

Sensor Evaluation Kit

# SensorShield-EVK-003 Manual

SensorShield-EVK-003 is a Kit, which are included the 8 kinds of Sensor and Shield-EVK-001 which connects Arduino and ROHM Sensor Boards. Shield-EVK-001 will be referred to as "SensorShield" on this manual.

## Board Information

No.	Sensor	Type Name
1	Accelerometer	KX224-I2C
2	Pressure Sensor	BM1383AGLV
3	Magnetometer	BM1422AGMV
4	ALS/PS Sensor	RPR-0521RS
5	Color Sensor	BH1749NUC
6	Optical Sensor for Heart Rate Monitor	BH1790GLC
7	Hall Sensor	BD7411G
8	Temperature Sensor	BD1020HFV

Table 1. Sensor lineup

### SensorShield Detail

- Connection Board between Arduino and ROHM Sensor Board (Figure 1)
- Size: 88mm x 63mm
- Five I2C Sensors, One I/O Sensor and Two Analog Sensors can be controlled
- 5V-3.0/1.8V Level Shifter
  - GPIO : FAIRCHILD FXMA108
  - I2C : NXP PCA9306
  - I2C pull-up register is implemented

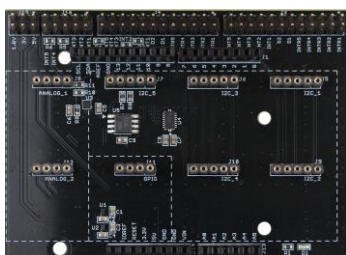


Figure 1. SensorShield

## Preparation

- Arduino Uno 1pc
- Personal Computer installed Arduino IDE 1pc
  - Requirement : Arduino 1.6.7 or higher
  - Please use Arduino IDE which can be downloaded from the link below:  
<http://www.arduino.cc/>
- USB cable for connecting Arduino and PC 1pc
- SensorShield-EVK-003 1pc

## Setting for Board and Software

The following explanation is about a connection method of BM1422AGMV-EVK-001 which is I2C connection sensor.

1. Connect the SensorShield to the Arduino (Figure 2)

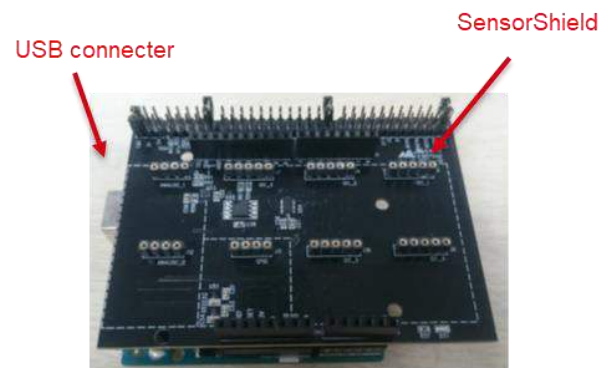


Figure 2. Connection between the Arduino and the SensorShield

2. Connect BM1422AGMV-EVK-001 to the socket of I2C\_1 on the SensorShield (Figure 3)

- Set Voltage of the SensorShield to 1.8V or 3.0V (Figure 3)
- Set Interrupt of the SensorShield to INTR1 (Figure 3)

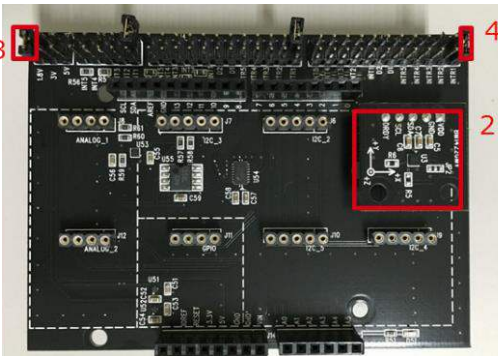


Figure 3. Connection between BM1422AGMV-EVK-001 and the SensorShield

- Wait for the message "Done uploading" (Figure 5)

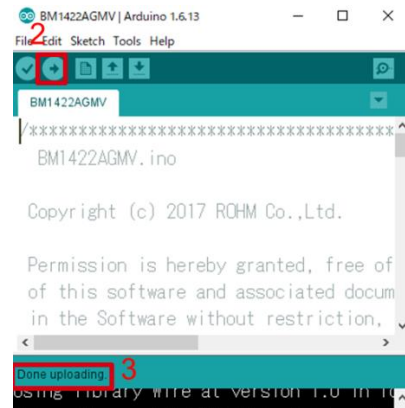


Figure 5. Uploading

- Connect the Arduino to the PC using a USB cable
- Download BM1422AGMV.zip from the link below: <http://www.rohm.com/web/global/sensor-shield-support>
- Launch Arduino IDE
- Select [Sketch]->[Include Library]->[Add.ZIP library...], install BM1422AGMV.zip
- Select [File]->[Examples]->[BM1422AGMV]->[example]->[BM1422AGMV]

