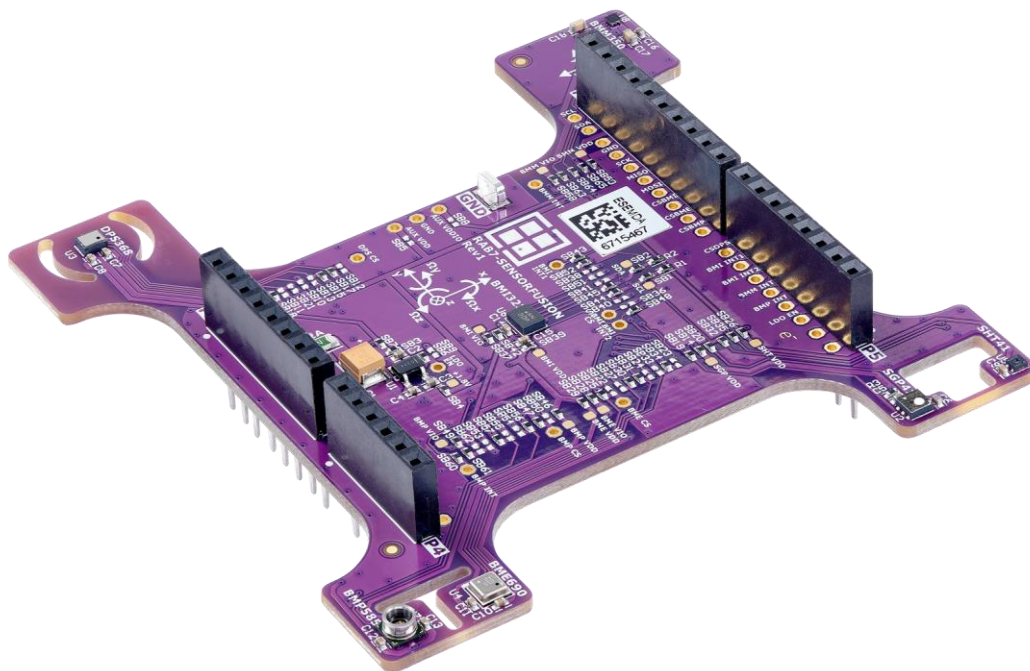


## RAB7 – SENSORFUSION

### User Manual



## Versions

Version	Date	Rationale
0.1	March 04, 2025	First draft. Author: GDR
1.0	May 7, 2025	Release version. Author: KOA

## Legal Disclaimer

The evaluation board is for testing purposes only and, because it has limited functions and limited resilience, is not suitable for permanent use under real conditions. If the evaluation board is nevertheless used under real conditions, this is done at one's responsibility;  
any liability of Rutronik is insofar excluded.

