IST8310使用说明 v1.4



IST8310軟件流程

- I²C default (CAD0, CAD1 floating) slave address: 0EH
- Driver前置设定动作(在Stand-by mode設定):
 - 1) 0x41h填入 00100100b = 24h <= 开启16x内部平均
 - 2) 0x42h填入 11000000b = C0h <=Set/Reset Pulse Duration设定。
- Driver读取动作:
 - 1) 0x0Ah写入0x01h (Single Measurement Mode)
 - 2) 等待6ms (16x内部平均後最快)
 - 3) 0x03h起连续读取6 bytes分别为X_{Low}, X_{High}, Y_{Low}, Y_{High}, Z_{Low}, Z_{high}
 - 4) 做Cross-axis校正程序(于后页)
 - 5) 做外部軟件均值濾波(page 6, 根據顧客需求選用)
 - 6) 重复以上1)~4) or 5)



Cross-Axis校正程序

从OTP中读取FT测试 后存入的Cross-Axis Data(Hex, LSB) 数据处理:

- 1. 取2个Byte为一组
- 2. Hex to Dec
- 3. 乘一個常數M=3/20

根据下页公式 得到转换矩阵 A(3 x 3)

得到校正之后的结果(正圆)

将转换矩阵A乘上 IST8310得到的三轴 Raw Data (可能为偏心椭圆)

(A x Raw Data)



Cross-Axis校正公式

校正公式:

$$A = \begin{pmatrix} 50 & 0 & 0 \\ 0 & 50 & 0 \\ 0 & 0 & 50 \end{pmatrix} \times \begin{pmatrix} X_{11} & X_{21} & X_{31} \\ X_{12} & X_{22} & X_{32} \\ X_{13} & X_{23} & X_{33} \end{pmatrix}$$
 一 寄存器中的9c~ac位置,每两个Byte为一组(Hex)。

A: Cross-Axis转换矩阵

X₁₁~X₃₃: IST8310经FT测试得到之Cross-Axis Data

 Y_{ab} 转换成 X_{ab} 须经过以下数据处理:

- 1. 取2个Byte为一组
- 2. Hex to Dec
- 3. 乘一个常数M=3/20

则 $X_{11} = Y_{11} * M, X_{12} = Y_{12} * M, X_{13}$ =Y₁₃*M, 而后类推。

 $X_{11} \sim X_{33}$ 的值, 存在IST8310

Parameter Y _{ab} (需经过数据处 理转换成X _{ab})	寄存器Address (Low Byte, High Byte)
Y ₁₁	9c 9d
Y ₁₂	9e 9f
Y ₁₃	a0 a1
Y ₂₁	a2 a3
Y ₂₂	a4 a5
Y ₂₃	a6 a7
Y ₃₁	a8 a9
Y ₃₂	aa ab
Y ₃₃	ac ad



IST8310 软件平均设定(选用)

• 平均算法:

$$X_{avg1}$$
=($X_m+X_{m-1}+X_{m-2}+X_{m-3}$)/4, (每四笔资料做平均,产生一笔新资料) X_{avg2} =($X_{m-1}+X_{m-2}+X_{m-3}+X_{m-4}$)/4, X_{avg3} =($X_{m-2}+X_{m-3}+X_{m-4}+X_{m-5}$)/4, 而后类推。

