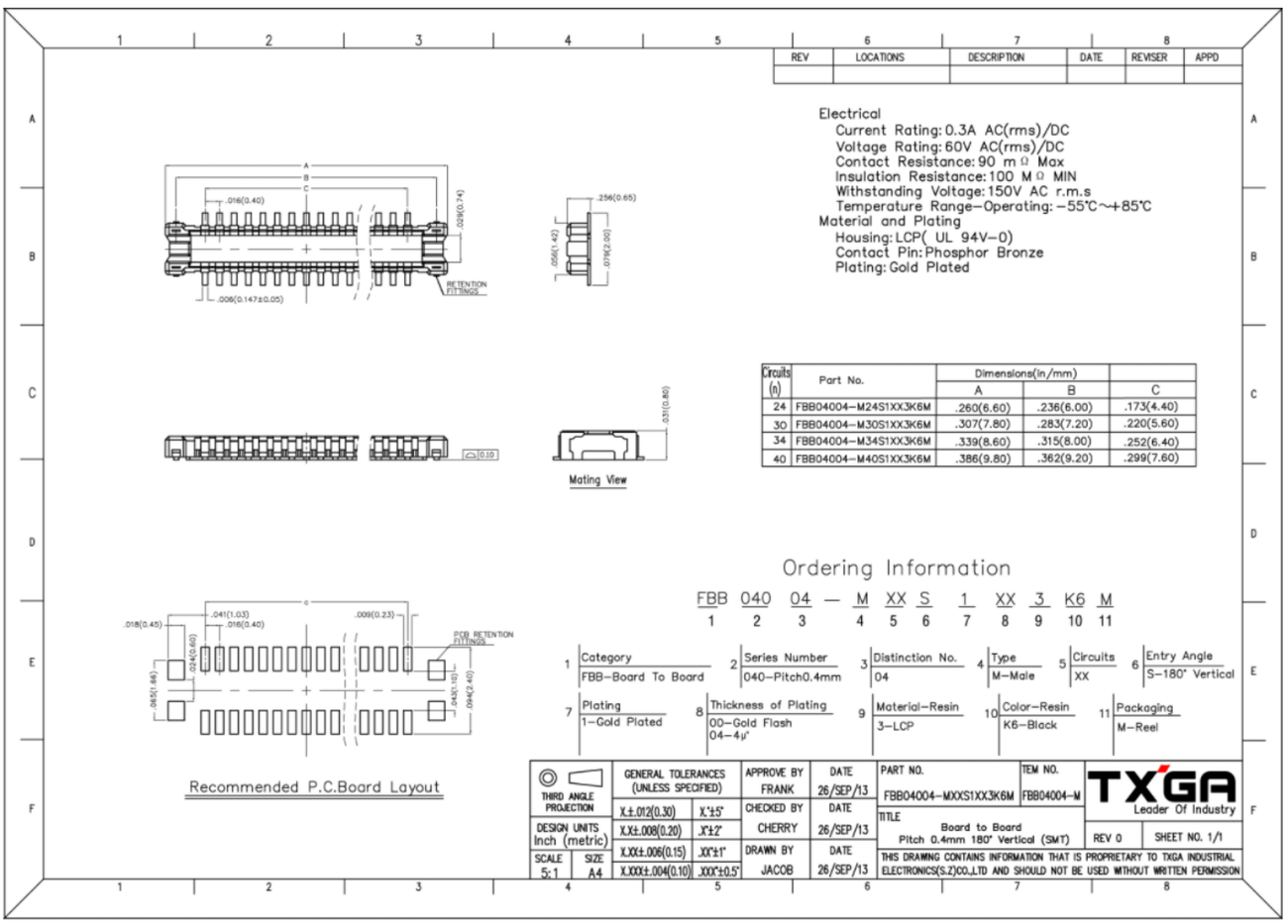


Figure 3: RAK12009 WisBlock MQ3 Alcohol Sensor Module Mechanic Drawing

WisConnector PCB Layout



Circuits (n)	Part No.	Dimensions(in/mm) A	B	C
24	FBB04004-M24S1XX3K6M	.260(6.60)	.236(6.00)	.173(4.40)
30	FBB04004-M30S1XX3K6M	.307(7.80)	.283(7.20)	.220(5.60)
34	FBB04004-M34S1XX3K6M	.339(8.60)	.315(8.00)	.252(6.40)
40	FBB04004-M40S1XX3K6M	.386(9.80)	.362(9.20)	.299(7.60)