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## Overview

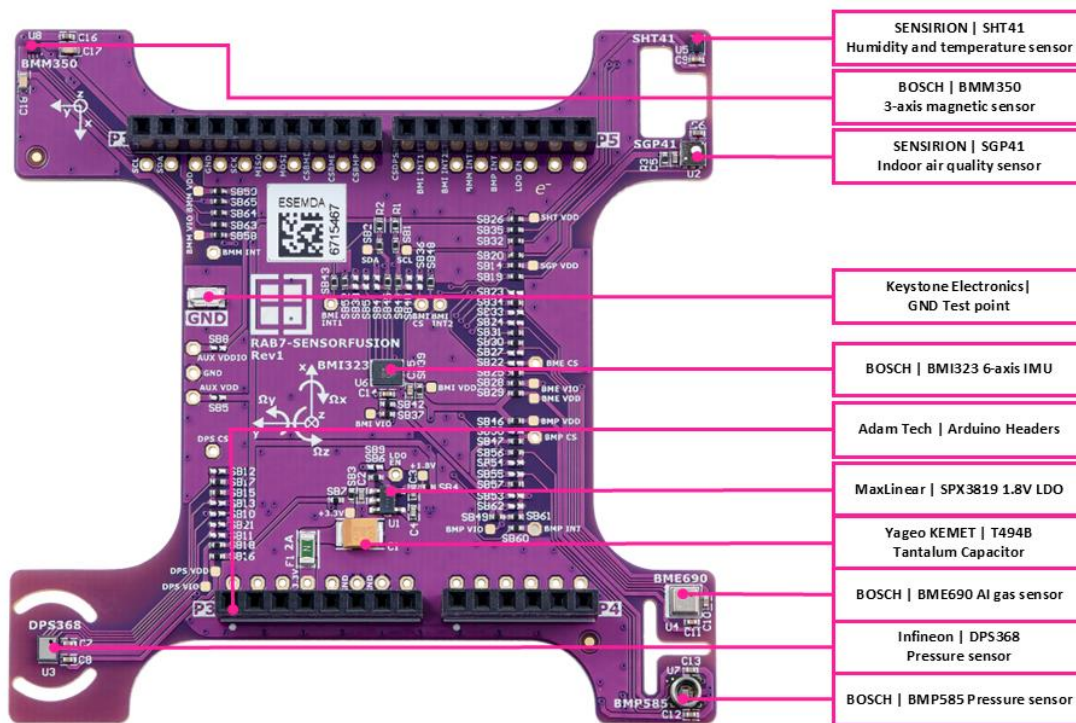
### Features

RAB7-SENSORFUSION is an Arduino shield adapter board for the environment and inertial sensors from Infineon, Sensirion and Bosch evaluation and prototyping.

It is powered via Arduino headers with a single 3.3V supply but it could be configured to work with external separate voltage sources for the VDD and VDDIO. The onboard LDO provides the 1.8V voltage source. All the sensors are configured to work with the I2C interface by default. The SPI is possible for all the sensors with SPI capability, but it needs to be reconfigured by soldering the solder bridges first. The I2C addresses of SGP41, SHT41 and BMM350 are fixed and cannot be reconfigured. Unsoldering solder bridges could disconnect every sensor from the power supply and I2C circuits. The interrupts of BMI323, BMM350 and BMP581 could be connected to almost any Arduino using wires [the holes at every pin are provided for that purpose].