- Select [Tools]->[Serial Monitor] (Figure 6)

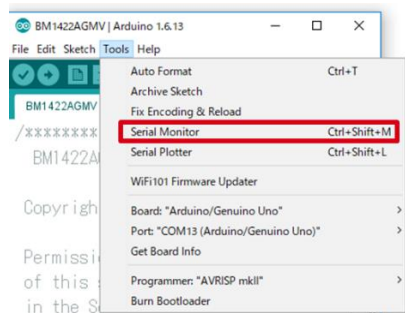


Figure 6. Tools Setting

**Measurement**

- Select [Tools] and check the contents enclosed in the red frame. (Figure 4) Board should be "Arduino/Genuino Uno" and Port should be COMxx (Arduino/Genuino Uno). COM port number is different in each environment.

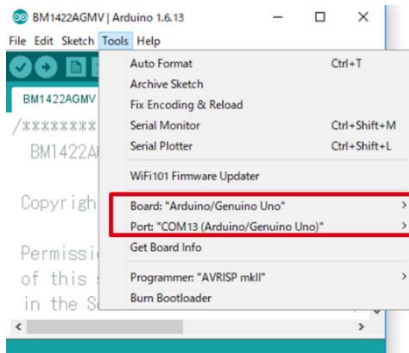


Figure 4. COM Port setting

- Check log of Serial Monitor (Figure 7)

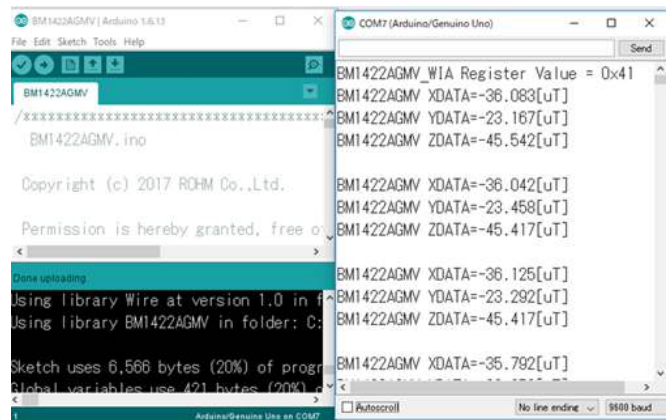


Figure 7. Serial Monitor

- Write the program by pressing right arrow button for upload (Figure 5)

### Three kinds of connection method

The following explanation is about three kinds of connection methods of I2C Sensor, I/O Sensor and Analog Sensor.

#### 1. I2C Sensor (Example: KX224-I2C)

[Setting for Program]

Select [File]->[Examples]->[KX224-I2C]->[example]->[KX224-I2C]

Check log of Serial Monitor according to measurement method

[Measurement]

Get the data of each X, Y, Z axis of KX224-I2C every 500ms and display it.(Figure 8)

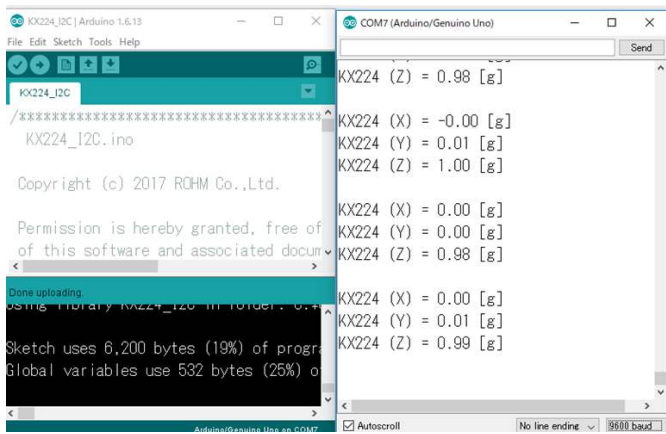


Figure 8. Serial Monitor (KX224-I2C)

#### 2. I/O Sensor (Example: BD7411G)

[Setting for Program]

Select [File]->[Examples]->[BD7411G]->[example]->[BD7411G]

Check log of Serial Monitor according to measurement method

[Measurement]

Check the output of BD7411G every 500ms, and when the output is low, display a message (Figure 9)

\*Notice : When a program of BD7411G is written, please remove BD7411G-EVK-001.

