

IST8310

3D Magnetometer

Datasheet

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1 General Description

iSentek IST8310 is a 3-axis digital magnetometer with 3.0x3.0x1.0mm³, 16-pin LGA package. It is an integrated chip with 3-axis magnetic sensors, digital control logic, built-in temperature compensation circuit and self-test function. IST8310 provides an I²C digital output with fast mode up to 400kHz. The high output data rate, ultra-low hysteresis, excellent temperature drift and low noise performance features make it a perfect candidate for high accuracy applications.

Features

- Single chip 3-axis magnetic sensor
- 3.0x3.0x1.0mm³, 16-pin LGA package
- I²C slave, Fast Mode up to 400kHz
- 14 or 16 bits adjustable data output
- Wide dynamic range of ±1600uT (x, y-axis) and ±2500uT (z-axis)
- High output data rate of maximum 200Hz
- High sensitivity of maximum 1320 LSB/Gauss.
- Ultra-low hysteresis (<0.1%FS)
- Ultra-low sensitivity temperature drift (±0.016 %/°C)
- Ultra-low offset temperature drift (0.024uT/°C)
- Wide operating temperature range (-40 ~ 85 °C)
- High precision temperature compensation
- Built-in self-test function
- Software and algorithm support available (For tilt compensation, cross-axis compensation, soft/hard-iron calibration and noise suppression)

Applications

Quadcopter/Drone Applications
Augmented Reality Applications
Virtual Reality Applications
Location Based Services
Navigation Applications
Industrial Applications
Magnetometry
IOT devices
Heading
Gaming

2 Block Diagram, Package Dimension and Application Circuit

2.1 Block diagram

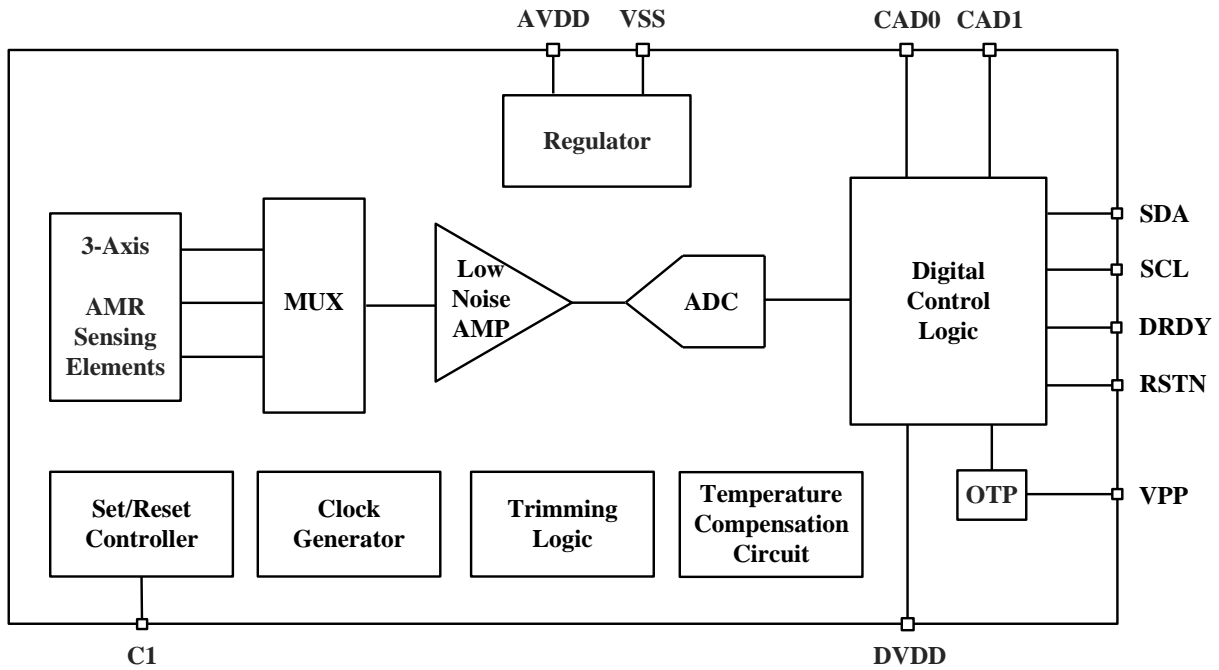
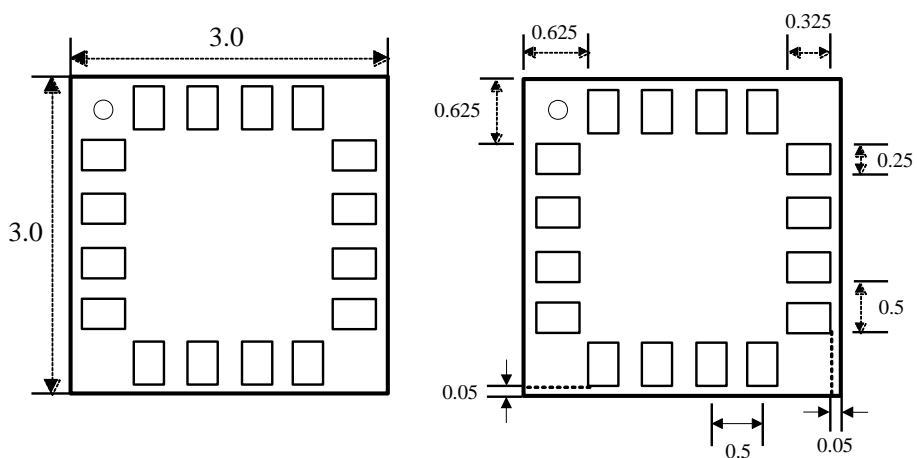


