The driver of QMC5883L

Example Code Introduction for 32-bit NuMicro®Family

Information

Application	This sample code is the driver of QMC5883L based on NANO100 series.
BSP Version	Nano100B_Series_BSP_CMSIS_v3.03.000
Hardware	NuTiny-EVB-Nano130-LQFP128 V1.0

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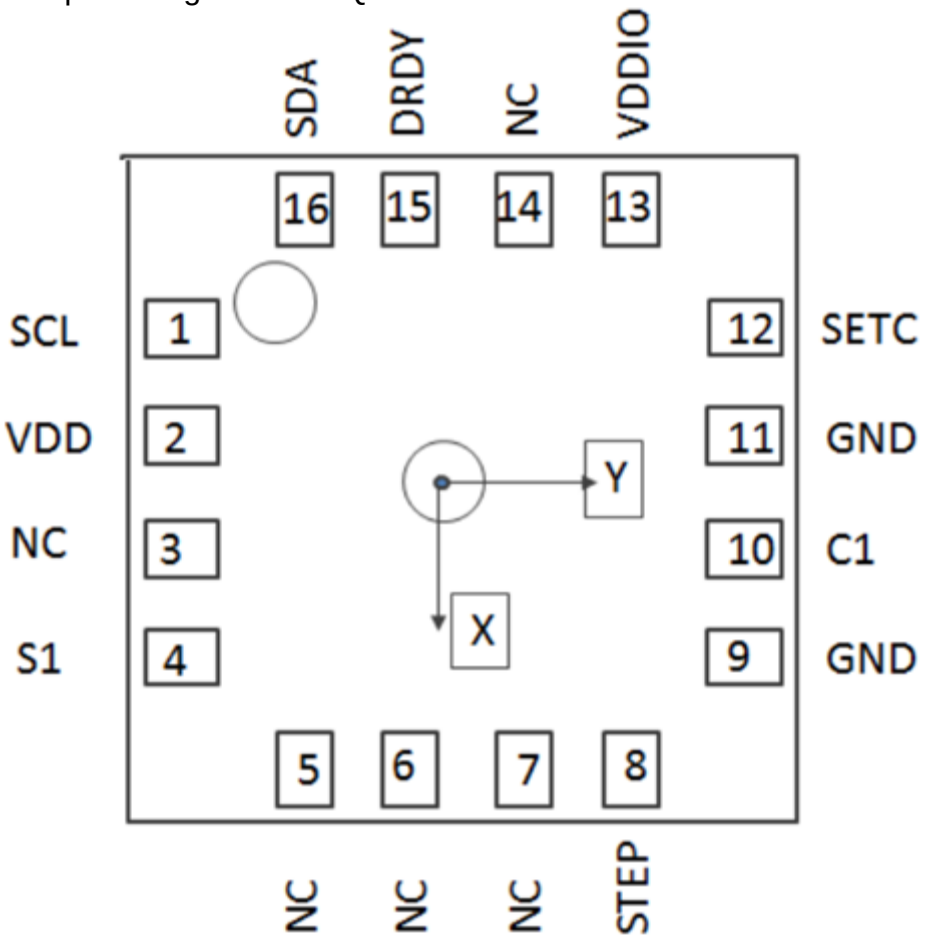
1 Function Description

1.1 Introduction

QMC5883L is a three-axis magnetic sensor, controlled by I2C interface.

1.1.1 Pin Configuration

The pin configuration of QMC5883L is shown below.



Pin description is shown in the following table.

Pin No.	Pin Name	Function
1	SCL	Serial Clock – I2C Master/Slave Clock
2	VDD	Power Supply (2.16V to 3.6V)
3	NC	Not to be Connected
4	S1	Tie to VDDIO
5	NC	Not to be Connected
6	NC	Not to be Connected

7	NC	Not to be Connected
8	SETP	Set/Reset Strap Positive – S/R Capacitor (C2) Connection
9	GND	Supply Ground
10	C1	Reservoir Capacitor (C1) Connection
11	GND	Supply Ground
12	SETC	S/R Capacitor (C2) Connection – Driver Side
13	VDDIO	IO Power Supply (1.71V to VDD)
14	NC	Not to be Connected
15	DRDY	Data Ready, Interrupt Pin. Default low. Data ready high until data register is read.
16	SDA	Serial Data – I2C Master/Slave Data

