RAK12016 WisBlock Flex Sensor Module Datasheet
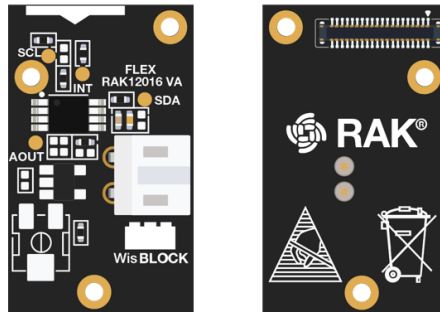
Overview

Figure 1: RAK12016 Flex Sensor Module

Description

RAK12016 is a flex sensor module, a part of the RAKWireless WisBlock Sensor series. It uses an FS-L-0095-103-ST from Spectrasymbol, which can measure the amount of deflection or bending.

Features

- Measure bending between 1 to 180 degrees
- Accuracy to 1 degree
- 3.3 V Power Supply
- Chipset: Spectrasymbol FS-L-0095-103-ST
- Module size: 15 X 25 mm

Specifications

Overview

Mounting

The RAK12016 WisBlock Flex Sensor Module can be mounted to the IO slot of the WisBlock Base☐ board.
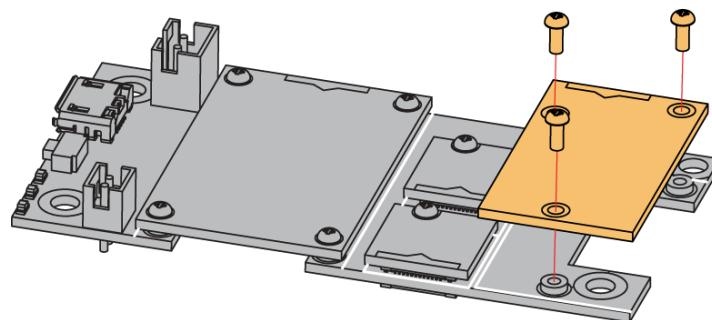**Figure 2** shows the mounting mechanism of the RAK12016 on a WisBlock Base module.

Figure 2: RAK12016 mounting mechanism on a WisBlock Base module

> 📝 **NOTE**
>
> - By using a JST PH2.54 Connector (J2), the flex sensor (FS-L-0095-103-ST) can also be an external module that is outside of the WisBlock unit, so it can measure bending on all kinds of objects.

Hardware

The hardware specification is categorized into five (5) parts. It shows the chipset of the module and discusses the pinouts and their corresponding functions and diagrams. It also covers the electrical and mechanical characteristics that include the tabular data of the functionalities and standard values of the RAK12016 WisBlock Module.

Chipset

Vendor	Part number
Spectrasymbol	FS-L-0095-103-ST

Pin Definition

The RAK12016 WisBlock Flex Sensor Module comprises a standard WisBlock connector. The WisBlock connector allows the RAK12016 module to be mounted to a WisBlock Base board. The pin order of the connector and the pinout definition is shown in **Figure 3**.
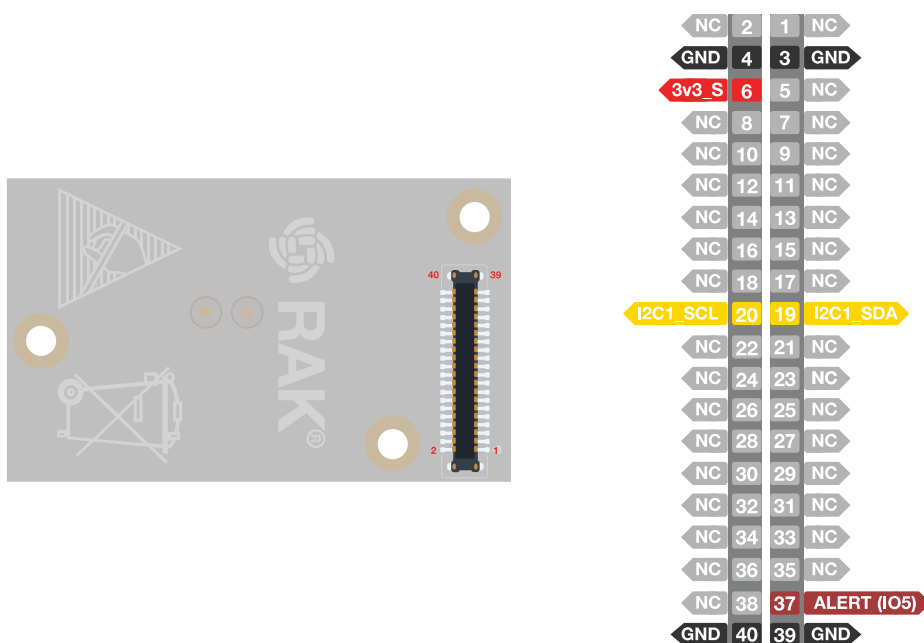