Figure 4: WisConnector PCB Footprint and Recommendations

Schematic Diagram

Power Supply Circuit

Figure 5 shows RAK12009 step-up power supply circuit.

- **VBAT** Battery voltage (max voltage is 4.2 V)
- **EN** Power enable pin (active high). This pin is connected to **IO6** of WisBlock Core.

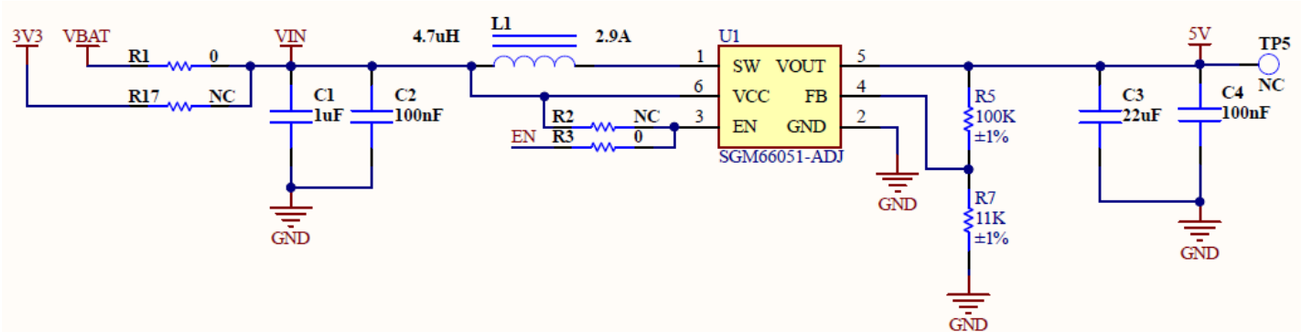


Figure 5: RAK12009 WisBlock MQ3 Alcohol Sensor Module Power Supply

Alcohol Detector Circuit

Figure 6 shows the alcohol detector circuit.

- **U2** is the MQ-3B Alcohol sensor.
- The pin 2 voltage (5 V) is used to supply standard working temperature to the sensor.
- **AOUT** is the voltage of load resistance R12 which is in series with sensor.
- The pin 1 and pin 3 voltage (5 V) supply the detect voltage to load resistance R12.
- **U3** is a 12-bit analog-to-digital converter with alert function. The **U3** power supply is 5 V.