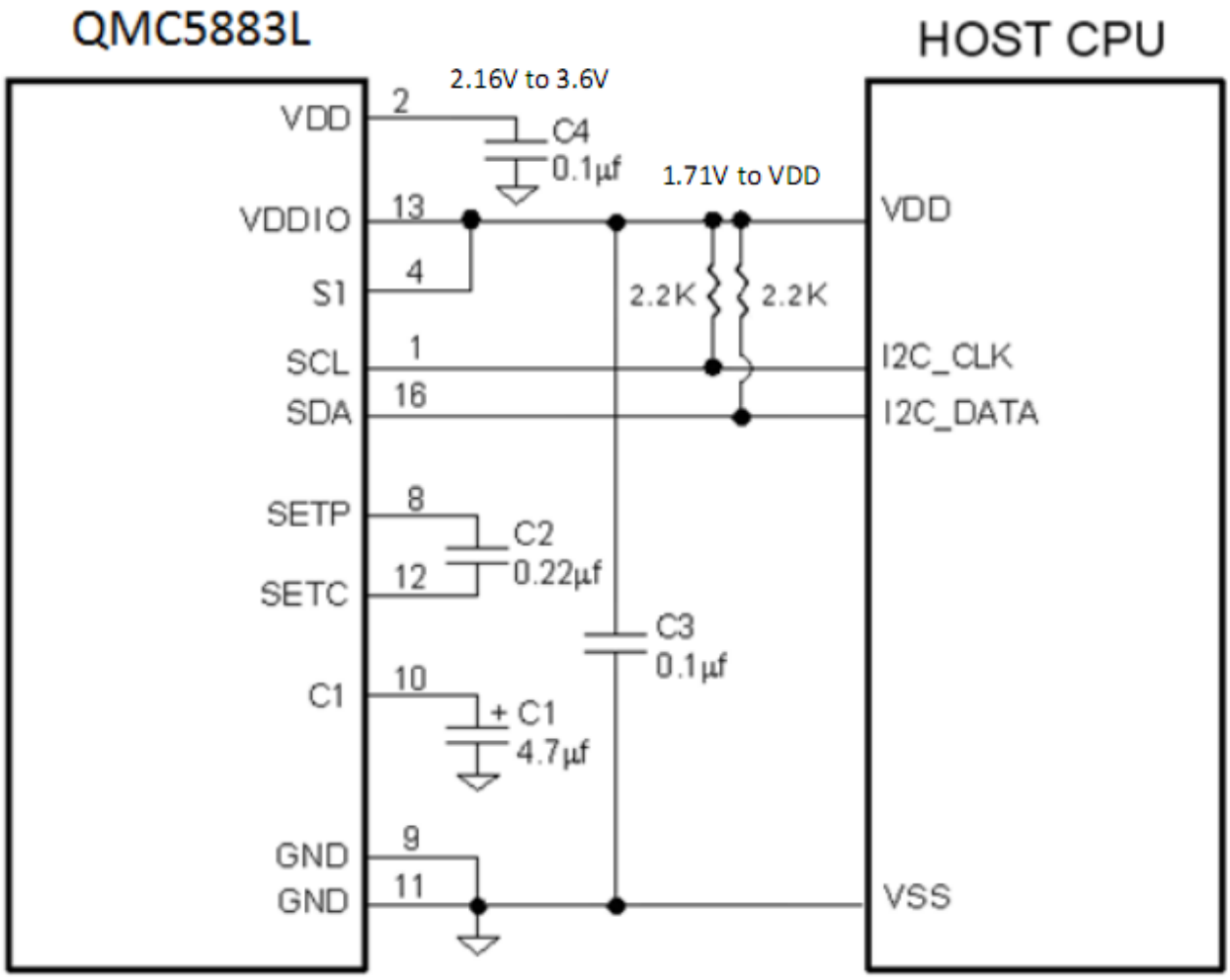
1.1.2 Register Map

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_PNT						INT_ENB	R/W, Read only on blanks
0BH	SET/RESET Period FBR [7:0]								Read/Write
0CH	Reserved								Read only
0DH	Chip ID								Read only