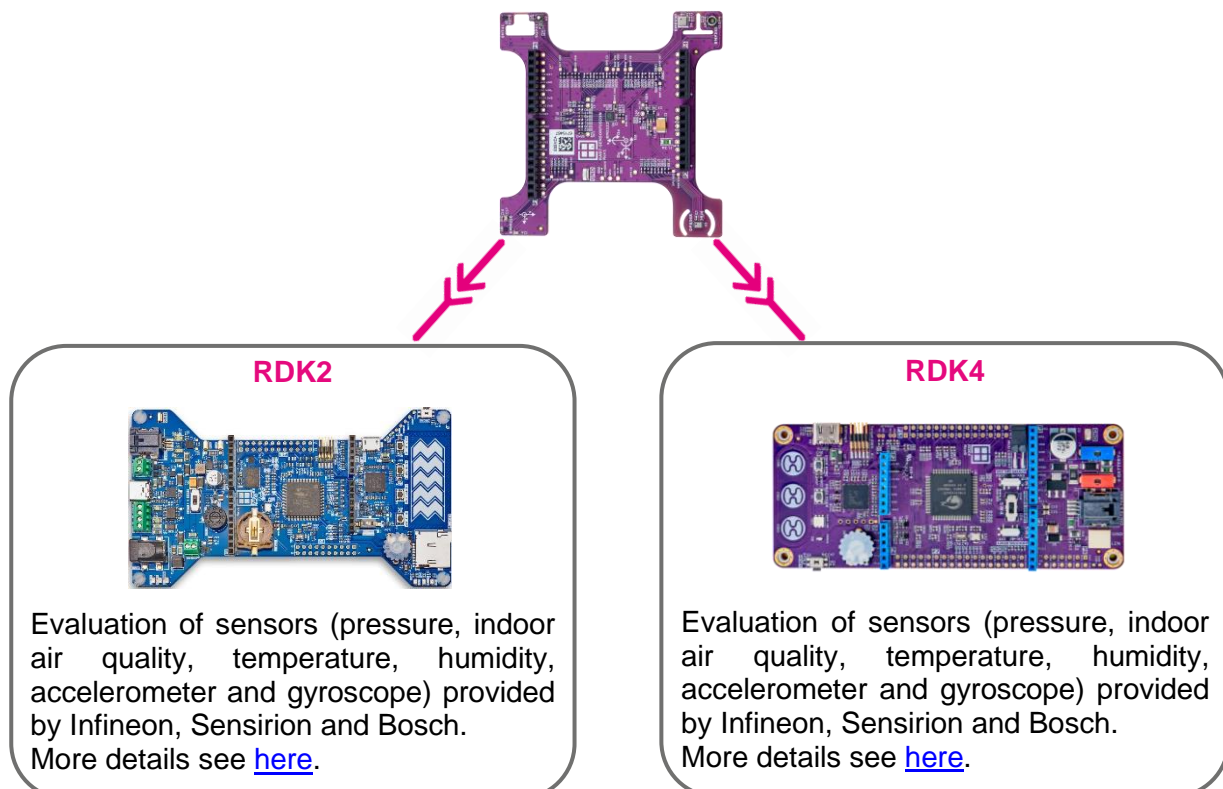
- DPS368 – Infineon’s digital XENSIV™ barometric pressure sensor.
- BMP585 – Bosch’s digital pressure sensor.
- SGP41 – Sensirion’s indoor air quality sensor for VOC measurements.
- BME690 – Bosch’s digital low-power gas, pressure, temperature and humidity sensor with AI.
- SHT41 – Sensirion’s high-accuracy and low power relative humidity and temperature sensor.
- BMI323 – Bosch’s 6-axis, smart, low-power inertial measurement unit.
- BMM350 - Bosch’s 3-axis magnetic sensor.
- SPX3819M5-L-1-8/TR – Low noise 500mA LDO from MaxLinear.
- Non-magnetic capacitors from VISHAY (VJ Non-Magnetic Series).
- Yageo KEMET tantalum capacitor (T494 Industrial Grade MnO<sub>2</sub>).
- I2C and SPI interface via Arduino-compatible ADAM-TECH connectors.
- A Keystone Electronics Test Point connector for a ground signal.
- Passive components from Samsung EM, ASJ and Yageo.

## Component Placement



## Applicable Boards

The following Rutronik System Solution boards are compatible with Sensorfusion and can be connected to it to provide additional functionality.



## Hardware

### I2C Addresses

Designator	Device	7-bit Hex I2C Address
U3	DPS368XTSA1	0x77
U2	SGP41-D-R4	0x59
U6	BMI323	0x68
U4	BME690	0x76
U7	BMP585	0x47
U8	BMM350	0x14
U5	SHT41-AD1B-R2	0x44