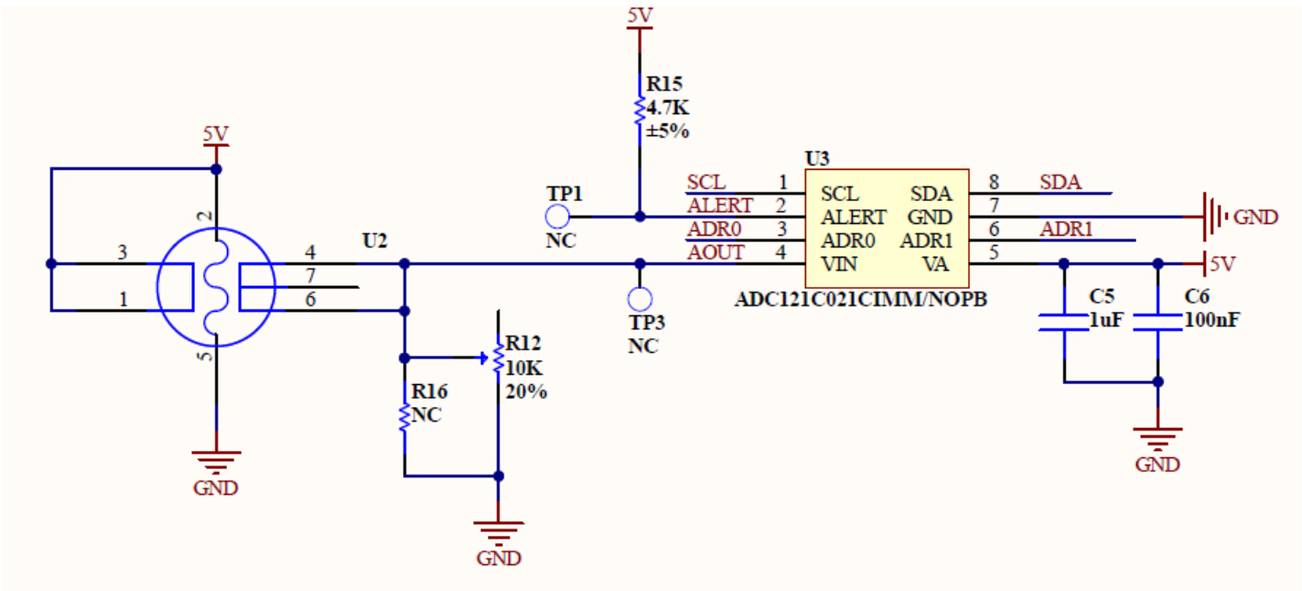


Figure 6: RAK12009 WisBlock MQ3 Alcohol Sensor Module Detector Circuit

Voltage Level Shifter Circuit

The 40-pin WisConnector voltage level is 3.3 V, while U2 and U3 levels are 5 V. To interface the different voltage levels between 40-pin WisConnector and Alcohol detector circuit, the RAK12009 uses a built-in voltage level shifter circuit.

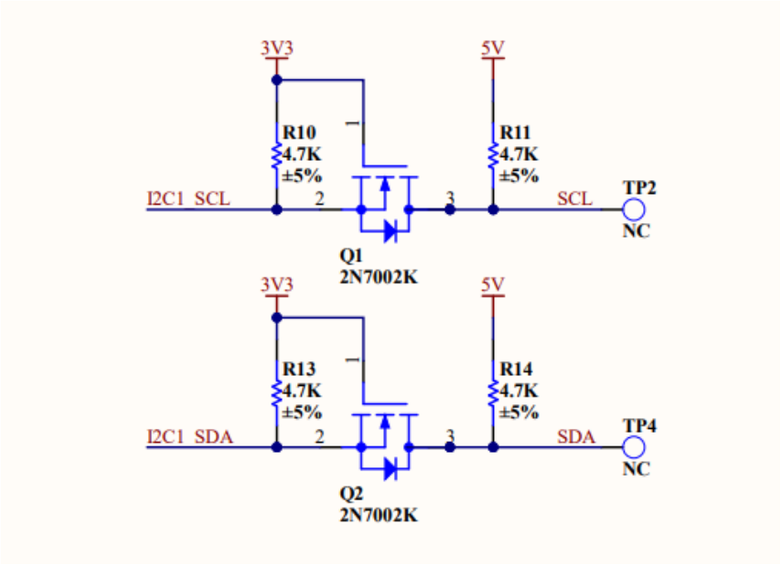


Figure 7: Voltage Level Shifter Circuit

I2C Address

The I2C address of the Analog-to-Digital converter chip of RAK12009 can be selected via resistor jumpers, as shown in **Figure 8**.

