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

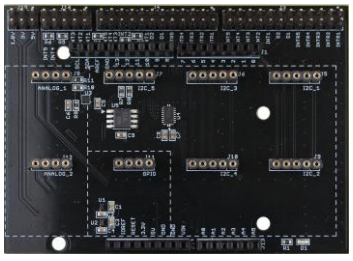

Figure 1. SensorShield

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)

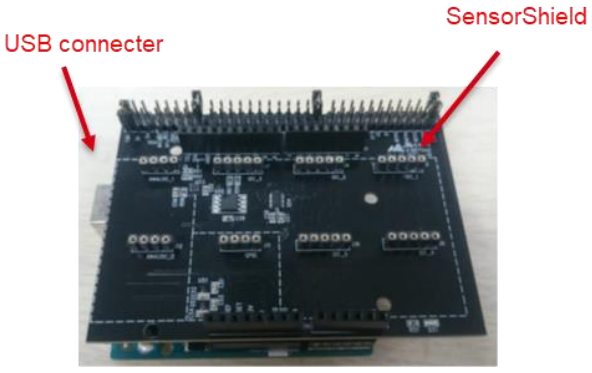

Figure 2. Connection between the Arduino and the SensorShield

2. Connect BM1422AGMV-EVK-001 to the socket of I2C_1 on the SensorShield (Figure 3)

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

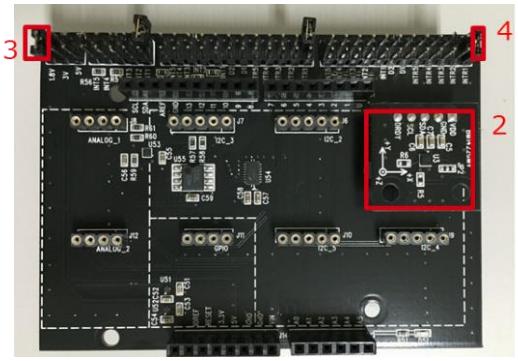

Figure 3. Connection between BM1422AGMV-EVK-001 and the SensorShield

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

Measurement

1. 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.

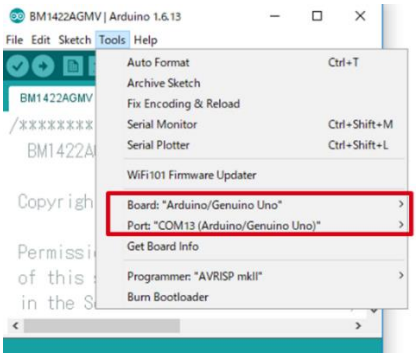

Figure 4. COM Port setting

2. Write the program by pressing right arrow button for upload (Figure 5)
3. Wait for the message "Done uploading" (Figure 5)