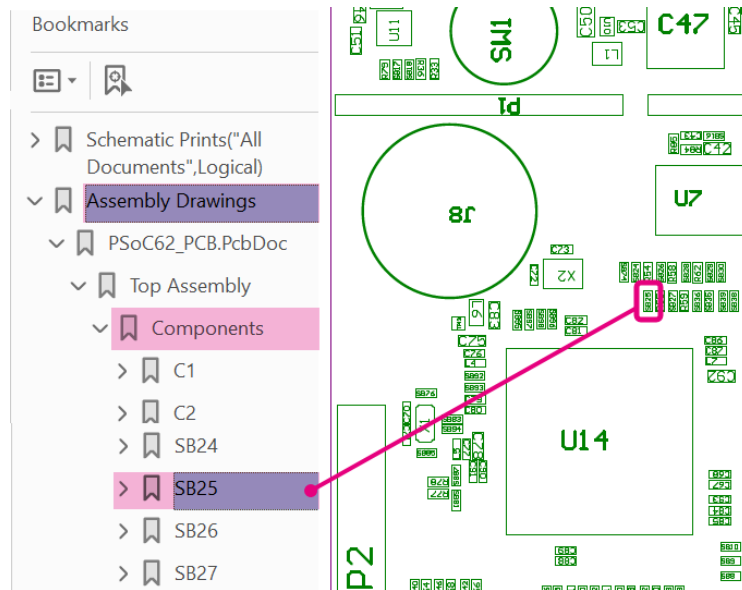
### Solder Bridges

Designator	Circuit	Default
SB1	I2C SCL pull-up resistor with VDDIO	Closed
SB2	I2C SDA pull-up resistor with VDDIO	Closed
SB3	3.3V power supply for U1 1.8V LDO	Closed
SB4	1.8V LDO supply with a main VDD	Closed
SB5	Main VDD with auxiliary AUX_VDD	Opened
SB6	LDO Enable signal with 3.3V input power rail	Closed
SB7	3.3V power supply with interface VDDIO	Closed
SB8	Interface VDDIO with auxiliary AUX_VDDIO	Opened
SB9	Arduino LDO_EN control signal with U1 EN pin	Opened
SB10	Arduino SPI CS DPS with U3 DPS368 CSB pin	Opened
SB11	Arduino SPI MISO with U3 DPS368 SDO pin	Opened
SB12	Arduino SPI SCK with U3 DPS368 SCK pin	Opened
SB13	Arduino SPI MOSI with U3 DPS368 SDI pin	Opened
SB14	VDDIO power supply for U2 SGP41	Closed
SB15	Arduino I2C SDA with U3 DPS368 SDI pin	Closed
SB16	VDD power supply with U3 DPS368 VDD pin	Closed
SB17	Arduino I2C SCL with U3 DPS368 SCK pin	Closed
SB18	VDDIO power supply with U3 DPS368 VDDIO pin	Closed
SB19	Arduino I2C SDA with U2 SGP41 SDA pin	Closed
SB20	Arduino I2C SCL with U2 SGP41 SCL pin	Closed
SB21	U3 DPS368 SDO pull-down to GND	Closed
SB22	Arduino SPI CS BME signal with U4 BME690 SCB pin	Opened
SB23	Arduino SPI MISO with U4 BME690 SDO pin	Opened
SB24	Arduino SPI SCK with U4 BME690 SCK pin	Opened
SB25	U4 BME690 SCB pull-up to BME_VDDIO	Closed
SB26	VDDIO power supply for U5 SHT41	Closed

