HMC5883L(Or QMC5883L) Electronic Compass

In our Professional Kit, there exist two kinds of Compass module. One kind uses HMC5883L module, the other uses QMC5883L module. You will get one of them when you get the Professional Kit. They don't have too much difference. HMC5883L is made by Honeywell. but because the production is about to be stopped, so we use a similar compass module-QMC5883L instead. QMC5883L is made by a Chinese company, they get the production authorization of HMC5883L from Honeywell, and rename it QMC5883L. So QMC5883L and HMC5883L basically are the same, they shares the same hardware design. Just their register is a bit different. We only need to change the software a bit.

When you got the Professional Kit, please check which compass module you get based on the following picture. The HMC5883L has a label "L883"on it, while QMC5883L comes with "5883"

HMC5883L Electronic Compass

QMC5883L Electronic Compass

HMC5883L Electronic Compass

**QMC5883L Electronic Compass**

HMC5883L Electronic Compass

Introduction

3-Axis Compass module, I2C based Honeywell HMC5883 digital compass. This ASIC is equipped with high resolution HMC118X magneto-resistive sensors and a 12-bit ADC. It provides compass heading accuracy up to 1° to 2°. Signal conditioning like amplification, automatic degaussing strap drivers and offset cancellation are inbuilt. This module also includes a MIC5205-2.5 voltage regulator for power supply requirement. Hence user can connect any 3.3V to 6V DC power supply.
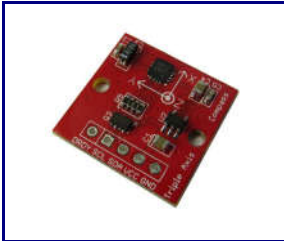
Features

- I2C interface
- Compatible with 3.3V-5.0V voltage level
- Max 116Hz output rate
- High heading accuracy

Usage

Below is a register map that might help you understand what you can get from this module. There are totally 13 registers provided by HMC5883L. Out of three registers - Configuration register A, Configuration Register B and Mode Register decide the working mode of the device. The remaining registers are read only data output registers, status register and identification registers.

Address Location	Name	Access
00	Configuration Register A	Read/Write
01	Configuration Register B	Read/Write
02	Mode Register	Read/Write
03	Data Output X MSB Register	Read
04	Data Output X LSB Register	Read
05	Data Output Z MSB Register	Read
06	Data Output Z LSB Register	Read
07	Data Output Y MSB Register	Read
08	Data Output Y LSB Register	Read
09	Status Register	Read
10	Identification Register A	Read
11	Identification Register B	Read
12	Identification Register C	Read

This demo is going to show you how to read raw data, how to calibrate the data with your local magnetic declination angle and how to get heading angle.
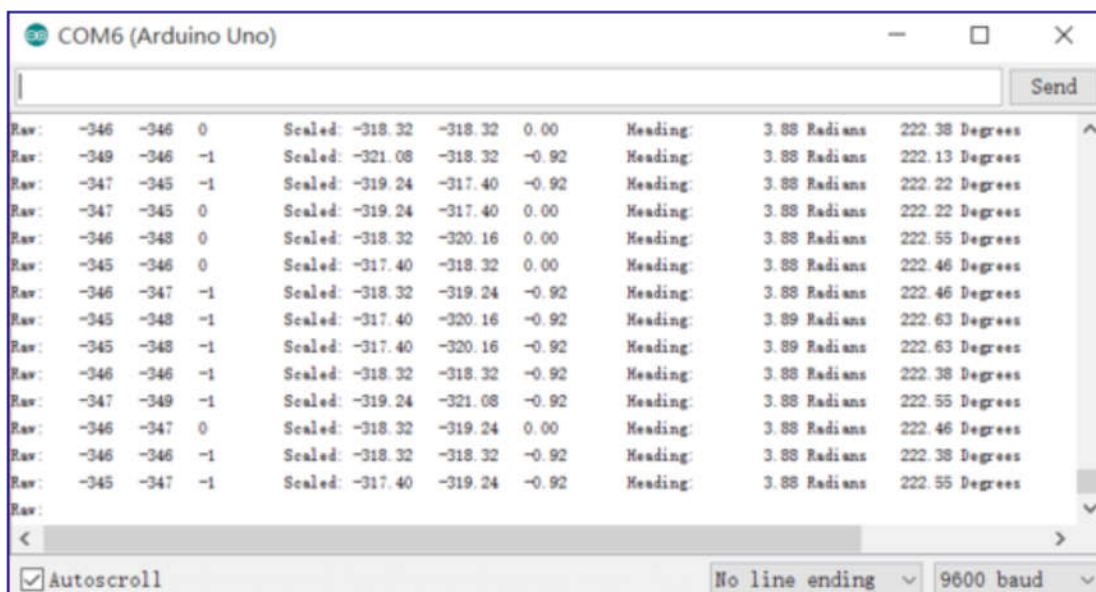
First off, before any action you are going to take, you need to prepare a parameter you are going to use in your demo. That's your local magnetic declination.

You can find it out in degree via the [magnetic declination webpage](). For example, mine is -2°37', which is -2.617 degree.