 $*X_{m}, X_{m-1}, X_{m-2}, X_{m-3}, X_{m-4}, X_{m-5}$ 为磁传感器依时序的三轴原始输出数据。

*X_{avg1}, X_{avg2}, X_{avg3}为最终用来算指向以及磁强度的三轴输出数据。



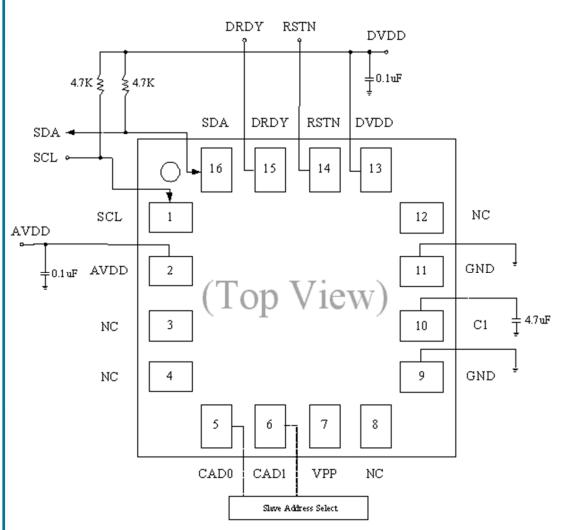
IST8310 Pin Table

Pin	Name	Function
1	SCL	I ² C serial clock
2	AVDD	Analog supply voltage, 1.72~3.6V
3	NC	Not use
4	NC	Not use
5	CAD0	I ² C slave address
6	CAD1	I ² C slave address
7	VPP	Test pin, floating connection is suggested
8	NC	Not use
9	VSS	GND
10	C1	Set/Reset function, 4.7uF
11	VSS	GND
12	NC	Not use
13	DVDD	Digital supply voltage, 1.72~3.6V
14	RSTN	Reset pin, resets registers by setting it to "Low".
		Internally pulled to "High" as default.
		MCU connection is suggested.
15	DRDY	Data ready indication, output pin only
16	SDA	I ² C serial data

Data from IST8310 datasheet.



IST8310 Application Circuit



Slave Address Select

CAD1 CAD0 Address

VSS VSS 0CH

VSS VDD 0DH

VDD VSS 0EH

VDD VDD 0FH

*if CAD1 and CAD0 are floating, I²C address will be 0EH

Data from IST8310 datasheet.



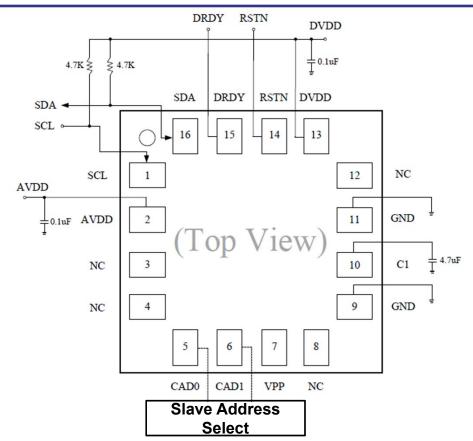
Pin-to-Pin Information to HMC5883/5983



IST8310 p2p to HMC5883/5983 (1/2)

Pin No.	IST8310	HMC5883L	HMC5983L	Comments	
1	SCL	SCL	SCL/SPI_SCK	IST8310 doesn't support SPI, otherwise compatible.	
2	AVDD	VDD	VDD	Compatible (IST8310:1.72~3.6V; HMC5x83L: 2.16~3.6V)	
3	NC	NC	NC	Compatible	
4	NC	S1	SPI_CS	Compatible (IST8310 doesn't care, no connection inside)	
5	CAD0	NC	SPI_SDO	Compatible (IST8310 slave address select, see page 5)	
6	CAD1	NC	I ² C/~SPI	Compatible (IST8310 slave address select, see page 5)	
7	VPP	NC	NC	Compatible (VPP pin can be connected to GND or floating)	
8	NC	SETP	SETP	Compatible (IST8310 doesn't care, no connection inside)	
9	VSS	GND	SoC	Compatible (for HMC5893, keep SoC signal = "0")	
10	C1	C1	C1	Compatible	
11	VSS	GND	GND	Compatible	
12	NC	SETC	SETC	Compatible (IST8310 doesn't care, no connection inside)	
13	DVDD	VDDIO	VDDIO	Compatible	
14	RSTN	NC	NC	Compatible (RSTN pin can be connected to MCU or floating)	
15	DRDY	DRDY	DRDY	Compatible	
16	SDA	SDA	SDA/SPI_SDI	IST8310 doesn't support SPI, otherwise compatible.	

IST8310 p2p to HMC5883/5983 (2/2)



PN	Pin 6	Pin 5	i2c Address
HMC5883L	NC	NC	0EH
HMC5983L	VDD	NC	0EH



*if CAD1 and CAD0 are floating, I²C address will be 0EH

- PC slave address is 0EH when you mount IST8310 onto HMC5883L/5983L"s PCB.
- Nothing else needs to be taken care of.