SB27	Arduino SPI MOSI with U4 BME690 SDI pin	Opened
SB28	VDDIO power supply with U4 BME690 VDDIO pin	Closed
SB29	VDD power supply with U4 BME690 VDD pin	Closed
SB30	Arduino I2C SDA with U4 BME690 SDI pin	Closed
SB31	Arduino I2C SCL with U4 BME690 SCK pin	Closed
SB32	Arduino I2C SCL with U5 SHT41 SCL pin	Closed
SB33	BME_VDDIO pull-up for U4 BME690 SDO pin	Opened
SB34	U4 BME690 SDO pin pull-down	Closed
SB35	Arduino I2C SDA with U5 SHT41 SDA pin	Closed
SB36	Arduino SPI CS BMI signal with U6 BMI323 CSB pin	Opened
SB37	U6 BMI323 CSB pin pull-up to BMI_VDDIO	Closed
SB38	Arduino SPI MISO with U6 BMI323 SDO pin	Opened
SB39	VDD power supply with U6 BMI323 VDD pin	Closed
SB40	Arduino SPI SCK with U6 BMI323 SCX pin	Opened
SB41	Arduino SPI MOSI with U6 BMI323 SDX pin	Opened
SB42	VDDIO power supply with U6 BMI323	Closed
SB43	Arduino BMI INT1 signal with U6 BMI323 INT1	Closed
SB44	Arduino I2C SCL with U6 BMI323 SCX pin	Closed
SB45	Arduino I2C SDA with U6 BMI323 SDX pin	Closed
SB46	VDD power supply with U7 BMP585 VDD pin	Closed
SB47	U7 BMP585 CSB pull-up to BMP585_VDDIO	Closed
SB48	Arduino BMI INT2 with U6 BMI323 INT2 pin	Closed
SB49	VDDIO power supply with U6 BMI323 VDDIO pin	Closed
SB50	Arduino SPI CS BMP signal with U7 BMP585 CSB pin	Opened
SB51	U6 BMI323 SDO pull-up to BMI_VDDIO	Opened
SB52	U6 BMI323 SDO pull-down to GND	Closed
SB53	Arduino SPI MISO with U7 BMP585 SDO pin	Opened
SB54	Arduino SPI SCK with U7 BMP585 SCX pin	Opened
SB55	Arduino SPI MOSI with U7 BMP585 SDX pin	Opened
SB56	Arduino I2C SCL with U7 BMP585 SCX pin	Closed
SB57	Arduino I2C SDA with U7 BMP585 SDX pin	Closed
SB58	VDDIO power supply to U8 BMM350 VDDIO pin	Closed
SB59	VDD power supply to U8 BMM350 VDD pin	Closed
SB60	Arduino BMP INT with U7 BMP585 INT pin	Closed
SB61	U7 BMP585 SDO pull-up to BMP_VDDIO rail	Closed
SB62	U7 BMP585 SDO pull-down to GND	Opened
SB63	Arduino I2C SCL to U8 BMM350 SCK pin	Closed
SB64	Arduino I2C SDA to U8 BMM350 SDA pin	Closed
SB65	Arduino BMM INT signal to U8 BMM350 INT pin	Closed

The locations of the solder bridges can be found in [3D model](#) and [assembly drawings](#) of Sensorfusion.





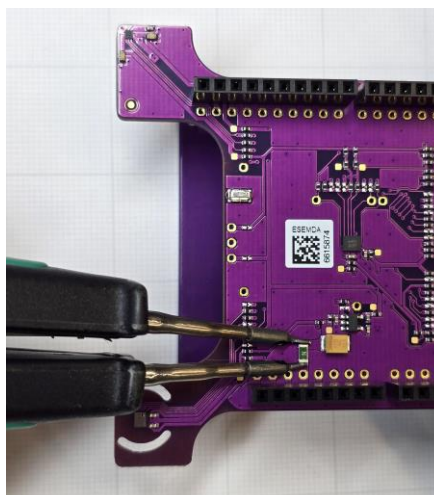
How to find a component on the layout

## Fuses

The RAB7-SENSORFUSION board has only one 2A fast-acting fuse F1 in a 1206 package; Part No: CC12H2A-TR „Eaton“.