Figure 3: RAK12016 Pinout Schematic

> 📝 **NOTE**
>
> - Only **I2C** related pins, **3V3_S**, **GND**, and **ALERT** are connected to the WisConnector.
> - **3V3_S** voltage output from the WisBlock Base that powers the RAK12016 module can be controlled by the WisBlock Core via WB_IO2 (WisBlock IO2 pin). This makes the module ideal for low-power IoT projects since the WisBlock Core can totally disconnect the power of the RAK12016 module.

Electrical Characteristics

This section shows the maximum and minimum ratings of the RAK12016 module and its recommended operating conditions. Refer to the table presented below.

Recommended Operating Conditions

Symbol	Description	Min.	Nom.	Max.	Unit
VDD	Power Supply	-	3.3	-	V

Mechanical Characteristic

Board Dimensions

The mechanical dimensions of the RAK12016 module are shown in **Figure 4** below.
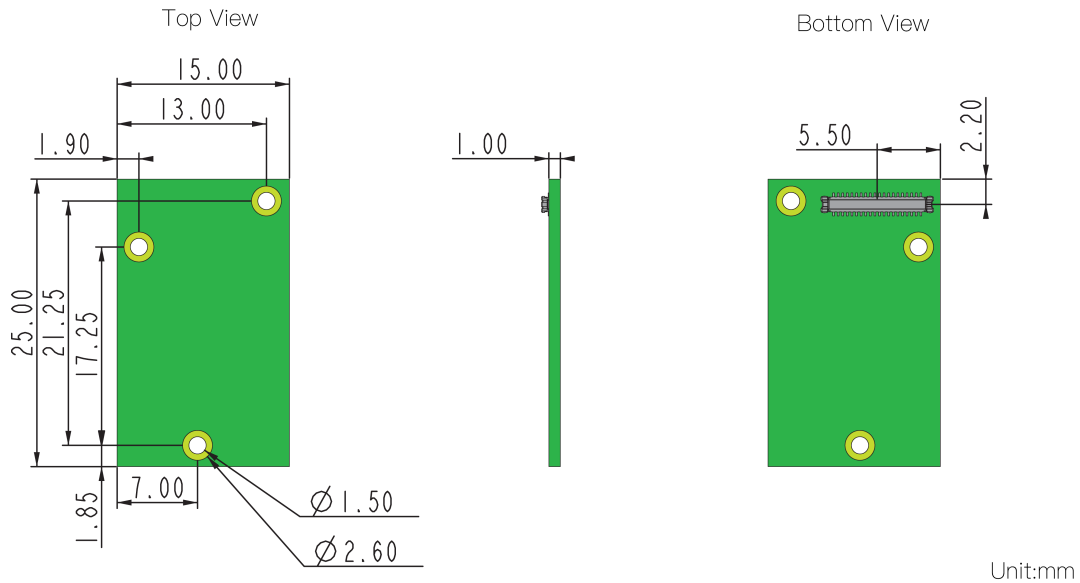

