

Magnetometer HMC5883L interfacing with PIC18F4550

Introduction



HMC5883L Magnetometer Module

Magnetometer HMC5883L is used for measuring the direction and magnitude of the Earth's magnetic field. It is used for low cost compassing and magnetometry.

It measures the Earth's magnetic field value along the X, Y, and Z axes from milli-gauss to 8 gauss.

It can be used to find the direction of the heading of the device.

It uses the I2C protocol for communication with microcontrollers.

For more information about Magnetometer HMC5883L and how to use it, refer to the topic HMC5883L Magnetometer Module (<https://www.electronicwings.com/sensors-modules/hmc5883l-magnetometer-module>) in the sensors and modules section.

Programming HMC5883L Magnetometer

Let's interface magnetometer HMC5883L with PIC18F4550 and calculate its heading angle. HMC5883L uses the I2C protocol for communication. Here we are connecting PIC18F4550 as a master device and HMC5883L as a slave device. Its I2C device address is 0x3C. Its read and write operation addresses are:

Here we are using I2C of PIC18F4550

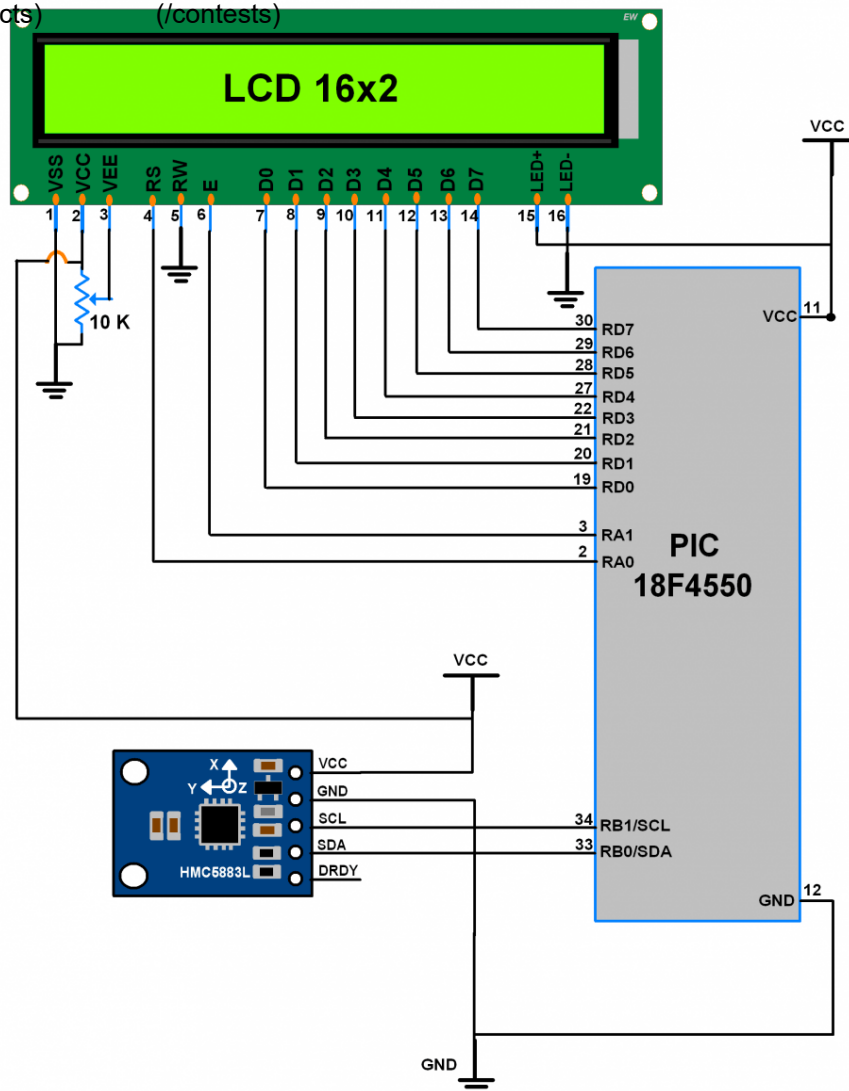
(<https://www.electronicwings.com/pic/pic18f4550-i2c>) to communicate with HMC5883L.

Slave device write address (SLA+W): 0x3C

Slave device read address (SLA+R): 0x3D



Connection Diagram HMC5883L Magnetometer to PIC18F4550



HMC5883L Magnetometer Interface With PIC18F4550

Programming steps

- First, we need to set configuration register A for an average of 8-sample measurement with 15 Hz default data output rate
- Set Gain using Configuration Register B i.e. here its 0xA0. (or we can choose any other desired gain)
- Select Continuous measurement mode of operation in Mode Register. Hence Mode Register value will become 0x00.

After initialization, write the start location of output data registers X, Y, and Z i.e. 0x03, and read all six registers' raw values.