Reference Information

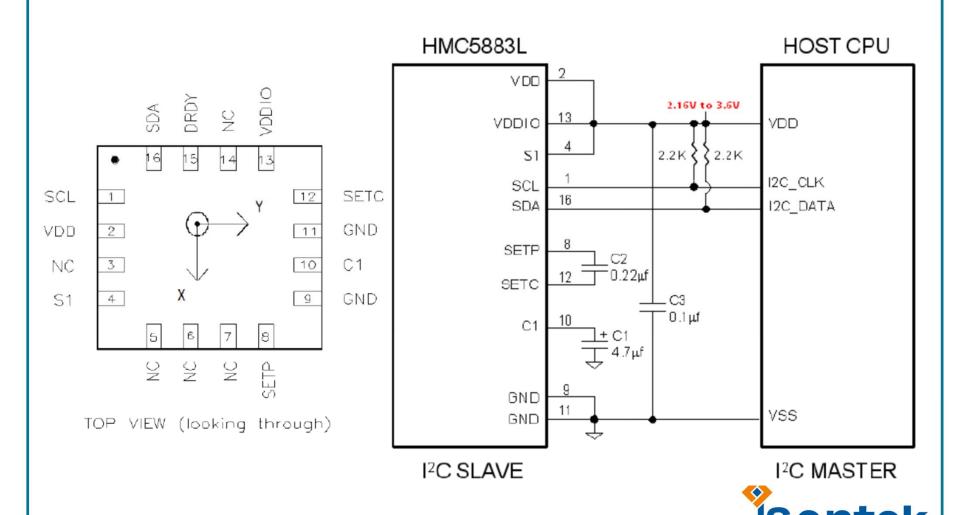


HMC5883L Pin Table

Pin	Name	Description
1	SCL	Serial Clock – I ² C 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. Internally pulled high. Optional connection. Low for 250 µsec when data is placed in the data output registers.
16	SDA	Serial Data – I ² C Master/Slave Data



HMC5883L Application Circuit



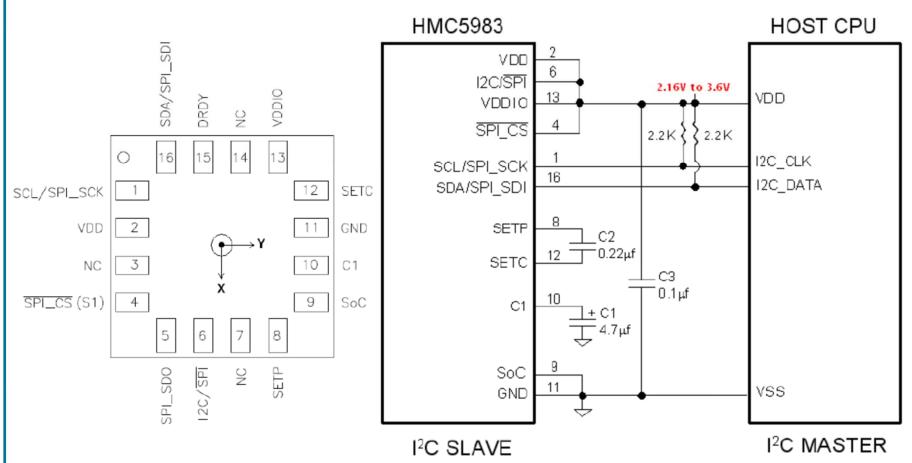
Data from HMC5883L datasheet.

HMC5983L Pin Table

Pin	Name	Description
1	SCL/SPI_SCK	Serial Clock – I ² C Master/Slave Clock or SPI Serial Clock
2	VDD	Power Supply (2.16V to 3.6V)
3	NC	Not to be Connected
4	SPI_CS	Chip Select line for SPI (active low). Tie to VDDIO for I ² C Interface
5	SPI_SDO	SPI Serial Data Out
6	I²C /~SPI	I ² C / SPI selection pin. Connect to VDD for I ² C (Also connect SPI_CS to VDDIO). Connect to GND for SPI.
7	NC	Not to be Connected
8	SETP	Set/Reset Strap Positive – S/R Capacitor (C2) Connection
9	SoC	Start of Conversion (leading edge active) Connect to Ground when this function/pad is not used in application.
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. No internal connection.
15	DRDY	Data Ready, Interrupt Pin. Internally pulled high. Optional connection. Low for >200 µsec when data are placed in the data output registers.
16	SDA/SPI_SDI	Serial Data – I ² C Master/Slave Data or SPI Serial Data In or SPI Serial Data I/O (SDI/O) for 3-wire interface



HMC5983L Application Circuit



Data from HMC5983L datasheet.