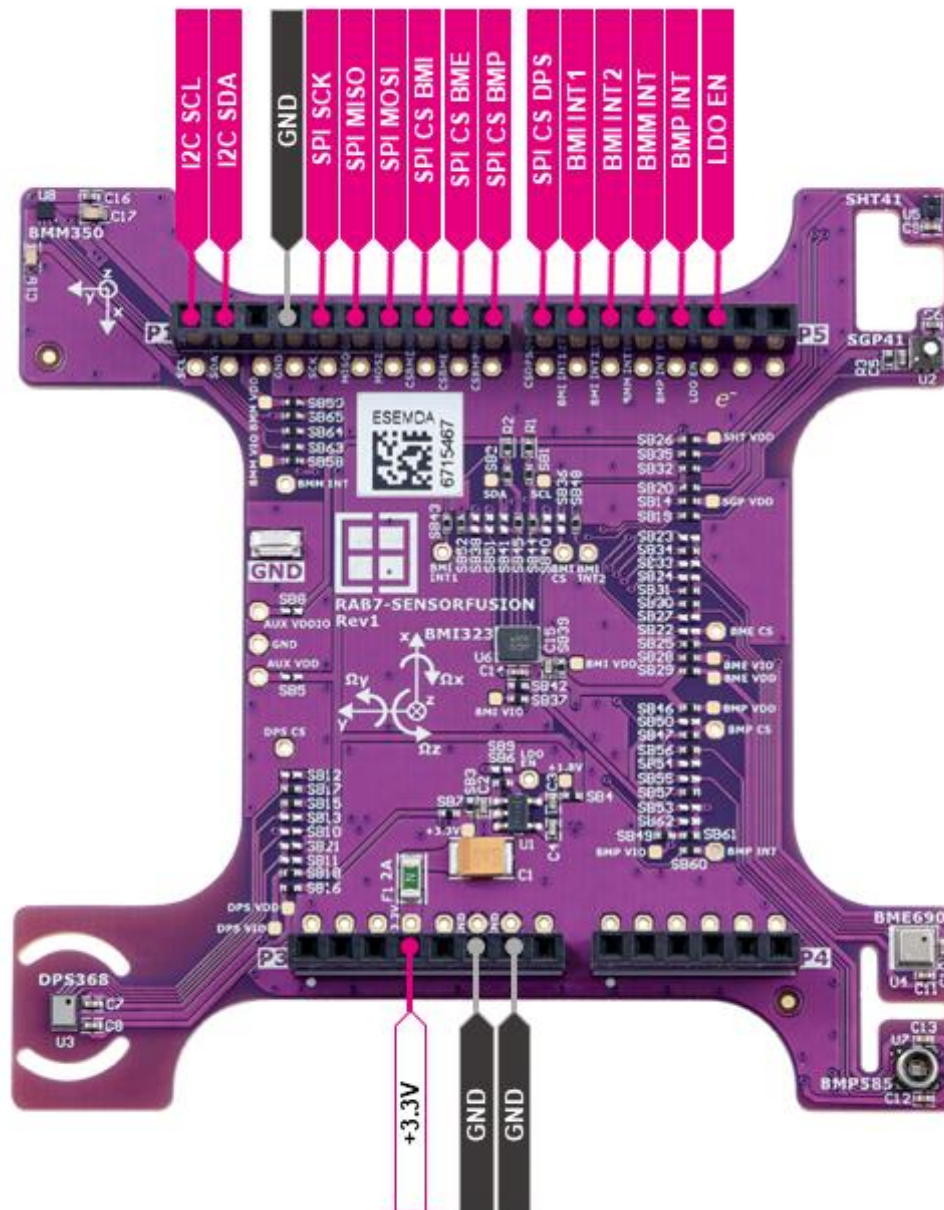
## Changing the Fuses or Solder Bridges

The SMD „Chipping Tool“ is recommended to use for SMD solder bridges or fuses soldering on the RAB7-SENSORFUSION development board.





