

Sensors and Bluetooth® Add-on boards for Sony Spresense

Introduction

In addition to the high-resolution audio codec and GPS receiver functions provided by the Spresense board computer for IoT supplied by Sony Semiconductor Solutions Corp., the Sensor Add-On Board (SPRESENSE-SENSOR-EVK-701) and Bluetooth® LE Add-On Board (SPRESENSE-BLE-EVK-701) add sensor capability and Bluetooth® LE communication functionality that contributes to the development and evaluation of advanced IoT devices.

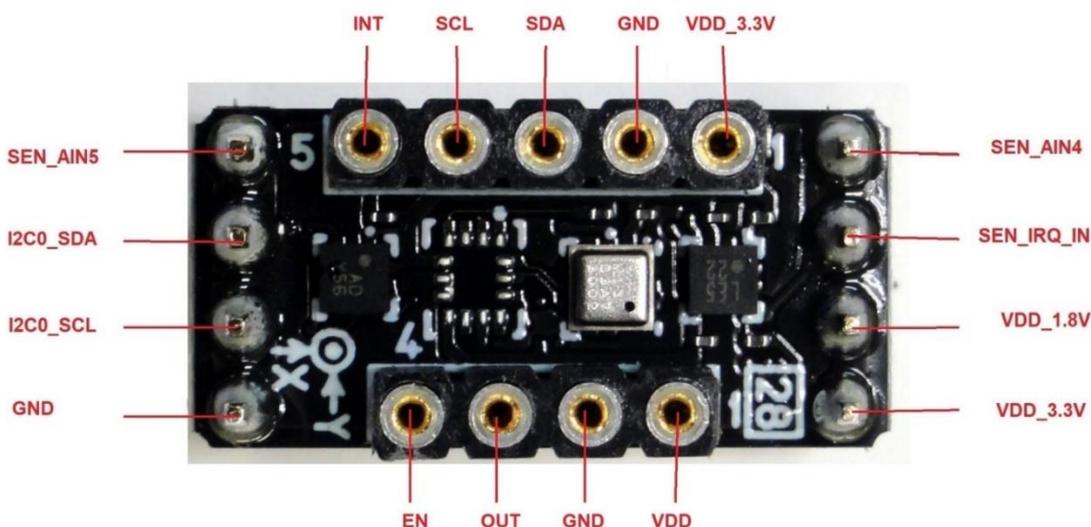
Sensor Add-On Board

The Sensor Add-On Board (SPRESENSE-SENSOR-EVK-701) adds 3 types of sensors essential for motion sensing (acceleration, barometric pressure, geomagnetism) to the GPS receiver and high-resolution audio decoding functions provided by the Spresense board computer. In addition, the Sensor Expansion Connector makes it possible to add more than 7 types of sensors, including brightness, proximity, color, magnetic, temperature, UV, and heart rate (pulse wave) sensors. Software for each platform supported by Spresense, such as Arduino and NuttX, is provided as open-source, contributing to faster device evaluation and development.

Part No.	Function
KX122-1037	Accelerometer
BM1422AGMV	Geomagnetic Sensor
BM1383AGLV	Barometric Pressure Sensor