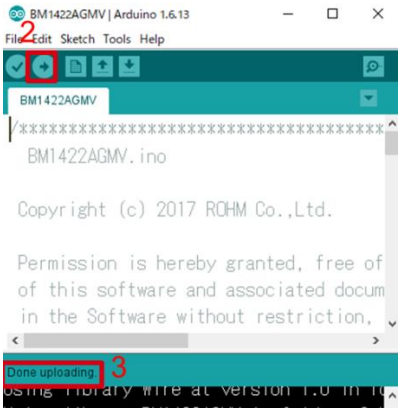

Figure 5. Uploading

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

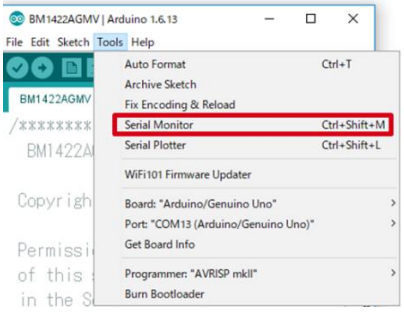

Figure 6. Tools Setting

5. Check log of Serial Monitor (Figure 7)

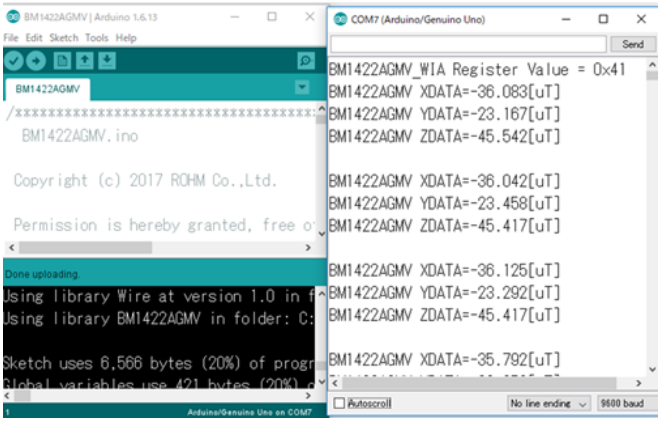

Figure 7. Serial Monitor

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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)

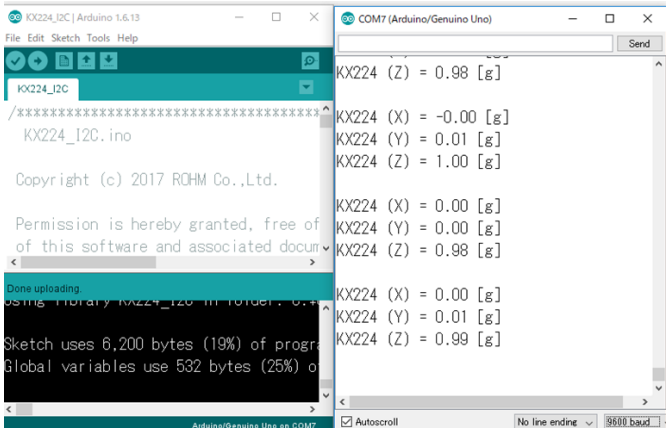

Figure 8. Serial Monitor (KX224-I2C)

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.

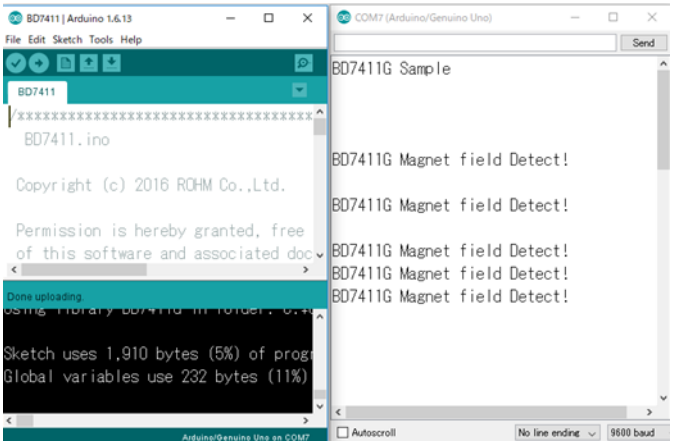

Figure 9. Serial Monitor (BD7411G)

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)

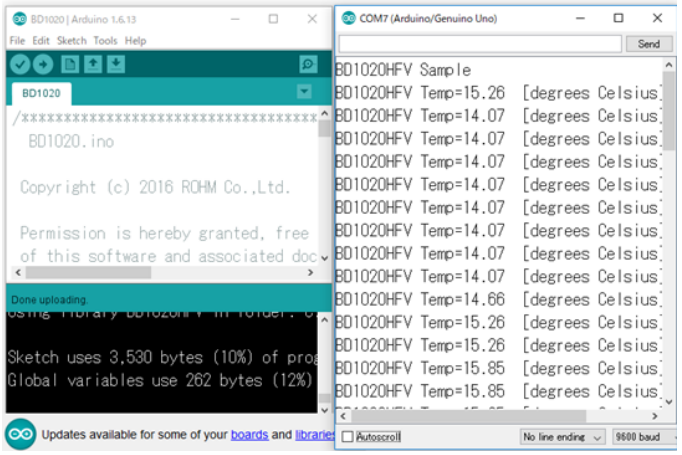

Figure 10. Serial Monitor (BD1020HFV)

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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

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