Then transfer it from degree to radians, and there you get the "declinationAngle". For example, in my case, declinationAngle = -2.617 / （2*π）= -0.0456752665 rad. Three significant figures are enough. So I would shorten it into -0.0456 rad. And this is the parameter you are going to replace the value of "declinationAngle" in the domo code with.
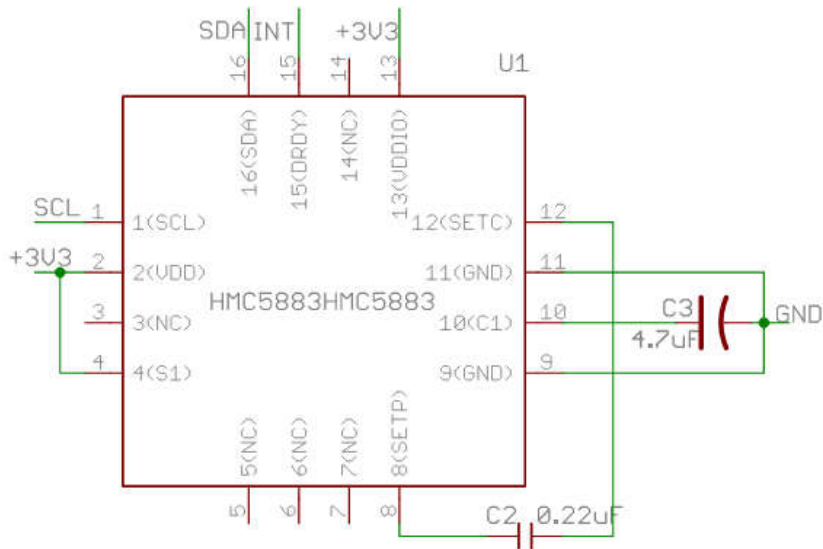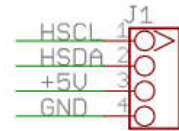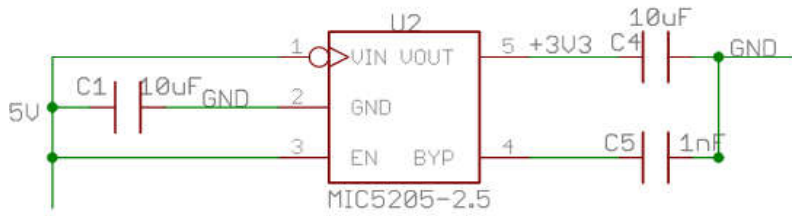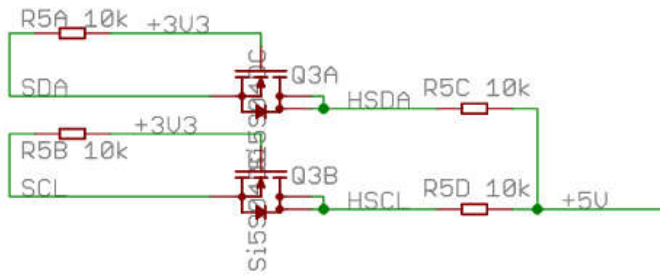
Now let's start to run your compass.

1. **Connect the HMC5883L Electronic Compass to Arduino via the I2C port.**
2. **Download the library file: [HMC5883L Compass library](). Unzip it into the libraries file of Arduino IDE by the path: ..\arduino-1.0.1\libraries.**
3. **Open the demo by the path:File -> Example ->Digital Compass ->HMC5883L_Example.**
4. **Replace the value of variable "declinitionAngle" with the one you've figured out already.**
5. **Upload the Code.**
6. **Check the output result by opening the serial monitor.**

```
😎 COM6 (Arduino Uno)                                          —    □    ✕
|                                                                    Send
Raw:   -346  -346   0    Scaled: -318.32  -318.32   0.00    Heading:    3.88 Radians   222.38 Degrees   ⌃
Raw:   -349  -346  -1    Scaled: -321.08  -318.32  -0.92    Heading:    3.88 Radians   222.13 Degrees
Raw:   -347  -345  -1    Scaled: -319.24  -317.40  -0.92    Heading:    3.88 Radians   222.22 Degrees
Raw:   -347  -345   0    Scaled: -319.24  -317.40   0.00    Heading:    3.88 Radians   222.22 Degrees
Raw:   -346  -348   0    Scaled: -318.32  -320.16   0.00    Heading:    3.88 Radians   222.55 Degrees
Raw:   -345  -346   0    Scaled: -317.40  -318.32   0.00    Heading:    3.88 Radians   222.46 Degrees
Raw:   -346  -347  -1    Scaled: -318.32  -319.24  -0.92    Heading:    3.88 Radians   222.46 Degrees
Raw:   -345  -348  -1    Scaled: -317.40  -320.16  -0.92    Heading:    3.89 Radians   222.63 Degrees
Raw:   -345  -348  -1    Scaled: -317.40  -320.16  -0.92    Heading:    3.89 Radians   222.63 Degrees
Raw:   -346  -346  -1    Scaled: -318.32  -318.32  -0.92    Heading:    3.88 Radians   222.38 Degrees
Raw:   -347  -349  -1    Scaled: -319.24  -321.08  -0.92    Heading:    3.88 Radians   222.55 Degrees
Raw:   -346  -347   0    Scaled: -318.32  -319.24   0.00    Heading:    3.88 Radians   222.46 Degrees
Raw:   -346  -346  -1    Scaled: -318.32  -318.32  -0.92    Heading:    3.88 Radians   222.38 Degrees
Raw:   -345  -347  -1    Scaled: -317.40  -319.24  -0.92    Heading:    3.88 Radians   222.55 Degrees
Raw:
Raw:                                                                                                  ⌄
<                                                                    >
☑Autoscroll                                    No line ending  ⌄  9600 baud  ⌄
```