Pin assignment

SPRESENSE-SENSOR-EVK-701



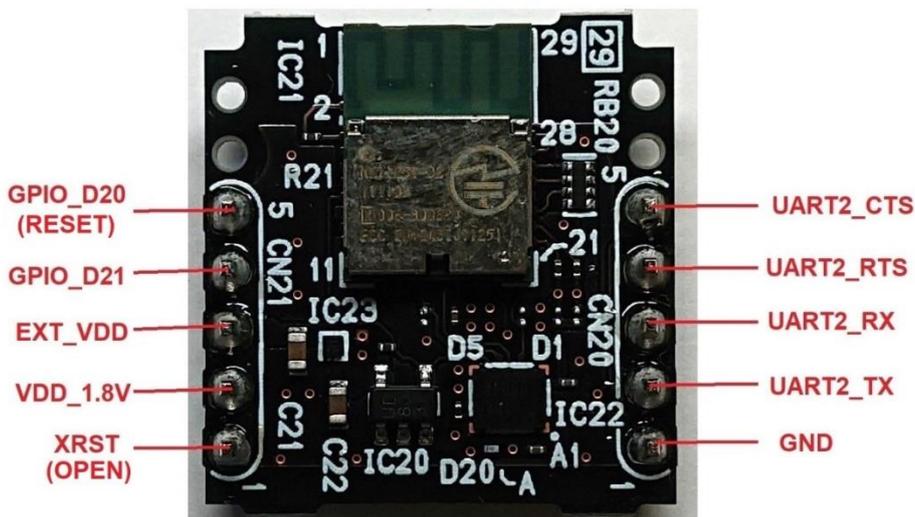
Bluetooth® LE Add-On Board

The Bluetooth® Add-On Board (SPRESENSE-BLE-EVK-701) adds Bluetooth LE communication functionality to the Spresense board computer. A built-in antenna, along with certification under major radio laws including TELEC, FCC, CE, and IC, allow for immediate use as a wireless device when combined with Spresense. Software for each platform supported by Spresense (i.e. Arduino and NuttX) is provided as open-source, contributing to faster device evaluation and development. The BLE Tool smartphone app can also be used to verify communication with the device.

Part No.	Function
MK71251-02	Bluetooth® LE module

Pin assignment

SPRESENSE-BLE-EVK-701



Arduino

<https://github.com/RohmSemiconductor/Arduino>

Supported devices

- Sensors
 - SPRESENSE-SENSOR-EVK-701
 - Accelerometer KX122, I2C, SAD=0x1F
 - Magnetometer BM1422AGMV, I2C, SAD=0x0F
 - Pressure sensor BM1383AGLV, I2C, SAD=0x5D
 - ROHM SensorShield Series
 - Accelerometer KX224, I2C, SAD=**0x1E***/0x1F
 - Color sensor BH1749NUC, I2C, SAD=0x38/**0x39***
 - Ambient Light Sensor and Proximity Sensor RPR-0521RS, I2C, SAD=0x38
 - Hall Effect sensor BD7411G, GPIO
- Communication
 - SPRESENSE-BLE-EVK-701
 - Bluetooth LE MK71251-02, UART

*Boldened is default device address

How to setup and test devices with Sony Spresense

For help regarding the installation of the Arduino IDE please refer to Setting up the Arduino IDE

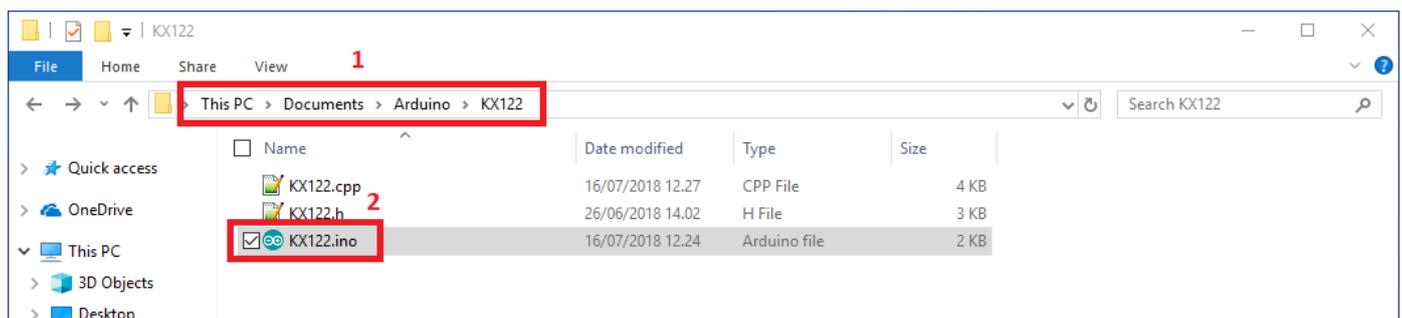
<https://developer.sony.com/develop/spresense/developer-tools/get-started-using-arduino-ide/set-up-the-arduino-ide/>

The example sketches are located in the same directory as the drivers.

The evaluation board sensors can be attached to the Sensor Add-on board, and should work without problems.