Figure 1. Block Diagram

2.2 Package Dimensions and Pin Description

IST8310 LGA Top View (Looking Through)

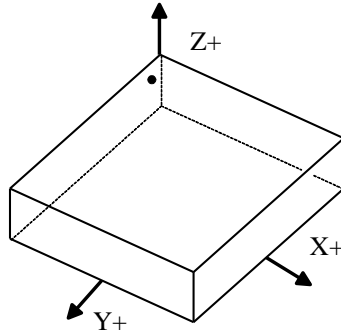


Unit: mm
Tolerance: ± 0.1 mm

IST8310 LGA Side View



IST8310 3D Top View



Unit: mm
Tolerance: ±0.1mm

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, connection to DVDD is suggested, Otherwise can be floating.
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” for floating connection. MCU connection is suggested.
15	DRDY	Data ready indication, output pin only
16	SDA	I ² C serial data

*please refer to Figure 2.

2.3 Application Circuit

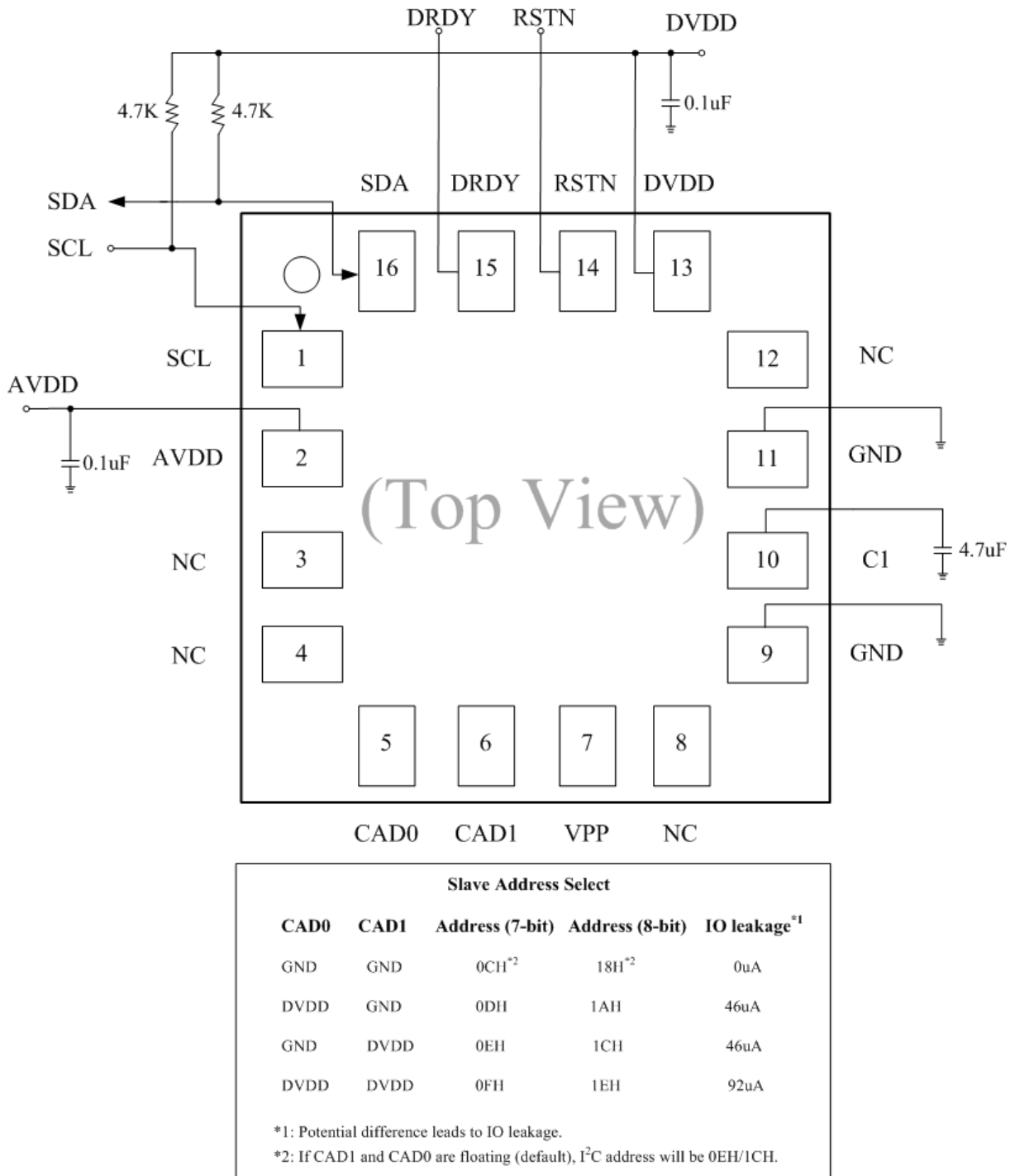


Figure 2. Application Circuit

3 Electrical Specifications

3.1 Absolute Maximum Ratings

Parameter	Symbol	Limits	Unit
Storage Temperature	TSTG	-40 to +150	°C
Analog Supply Voltage	AVDD	-0.5 to +3.6	V
Digital Supply Voltage	DVDD	-0.5 to +3.6	V
Digital Input Voltage	VIN	-0.3 to DVDD+0.3	V
Electrostatic Discharge Voltage* ¹	VESD_HBM	-4000 to 4000	V
Electrostatic Discharge Voltage* ²	VESD_MM	-350 to 350	V
Reflow Classification	JESD22-A113 with 260°C Peak Temperature		

- 1. Human Body Model (HBM)
- 2. Machine Model (MM)

3.2 Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit
Operating Temperature	TA	-40		+85	°C
Analog Supply Voltage	AVDD	1.72	2.8	3.6	V
Digital Supply Voltage	DVDD	1.72	1.8	3.6	V

3.3 Electrical Specifications

(Operating conditions: TA=+25°C; AVDD=2.8V; DVDD=1.8V; 4.7µF ceramic capacitors tied to C1 pin with maximum allowed line width and 5mm distance.)