## Board Pinout

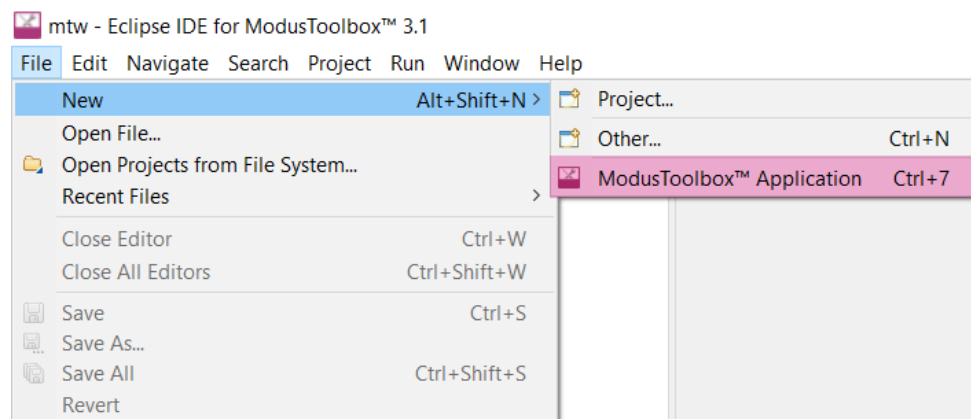


## Software and Firmware

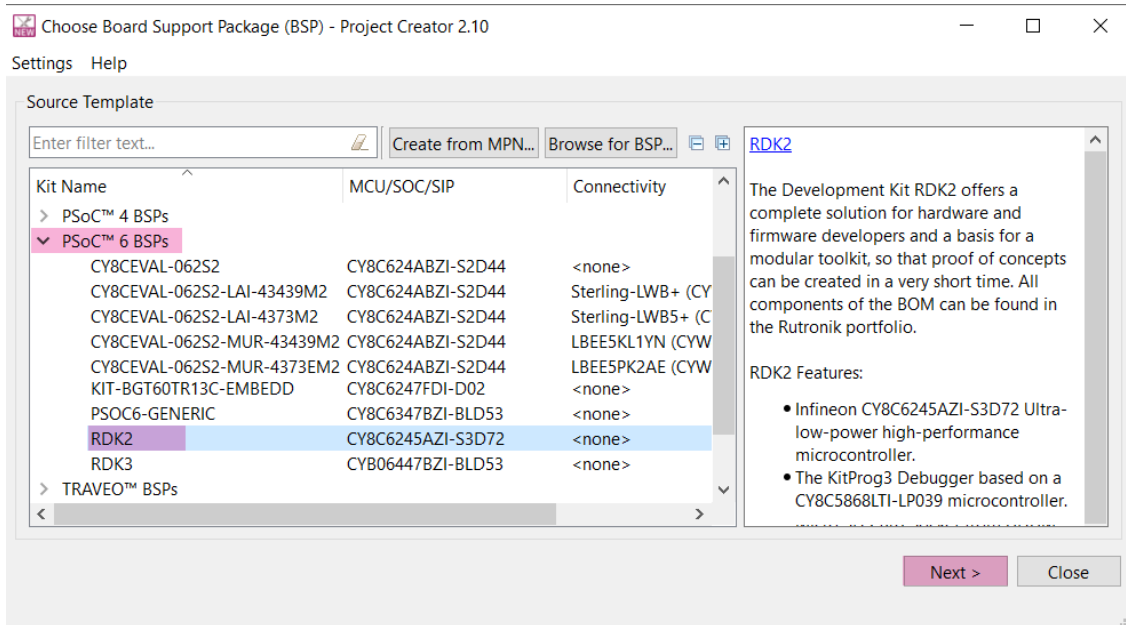
### Getting Started

The development kits RDK2 and RDK4 may be used to get started with the RAB7-SENSORFUSION adapter board. The same “RAB7-SENSORFUSION Demonstration” code example is available for all the previously mentioned development kits in ModusToolbox™ Project Creator.

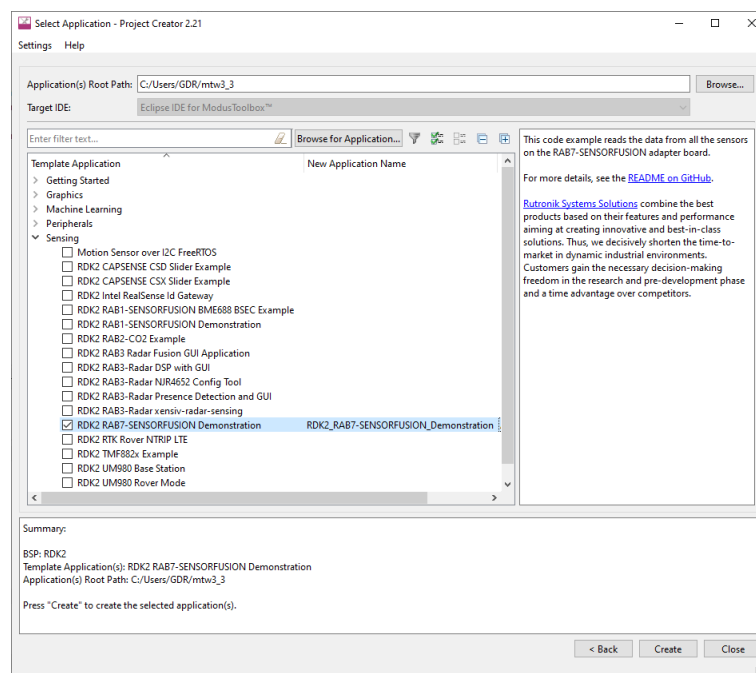
1. Please acquire the RDK2 (RDK4) development kit first. Check the [Rutronik24](#) or inquire from the [Rutronik System Solutions](#) by sending a question.
2. Register or/and login at [Infineon](#) website (myInfineon tab).
3. Download and install the latest version of [ModusToolbox™](#) software.
4. Mount the RAB7-SENSORFUSION board on the RDK2 Arduino headers.
5. Ensure the switch SW1 of RDK2 is set to “3.3V” and connect the Micro USB cable (A to Micro B) to “KitProg3”. Connect the RDK2 and SENSORFUSION assembly with a PC via cable.
6. Run **Modus Toolbox** application.
7. Go **File - New – Modus Toolbox Application** and wait for a while.