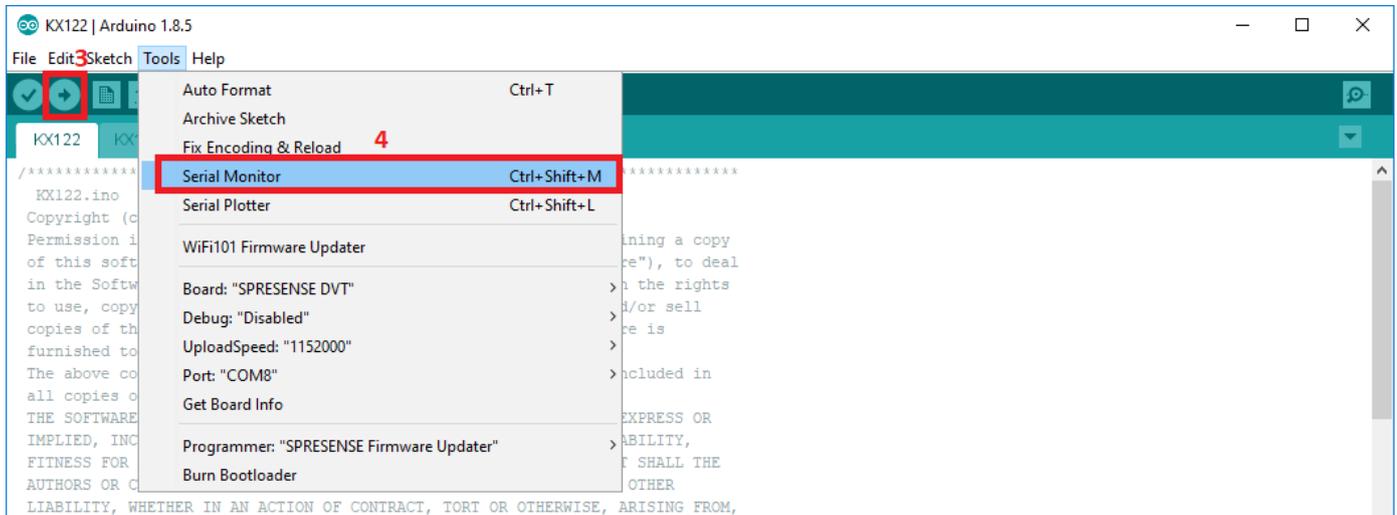
Installing the sensor & BLE example sketches

1. Place the example sketches inside your Arduino folder, which should be located in your users documents folder
2. Open the folder of the example you want to test, and open the sketch file. The Arduino IDE should start with the selected sketch open