Parameter	Symbol	Conditions	Min.	Typ.	Max	Unit
Operating Current	IDD3A	Full operation, at				µA
		1 sps		20		
		8 sps		72		
		10 sps		80		
		20 sps		140		
		50 sps		320		
		100 sps		600		
200 sps		1200				
Standby Current	ISTB			10		µA

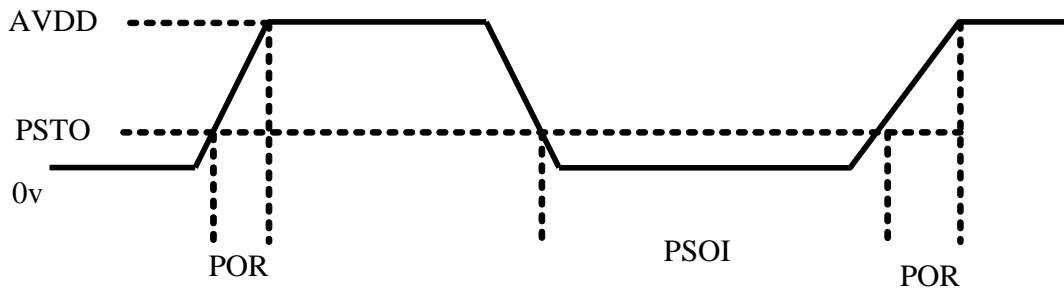
Output Data Rate (ODR)	ODR		1		200	Hz
Input Low Voltage	VIL		0		DVDD *30%	V
Input High Voltage	VIH		DVDD *70%		DVDD	V
Output Low Voltage	VOL	IOL= +4 mA	0		DVDD *20%	V
Output High Voltage	VOH	IOH= -100 uA (Except SCL and SDA)	DVDD *80%		DVDD	V

3.4 Magnetic Sensor Specifications

(Operating conditions: Ta=+25°C; AVDD=2.8V; DVDD=1.8V; 4.7µF ceramic capacitors tied to C1 pin with maximum allowed line width and 5mm distance.)

Parameter	Symbol	Condition	Min.	Typ.	Max	Unit
Dynamic Range	MDR_XY	TA=25 °C		±1600		uT
	MDR_Z	TA=25 °C		±2500		
Linearity	LIN	X-axis		1	1.5	%FS
		Y, Z-axis		0.1	0.5	
Resolution	RESO			0.3		uT/LSB
Sensitivity	SEN			3.3		LSB/uT
Zero Gauss Offset	ZGD	RMS value		±0.3		uT
Hysteresis	HS			0.1		%FS
Sensitivity Temperature Drift	TD_S	-40 ~ 85 °C		±0.016		%/°C
Zero-B Offset Temperature Drift	TD_O	-40 ~ 85 °C		0.024		uT/°C

3.5 Power On Reset (POR) Specifications



PSTO: Power Supply Turn Off voltage
 PSOI: Power Supply Turn Off Interval
 POR: Power On Reset

PSTO: max=0.1volt
 PSOI: min=10ms
 POR: max:50ms

When POR circuit detects the rise of AVDD voltage, it resets all internal circuits and initializes all registers. After reset, IST8310 transits to Stand-By mode.

4 Ordering Information

Order Number	Package Type	Packaging
IST8310	LGA – 16 pin	Tape and Reel: 5k pieces per reel

For more information on iSentek’s Magnetic Sensors, please contact us by phone at +86-132-6706-8686 (China), +86-755-2991-0201 (China) or +886-2-2698-3306 ext:110 (Taiwan); via e-mail: sales@isentek.com or visit us online at www.isentek.com.

The application circuits herein constitute typical usage and interface of iSentek’s product. iSentek does not warranty or assume liability of customer-designed circuits derived from this description or depiction.

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US Patent 9,297,863, Taiwanese Patents I437249, I420128 and I463160 apply to our magnetic sensor technology described.