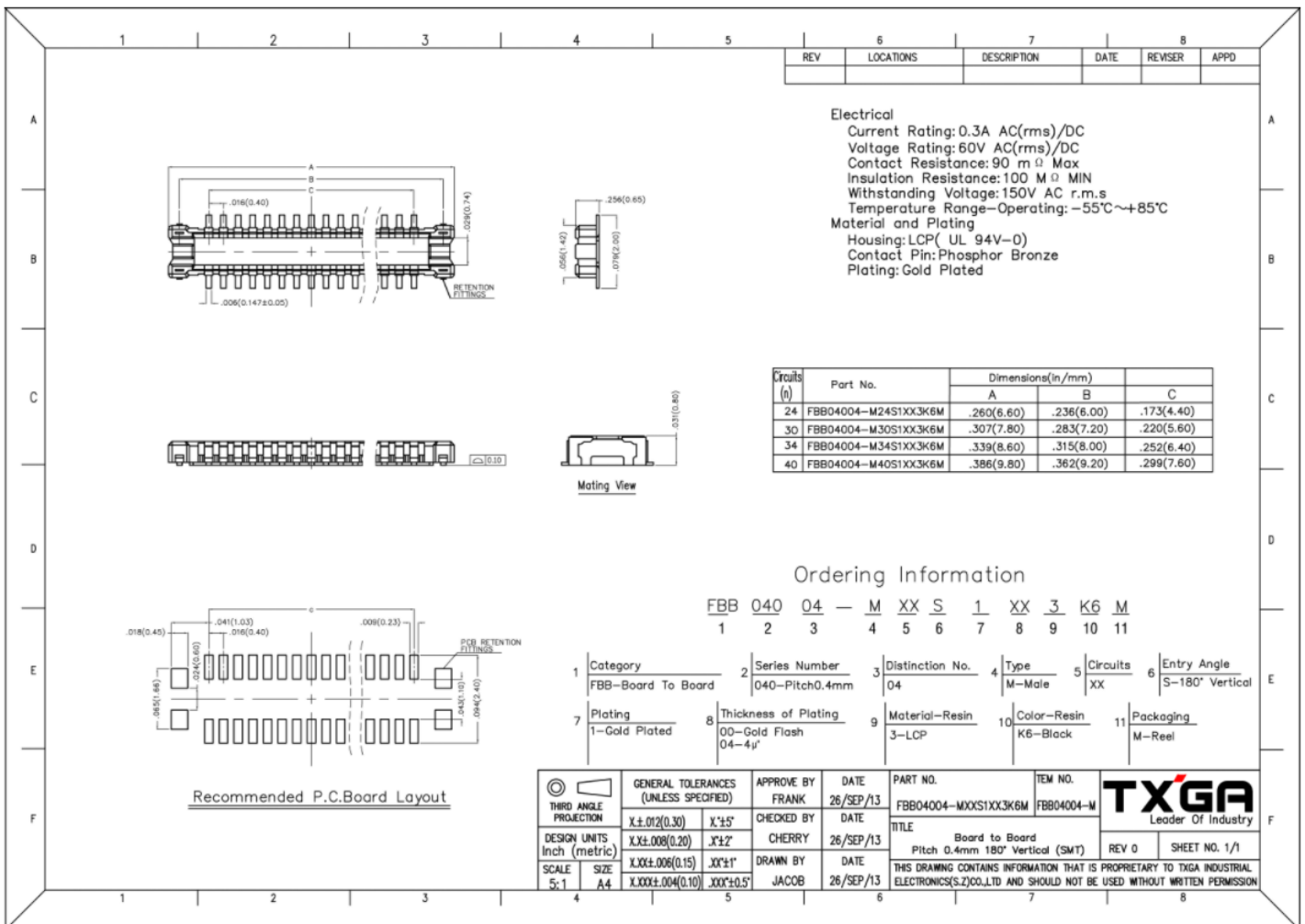**Figure 4:** RAK12016 Mechanical Dimensions