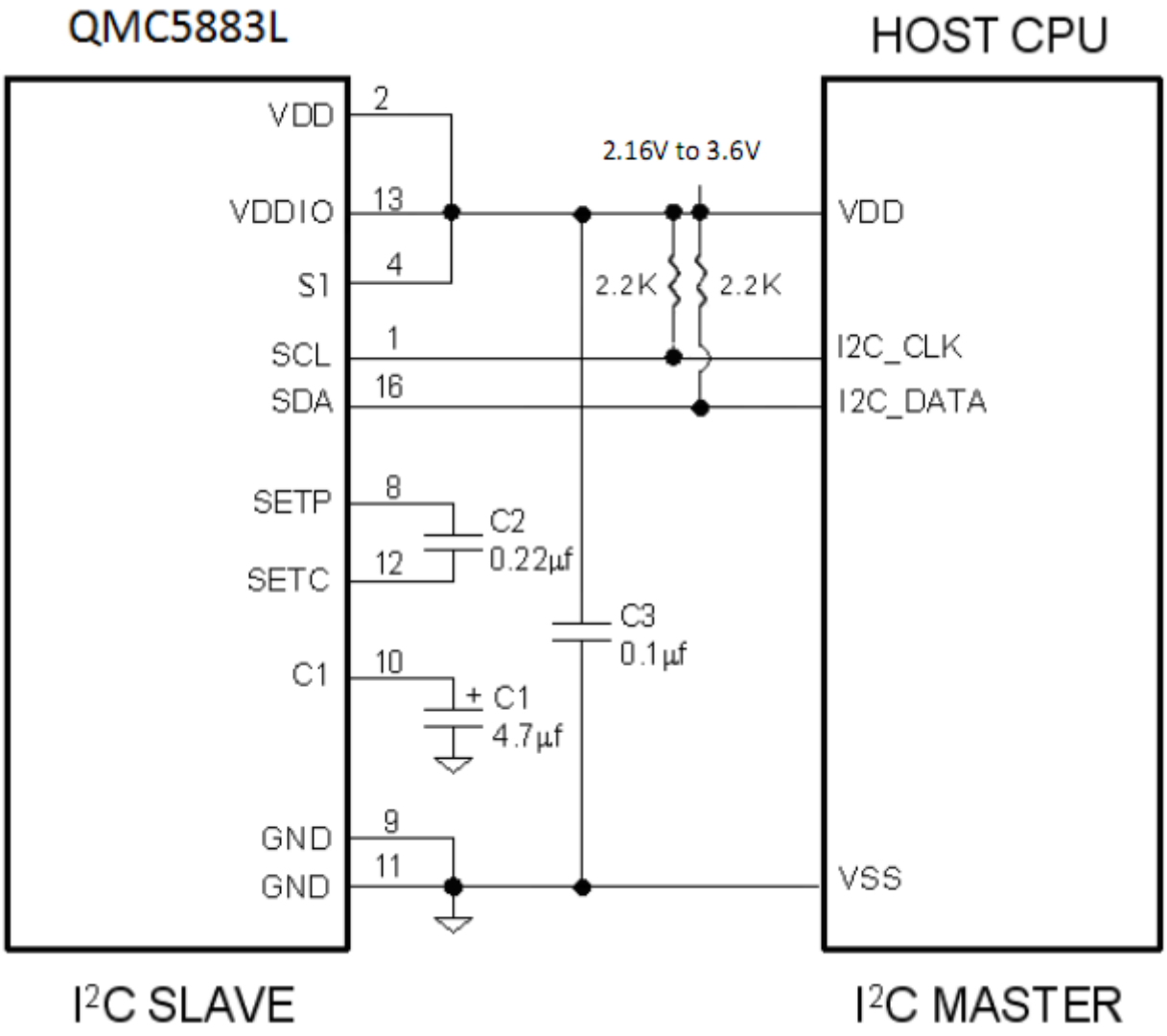
1.1.3 Application Circuit

The application circuit is shown below.