R5A 10k +3V3

SDA

R5B 10k +3V3

SCL

Q3A

Q3B

Si5924BDC

HSDA R5C 10k

HSCL R5D 10k +5V

U2

C1 10uF GND

5V

1 VIN VOUT 5 +3V3 C4 10uF GND

2 GND

3 EN BYP 4 C5 1nF

MIC5205-2.5

J1

HSCL 1
HSDA 2
+5V   3
GND   4

SDA INT +3V3

U1

16 15 14 13

16(SDA) 15(DRDY) 14(NC) 13(VDDIO)

SCL 1 1(SCL)   12(SETC) 12

+3V3 2 2(VDD)   11(GND)   11

      3 3(NC)   10(C1)   10   C3
                                           4.7uF GND
      4 4(S1)   9(GND)   9

HMC5883HMC5883

5(NC) 6(NC) 7(NC) 8(SETP)

5 6 7 8

C2 0.22uF

INT P$1

DRDY

QMC5883L Electronic Compass

Introduction

3-Axis Compass module, I2C based QMC5883 digital compass. This ASIC is equipped with high resolution magneto-resistive sensors and a 16-bit ADC. It provides compass heading accuracy up to 1° to 2°. Signal conditioning like amplification, automatic degaussing strap drivers and offset cancellation are inbuilt. This module also includes a MIC5205-2.5 voltage regulator for power supply requirement. Hence user can connect any 3.3V to 6V DC power supply.

Features

- **I2C interface**
- **Compatible with 3.3V-5.0V voltage level**
- **Max 200Hz output rate**
- **High heading accuracy**

Usage

Below is a register map that might help you understand what you can get from this module. There are totally 14 registers provided by QMC5883L. Two Control Registers decide the working mode of the device, they come with address "09H" and "0AH". Most of the remaining registers are read only data output registers, status register and identification registers.

Addr.	7	6	5	4	3	2	1	0	Access
00H	Data Output X LSB Register XOUT[7:0]								Read only
01H	Data Output X MSB Register XOUT[15:8]								Read only
02H	Data Output Y LSB Register YOUT[7:0]								Read only
03H	Data Output Y MSB Register YOUT[15:8]								Read only
04H	Data Output Z LSB Register ZOUT[7:0]								Read only
05H	Data Output Z MSB Register ZOUT[15:8]								Read only
06H						DOR	OVL	DRDY	Read only
07H	TOUT[7:0]								Read only
08H	TOUT[15:8]								Read only
09H	OSR[1:0]		RNG[1:0]		ODR[1:0]		MODE[1:0]		Read/Write
0AH	SOFT_ RST	ROL_P NT						INT_E NB	R/W, Read only on blanks
0BH	SET/RESET Period FBR [7:0]								Read/Write
0CH	Reserved								Read only
0DH	Chip ID								Read only

In this example we will make the module output the heading angle between South and this module.

1. **Connect the QMC5883L Electronic Compass to Arduino via the I2C port. Make sure the QMC5883L module is horizontal。**
2. **Download the library file: [QMC5883L Compass library](). Unzip it into the libraries file of Arduino IDE by the path: ..\arduino-1.0.1\libraries.**
3. **Open the demo by the path:File -> Example ->Digital Compass ->QMC5883L_Example.**
4. **Upload the Code.**
5. **Check the output result by opening the serial monitor.**

R5A 10k +3V3

SDA

R5B 10k +3V3

SCL

Si59?4Si59?4?C

Q3A

HSDA R5C 10k

Q3B

HSCL R5D 10k +5V

U2

VIN VOUT 5 +3V3 C4 10uF GND

+5V C1 10uF GND

GND

EN BYP 4 C5 1nF

MIC5205-2.5

J1

HSCL 1
HSDA 2
+5V   3
GND   4

SDA INT +3V3

16 15 14 13

U1

16(SDA) 15(DRDY) 14(NC) 13(VDDIO)

SCL 1 1(SCL)

12(SETC) 12

+3V3 2 2(VDD)

11(GND) 11

3 3(NC)

10(C1) 10 C3 GND
                  4.7uF

4 4(S1)

9(GND) 9

HMC5883HMC5883

INT PS1

DRDY

5(NC) 6(NC) 7(NC) 8(SETP)

5 6 7 8

C2 0.22uF