Calculate Heading value by using the formula,

EW

ElectronicWings

(/)

Platforms

(/explore)

Projects


(/projects)

Contests

(/contests)

Q

+ Project (/publish/project)



(
i
n
r
a
d
i
a
n
)

(
i
n
r
a
d
i
a
n
)



Platforms
(/explore)

HMC5883L Magnetometer Code for PIC18F4550

Project (/projects) Contest (/contests)

```
/*
 * Magnetometer interface with PIC18F4550
 * http://electronicwings.com
 */

#include <pic18f4550.h>
#include <stdio.h>
#include <stdlib.h>
#include <math.h>          /* Include math header file */
#include "Configuration_header_file.h"
#include "I2C_Master_File.h"
#include "LCD_16x2_Header_file.h"

#define PI      3.14159265359  /* Define Pi value */
#define Declination  -0.00669
/* Define declination of location from where measurement going to be done */

void Magneto_init()          /* Magneto initialize function */
{
    I2C_Start(0x3C);          /* Start and write SLA+W */
    I2C_Write(0x00);          /* Write memory location address */
    /* Configure register A as 8-average, 15 Hz default, normal measurement */
    I2C_Write(0x70);
}
```



(https://www.
mouser.in?

utm_source=el
ectronicswing

Powered By s&utm_mediu
m=display&ut
m_campaign=
mouser-
componentsli
sting&utm_co
ntent=0x0)

Components Used

HMC5883L Magnetometer Module

Magnetometer HMC5883L is developed by Honeywell...

X 1


(https://www.mouser.in/ProductDetail/Olimex-Ltd/MOD-HMC5883L?qs=%2Fha2pyFaduiM2FizGGE3eZs8JvW%2Fsm6fbEJBqFTwYwfN63cbOSCmqA%3D%3D&utm_source=electronicwings&utm_medium=display&utm_campaign=mouser-componentslisting&utm_content=0x0)

Components Used

Powered By


LCD16x2 Display
LCD16x2 Display


X 1

 (https://www.mouser.com/ProductDetail/Adafruit/1447?qs=XAKIUOoRPe6AClmsjw7y7g%3D%3D&utm_source=electronicswings&utm_medium=display&utm_campaign=mouser-componentslisting&utm_content=0x0)

PIC18f4550
PIC18f4550

X 1


 (https://www.mouser.in/ProductDetail/Microchip-Technology/PIC18F4550-I-P?qs=oKK8NaWdAJs8nLDXBGwMXw%3D%3D&utm_source=electronicswings&utm_medium=display&utm_campaign=mouser-componentslisting&utm_content=0x0)


 Datasheet (/components/pic18f4550/1/datasheet)

Components Used





Powered By

PICKit 4 MPLAB
PICKit 4 MPLAB X 1

 (https://www.mouser.in/ProductDetail/Microchip-Technology/PG164140?qs=r5DSvIrkXmLKDuYNJlmlWw%3D%3D&utm_source=electronicswings&utm_medium=display&utm_campaign=mouser-componentslisting&utm_content=0x0)

 Datasheet (/components/pickit-4-mplab/1/datasheet)

Downloads

 HMC5883L_3-Axis_Digital_Compass_IC	Dow (/api/download/platform-attachment/221) d
 Applications of Magnetic Sensors for Low Cost Compass Systems	Dow (/api/download/platform-attachment/222) d
 Applications of Magnetoresistive Sensors in Navigation Systems	Dow (/api/download/platform-attachment/223) d
 Magnetometer Interface with PIC Project File	Dow (/api/download/platform-attachment/341) d

[Platforms \(/explore\)](#)[Projects \(/projects\)](#)[Contests \(/contests\)](#)

Comment

arnaldoricci1

[\(/users/arnaldoricci1/profile\)](#)
2018-09-30 14:46:54

About a pullup resistor??

Reply Like

lokeshc

[\(/users/lokeshc/profile\)](#)
2018-10-01 22:43:50

HMC5883L module has a on-board pull-up resistor. So no need to connect the external one.

Reply Like

Isteward

[\(/users/Isteward/profile\)](#)
2018-11-09 07:31:53

I have been using hmc5883l with my pic184550 project but cannot find any good calibration tools.

I have been trying mag3110 magnetometer but cannot get it to work with your code here. It hangs at the I2C_start_wait function in magneto_getheading. Any ideas on getting this to work?

Also is it possible to set HMC5883L calibration offsets and scales in your code here? Can you suggest some additions?

Reply Like 1

[About Us \(/about\)](#)[Business Offering \(/business-services\)](#)[Host Platform \(/launch-platform\)](#)[Contact Us \(/contactus\)](#)[Terms of Service \(/terms-of-service\)](#)[Cookies Policy \(/cookie-policy\)](#)[Privacy Policy \(/privacy-policy\)](#)

Connect On:

Facebook(<https://www.facebook.com/electronicwings>)LinkedIn(<https://www.linkedin.com/company/electronicwin>)Youtube(<https://www.youtube.com/channel/UCNdqkukBtk4>)Instagram(https://www.instagram.com/electronicwings_coigshid=1cip10jjttko)

ElectronicWings

© 2023