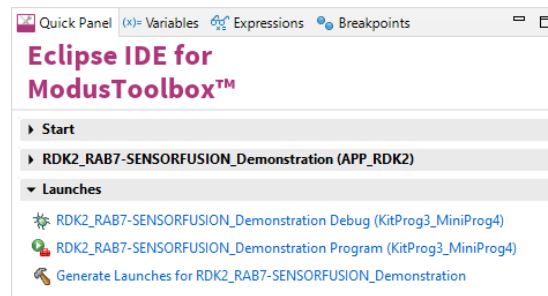
8. Open **PSoC 6** block, select **RDK2** and press **Next**.



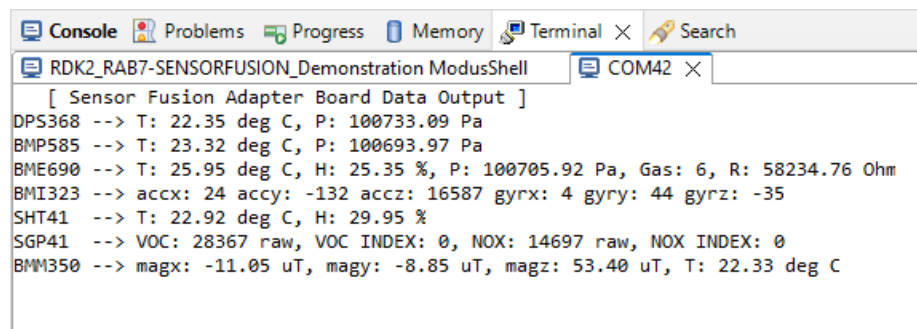
9. Open **Sensing** block, check **RDK2 RAB7-SENSORFUSION Demonstration Application** and press **Create**.



10. **Build** and **Debug** the project. If you are using RDK3 development kit, the keys may be downloaded from here: [RDK3 RUTRONIK Provisioning Keys](#).



11. The firmware example uses KitProg3 Debug UART for debug output.



## Firmware Examples

All these examples can be found on [GitHub](https://github.com) and are available directly from Project Creator in ModusToolbox™ IDE.

<a href="#"><u>RDk2_RAB7-SENSORFUSION_Demonstration</u></a>	This ModusToolbox™ code example reads the data from all the sensors on the RAB7-SENSORFUSION adapter board.
<a href="#"><u>RDk3_RAB7-SENSORFUSION_Demonstration</u></a>	This ModusToolbox™ code example reads the data from all the sensors on the RAB7-SENSORFUSION adapter board.
<a href="#"><u>RDk4_RAB7-SENSORFUSION_Demonstration</u></a>	This ModusToolbox™ code example reads the data from all the sensors on the RAB7-SENSORFUSION adapter board.

## Production Data

### Schematics

You'll find the schematics of RAB7-SENSORFUSION [here](#).

### BOM

You'll find the [BOM](#) for RAB7-SENSORFUSION here.

### Mechanical Layout