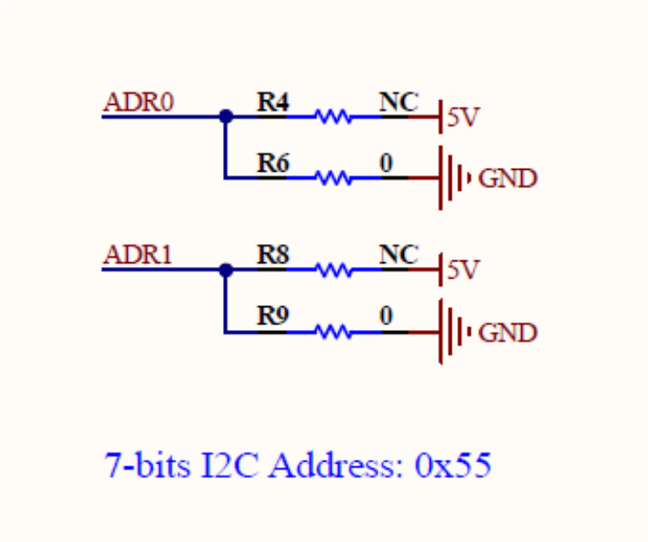


Figure 8: RAK12009 Alcohol Sensor Module I2C Address configuration

The I2C address is configured by the ADR1 and ADR0 address selection inputs, as shown below.

ADR1	ADR0	Slave Address [A6-A0]
Floating	Floating	1010000
Floating	GND	1010001
Floating	VA	1010010
GND	Floating	1010100
GND	GND	1010101
GND	VA	1010110

ADR1	ADR0	Slave Address [A6-A0]
VA	Floating	1011000
VA	GND	1011001
VA	VA	1011010

> 📝 **NOTE:**
>
> - The default 7-bit I2C address is 1010101 = 0x55. The selection input is ADR1 and ADR0 resistor jumper connected to **GND**.
> - **VA** is **U4** ADC121C021 Analog Power Supply (+5 V).