WisConnector PCB Layout

Figure 5: WisConnector PCB footprint and recommendations

PCB Silkscreen

RAK12016 PCB Silkscreen

Figure 6: RAK12016 PCB Silkscreen

Schematic Diagram

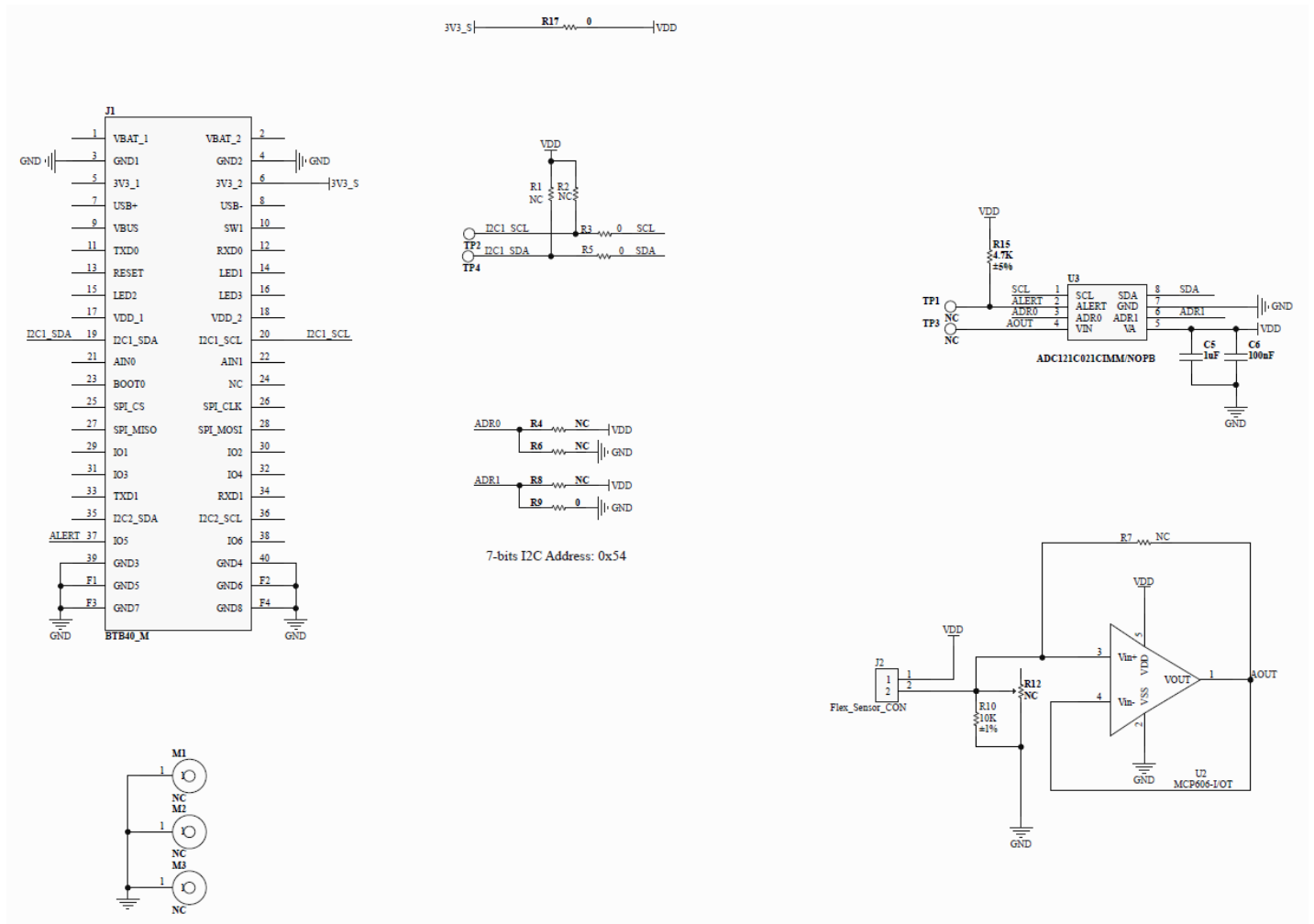**Figure 7** shows the schematic of the RAK12016 module.

Figure 7: RAK12016 WisBlock Module Schematics

Analog Input

J2 is used to connect the flex sensor. The sensor acts like a variable resistor, the resistance changes due to the angle of bend by flexing the component. **R10** and the flex sensor constitute a series voltage divider. The MCP606 Comparator is used because the low input bias current of the Op Amp reduces the error due to the source impedance of the flex sensor as a voltage divider.
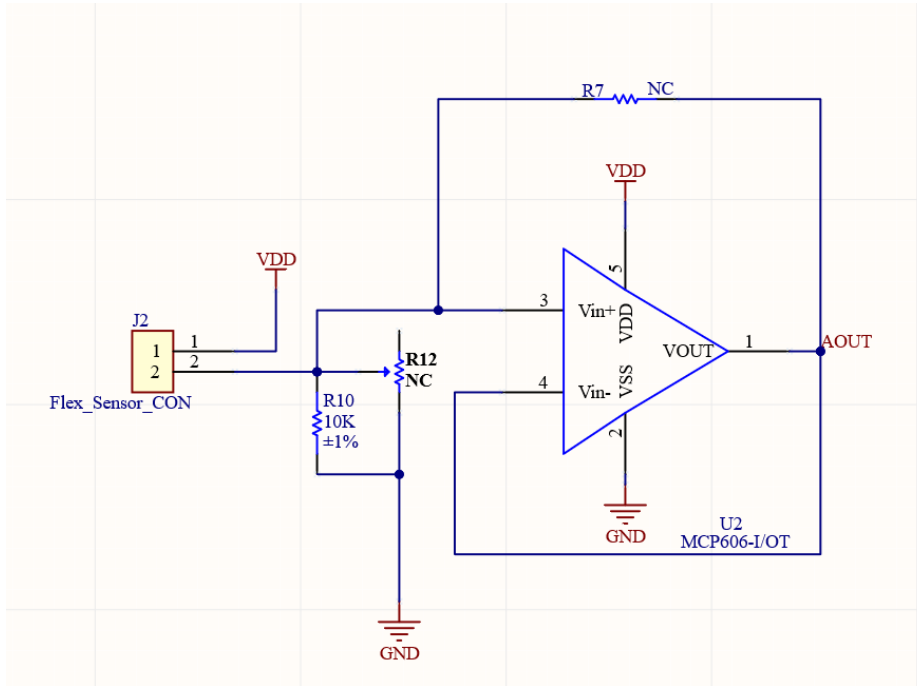
Figure 8: RAK12016 Analog Input Schematic