1.1.3.1 Dual Supply Connection



1.1.3.2 Single Supply Connection



For more information about QMC5883L, please refer to the datasheet of QMC5883L.

1.2 Principle

This sample code is the driver of QMC5883L based on NANO100 series. NANO100 series controls QMC5883L and reads 3-axis magnetic sensor data by I2C interface.

1.2.1 I2C Write

START	Slave Address (0x0D)							R W	SACK	Register Address (0x09)								SACK	Data (0x01)								SACK	STOP
	0	0	0	1	1	0	1	0		0	0	0	0	1	0	0	1		0	0	0	0	0	0	0	1		

1.2.2 I2C Read

START	Slave Address (0x0D)							R W	SACK	Register Addres (0x00)								SACK
	0	0	0	1	1	0	1	0		0	0	0	0	0	0	0	0	
START	Slave Address (0x0D)							R W	SACK	Data (0x00)								MACK
	0	0	0	1	1	0	1	1		0	0	0	0	0	0	0	0	
MACK	Data (0x02)								MACK	.....								MACK
	0	0	0	0	0	0	1	0		.....								

Data (0x01)										
0	0	0	0	0	0	0	1			
Data (0x07)								NACK	STOP	
0	0	0	0	0	1	1	1			

For more information, please refer to the datasheet of QMC5883L.

1.3 Demo Result

```
Core Clock = 42000000 Hz

+-----------------------------------------------------+
|   Nano100 Series I2C Sample Code with QMC5883L      |
+-----------------------------------------------------+
Data:  X: 8575  Y: 60021  Z: 4347
Data:  X: 8680  Y: 60121  Z: 4280
Data:  X: 8760  Y: 60176  Z: 4155
Data:  X: 8735  Y: 61841  Z: 4437
Data:  X: 5780  Y: 59916  Z: 6320
Data:  X: 8735  Y: 62291  Z: 3587
Data:  X: 8395  Y: 63026  Z: 2622
Data:  X: 8430  Y: 63056  Z: 2612
Data:  X: 8430  Y: 63001  Z: 2642
```

2 Code Description

Initialize QMC5883L.

```
void QMC5883L_Init(void)
{
    I2C0_Init();

    I2C0_Write(QMC5883L_ADDR, QMC5883L_REG_PERIOD, 0x01);
    I2C0_Write(QMC5883L_ADDR, QMC5883L_REG_CONTROL1, 0x0D);
}
```

Read 3-axis magnetic sensor data.

```
void QMC5883L_ReadData(uint8_t au8Data[6])
{
    I2C0_Read(QMC5883L_ADDR, QMC5883L_REG_DATAX_LSB, 6, au8Data);
}
```

3 Software and Hardware Environment

Software Environment

- BSP version
  - Nano100B_Series_BSP_CMSIS_v3.03.000
- IDE version
  - Keil uVersion4.74

Hardware Environment

- Circuit components
  - NuTiny-EVB-Nano130-LQFP128 V1.0
  - QMC5883L
- Diagram

NANO100 series controls QMC5883L by I2C interface, and reads 3-axis magnetic sensor data.

NANO100		QMC5883L
VDD	↔	VDD
VDD	↔	VDDIO
VDD	↔	S1
I2C0_SCL (PA.9)	↔	SCL
I2C0_SDA (PA8)	↔	SDA
GND	↔	GND

4 Directory Information

- EC_NANO100_I2C_ QMC5883L _V1.00
  - Library — Sample code header and source files
    - CMSIS — Cortex®Microcontroller Software Interface Standard (CMSIS) V4.5.0 definitions by ARM® Corp.
    - Device — CMSIS compliant device header file
    - StdDriver — All peripheral driver header and source files
  - SampleCode
    - ExampleCode — Source file of example code

5 How to Execute Example Code

1. Browsing into sample code folder by Directory Information(section 4) and double click I2C_ QMC5883L.uvproj.
2. Enter Keil compile mode
   a. Build
   b. Download
   c. Start/Stop debug session
3. Enter debug mode
   a. Run

6 Revision History

Date	Revision	Description
Dec.16, 2019	1.00	1. Initially issued.

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