Full Schematic

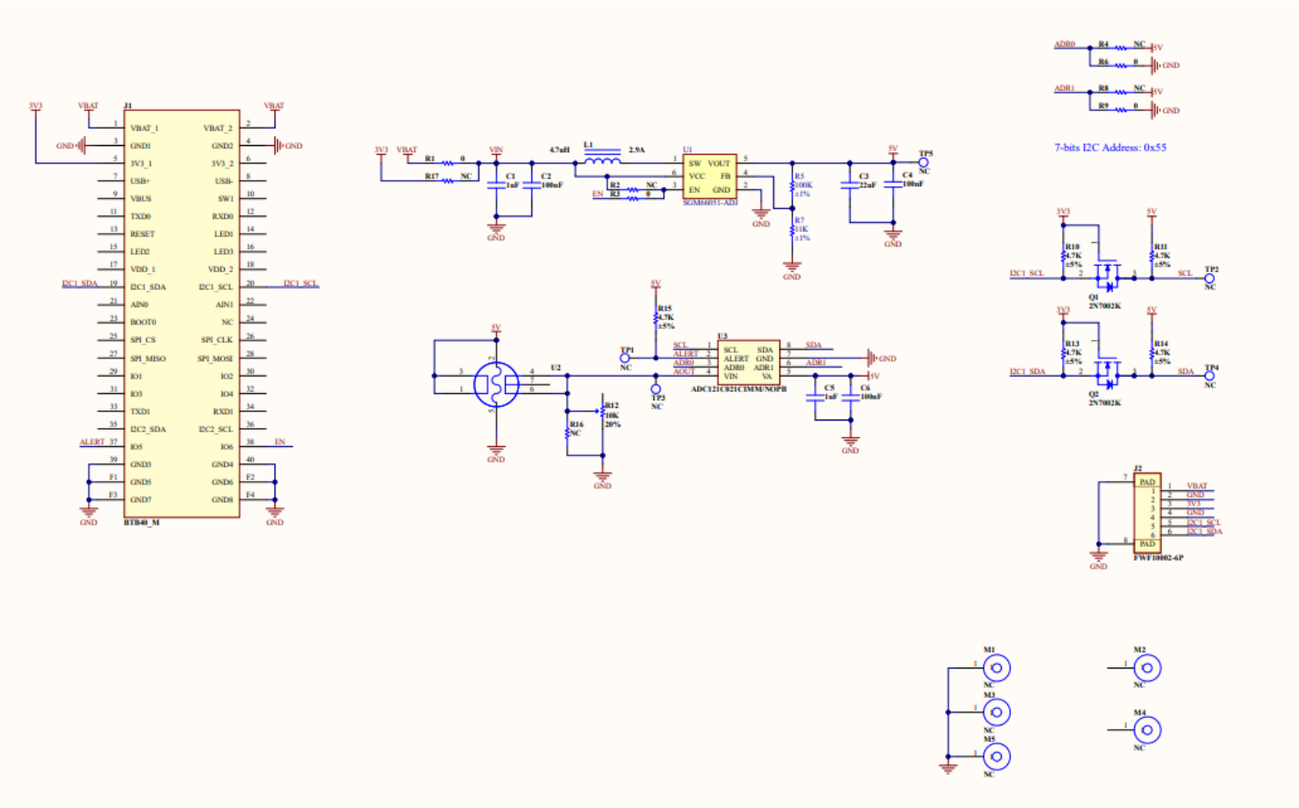


Figure 9: RAK12009 complete schematic

J2 Connector Pinout

RAK12009 has an additional J2 connector to provide an extra interface to the module. This connector separates the sensor module from the WisBlock Base, to fits with maker requirements. The pinout of J2 connector is shown in **Figure 10**.

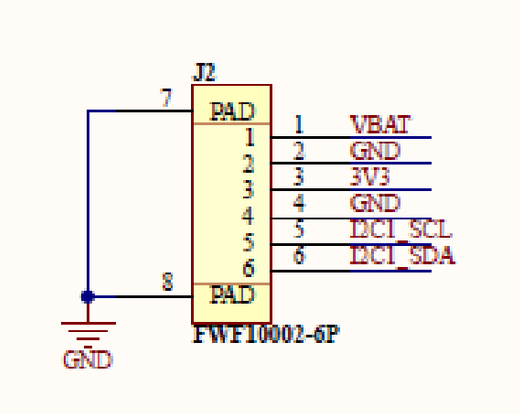


Figure 10: J2 Connector Pinout

WisConnector

Figure 11 shows the 40-pin WisConnector connection.

- **VBAT** is a battery voltage pin.
- **I2C1_SDA** and **I2C1_SCL** are the I2C related pins.
- **EN** is a power enable pin.
- **ALERT** is an analog-to-digital converter alert pin.

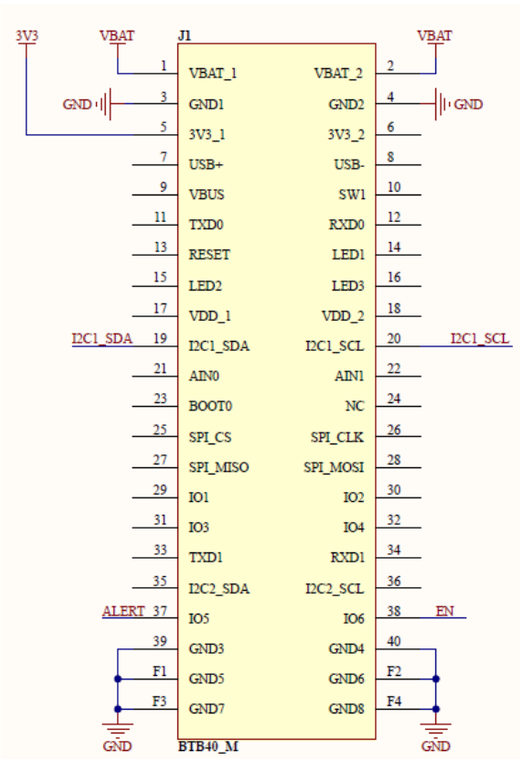


Figure 11: RAK12009 Module 40-pin WisConnector

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