Analog to Digital Converter (ADC)

ADC121C021 is the ADC module used that features an I2C compatible serial interface. The **ALERT** feature provides a converting interrupt (Watchdog) function to ensure that the input voltage remains within the limits that are set in the Registers.
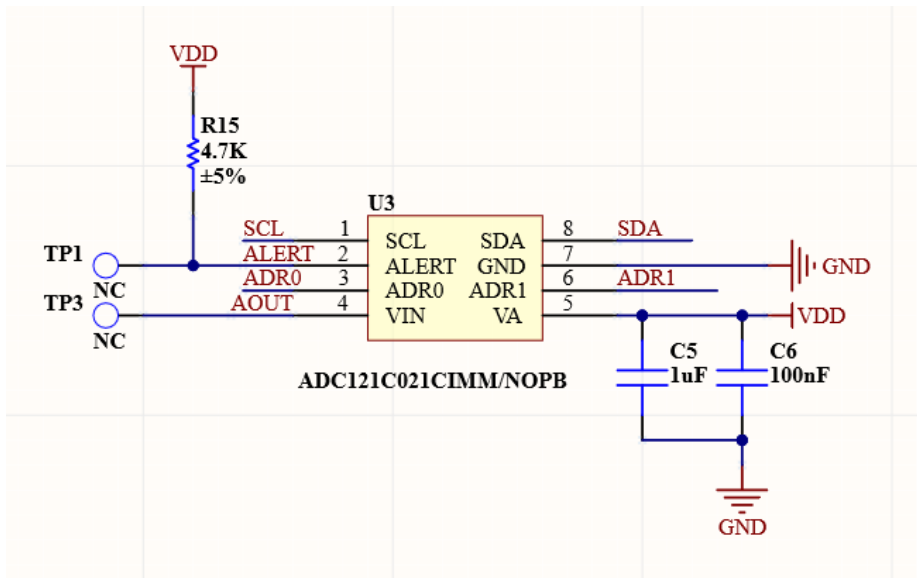

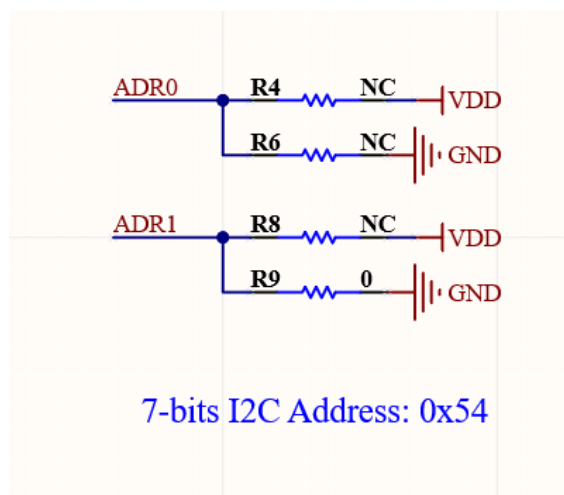**Figure 9:** RAK12016 Analog to Digital Converter

ADC I2C Address Select

Figure 10: ADC I2C Address Select
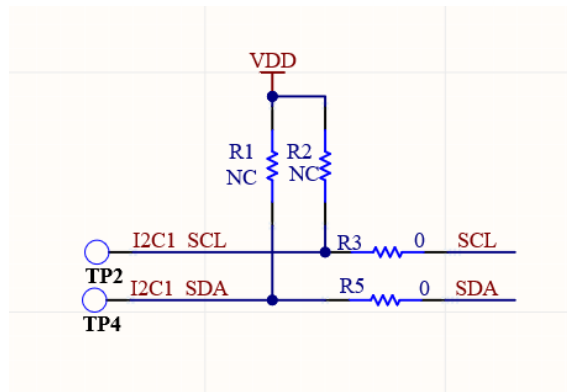
I2C Pull-Up Resistance

Figure 11: RAK12016 I2C Pull-up Resistance

> 📝 **NOTE**
>
> - The built-in I2C pull-up resistors are on the WisBlock Base module and not on the RAK12016.

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