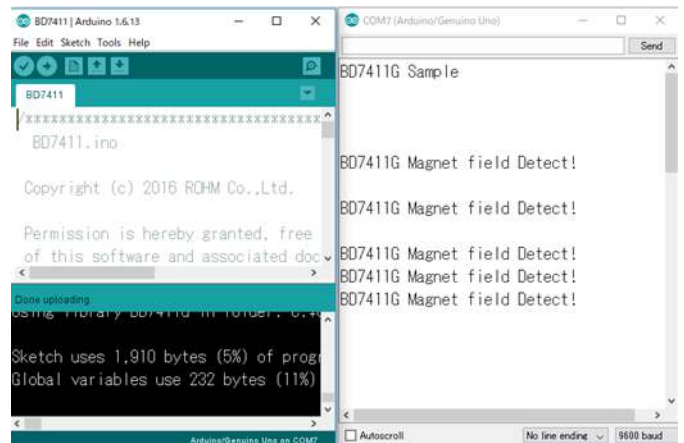


Figure 9. Serial Monitor (BD7411G)

#### 3. Analog Sensor (Example: BD1020HFV)

[Setting for Program]

Select [File]->[Examples]->[BD1020HFV]->[example]->[BD1020HFV]

Check log of Serial Monitor according to measurement method

[Measurement]

Convert the output of BD1020HFV into temperature every 500ms and display a message (Figure 10)

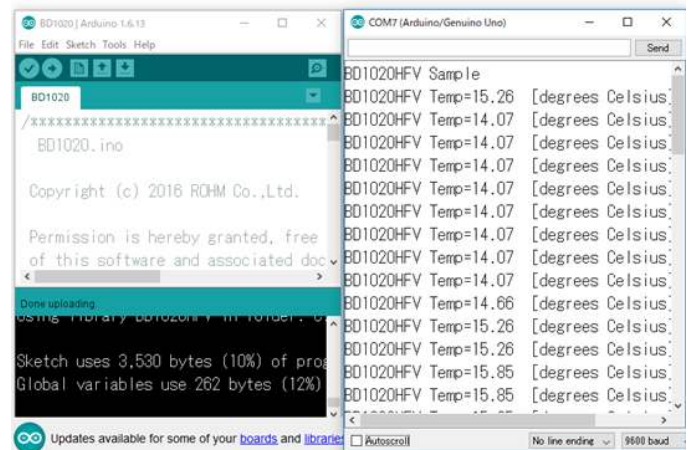


Figure 10. Serial Monitor (BD1020HFV)

## Notes

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No.	Sensor	Type Name	Connection Area
1	Accelerometer	KX224-I2C	I2C_1,I2C_2,I2C_3,I2C_4,I2C_5
2	Pressure sensor	BM1383AGLV	I2C_1,I2C_2,I2C_3,I2C_4,I2C_5
3	Magnetometer	BM1422AGMV	I2C_1,I2C_2,I2C_3,I2C_4,I2C_5
4	ALS/PS sensor	RPR-0521RS	I2C_1,I2C_2,I2C_3,I2C_4,I2C_5
5	Color sensor	BH1749NUC	I2C_1,I2C_2,I2C_3,I2C_4,I2C_5
6	Optical Sensor for Heart Rate Monitor	BH1790GLC	I2C_1,I2C_2,I2C_3,I2C_4,I2C_5
7	Hall sensor	BD7411G	GPIO
8	Temperature sensor	BD1020HFV	ANALOG_2

Table 2. Connection Area of each sensor

No.	Sensor	Type Name	Supply Power	Recommended Operating Voltage [V]			Selectable Power [V]		
				Min.	Typ.	Max	1.8	3	5
1	Accelerometer	KX224-I2C	VDD	1.71	2.5	3.6	○	○	
			IO_VDD	1.7	-	VDD			
2	Pressure sensor	BM1383AGLV	VDD	1.7	-	3.6	○	○	
3	Magnetometer	BM1422AGMV	AVDD	1.7	-	3.6	○	○	
			DVDD	1.7	-	3.6			
4	ALS/PS sensor	RPR-0521RS	VCC	2.5	3.0	3.6		○	
			VLEDA	2.8	3.0	5.5			
5	Color sensor	BH1749NUC	Vcc	2.3	2.5	3.6		○	
6	Optical Sensor for Heart Rate Monitor	BH1790GLC	VDD	2.5	3.0	3.6		○	
			VLED	3.6		5.5			○
7	Hall sensor	BD7411G	VDD	4.5	5.0	5.5			○
8	Temperature sensor	BD1020HFV	VDD	2.4	3.0	5.5		○	○

Table 3. The Operating Voltage of each sensor

No.	Sensor	Type Name	Device Address(7bit)
1	Accelerometer	KX224-I2C	0x1E/0x1F
2	Pressure sensor	BM1383AGLV	0x5D
3	Magnetometer	BM1422AGMV	0x0E/0x0F
4	ALS/PS sensor	RPR-0521RS	0x38
5	Color sensor	BH1749NUC	0x38/0x39
6	Optical Sensor for Heart Rate Monitor	BH1790GLC	0x5B

Blue character is default device address

Table 4. Device Address of the I2C Sensor