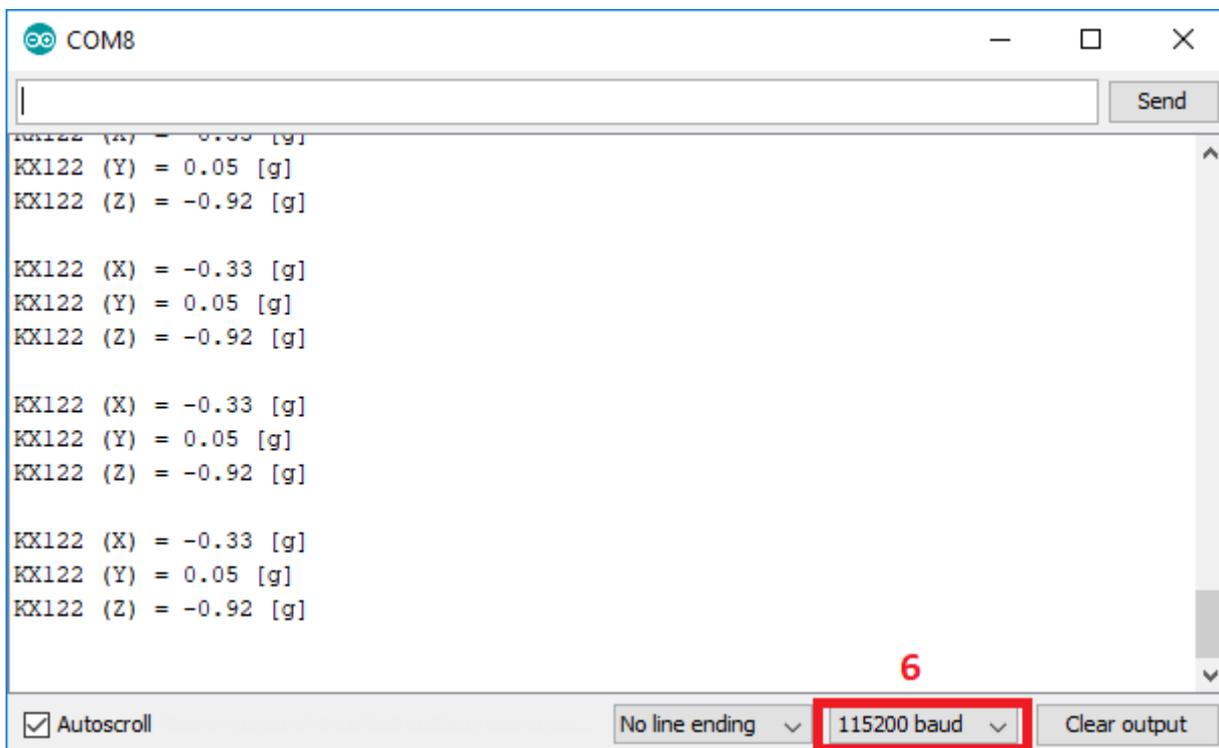


3. You can then proceed to upload the example sketch to your Spresense board by clicking **Upload**

- If the upload fails for some reason, you may need to reset your board or unplug and plug it back in
4. After the sketch has finished uploading, open the serial monitor by clicking Tools -> Serial Monitor or use the hotkey Ctrl+Shift+M



5. The sketch should start, if not, please reset the board by pressing the reboot button on the main board
6. To receive the correct data on the serial monitor, please ensure that the baud rate on the serial monitor is set correctly, usually to 115200



Testing the Bluetooth module

You need to download the LAPIS BLE tool for your phone to test the module.

1. Open the MK71251-02 sketch, upload it and open the serial monitor
 2. Open the LAPIS BLE tool on your phone, and enable bluetooth
 3. Locate the MK71251-02 on the list of devices
- If you do not see it on the list, you may need to reboot your board
4. Connect to the module
 5. Open the serial port profile
- Anything you type should show up on the serial monitor
 - If you type 'Z', the serial port profile should show 'WRITING TEST'

NuttX

<https://github.com/RohmSemiconductor/NuttX>

NuttX is a real-time operating system (RTOS) with an emphasis on standards compliance and small footprint.

<http://nuttx.org/doku.php?id=nuttx>

Supported devices

- Sensors
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 - Pressure sensor BM1383AGLV, I2C, SAD=0x5D
 - ROHM SensorShield Series
 - Accelerometer KX224, I2C, SAD=**0x1E***/0x1F
 - Color sensor BH1749NUC, I2C, SAD=0x38/**0x39***
 - Ambient Light Sensor and Proximity Sensor RPR-0521RS, I2C, SAD=0x38
 - Hall Effect sensor BD7411G, GPIO

*Boldened is default device address

This repository contains the drivers for:

- Accelerometer KX224
- Hall Effect sensor BD7411G
- Color sensor BH1749NUC

This repository contains the makefile, kconfig and cxd56-sensors.c modifications to allow you to easily test these devices.

However these files could be outdated compared to the Sony-provided files, and as such may cause you to lose other functionality.

Should you wish to use these drivers on a newer base, you need to modify:

- sdk/drivers/Kconfig and Make.defs
- sdk/bsp/board/Makefile
- sdk/bsp/board/common/src/cxd56-sensors.c

The actual driver files are located in:

- sdk/drivers
- sdk/bsp/board/common
- sdk/bsp/include/nuttx/sensors

The rest of the drivers are available on the [Sony GitHub](#) , and should come with the SDK.

How to setup and test devices with Sony Spresense

For help regarding the installation of the Spresense SDK please refer to [Setting up the Spresense SDK](#)

Uploading and testing the sensor drivers

1. Run the config and select the drivers and examples you wish to upload
 - In the sdk folder, type `tools/config.py --menuconfig`
2. Save the configuration and run `make`
3. Upload the `nuttx.spk` to the board according to the instructions in the [Flashing tutorial](https://developer.sony.com/develop/spresense/developer-tools/get-started-using-nuttx/set-up-the-nuttx-environment#_flashing_tutorial) (https://developer.sony.com/develop/spresense/developer-tools/get-started-using-nuttx/set-up-the-nuttx-environment#_flashing_tutorial)
4. When the system has booted, type `help`. This will show you the built-in applications, which should include the driver example you chose in the config
5. Type the name of the application in the NuttX shell, and the application should begin running

Notes

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