

# **IST8308**

# **3D Magnetometer**

# **Datasheet**

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## 1 General Description

iSentek IST8308 is a 3-axis digital magnetometer with 3.0x3.0x1.0mm<sup>3</sup>, 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. IST8308 provides an I<sup>2</sup>C digital output with fast mode up to 400kHz. The high output data rate, ultra-low noise, ultra-low hysteresis and excellent temperature drift features make it a perfect candidate for high accuracy applications.

### Features

- Single chip 3-axis magnetic sensor
- 3.0x3.0x1.0mm<sup>3</sup>, 16-pin LGA package
- I<sup>2</sup>C slave, Fast Mode up to 400kHz
- 14-bit data output
- Dynamic range of maximum  $\pm 500\mu\text{T}$ .
- High output data rate of 200Hz
- Ultra-high sensitivity (maximum 13.2 LSB/ $\mu\text{T}$ )
- Ultra-low hysteresis ( $<0.1\%$ FS)
- Ultra-low sensitivity temperature drift ( $\pm 0.023\%/^{\circ}\text{C}$ )
- Ultra-low offset temperature drift ( $0.017\mu\text{T}/^{\circ}\text{C}$ )
- Wide operating temperature range
- High precision temperature compensation
- Built-in self-test function
- Built-in noise suppression filter
- Software and algorithm support available (For tilt compensation, soft/hard-iron calibration)

### 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

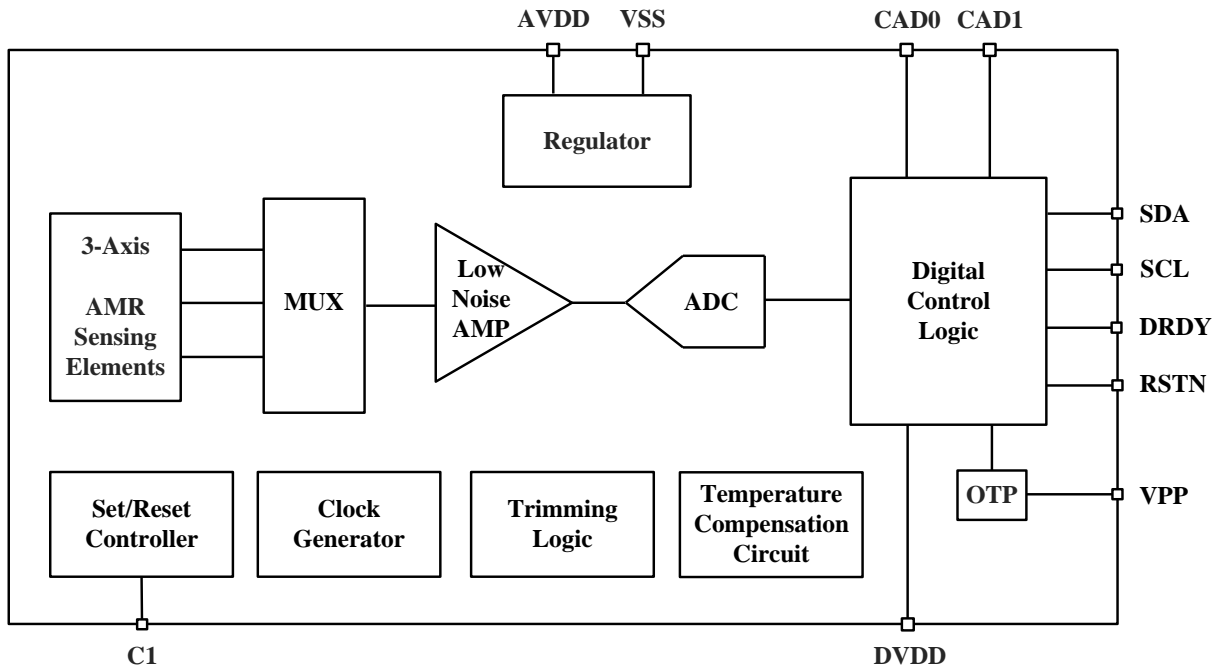
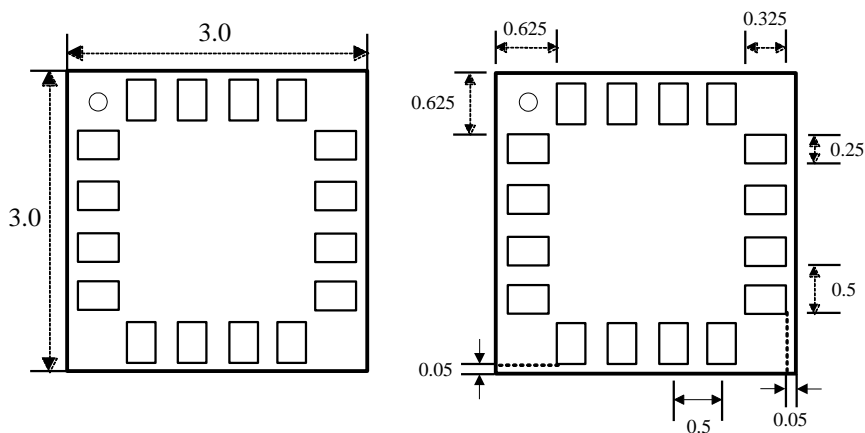


Figure 1. Block Diagram

### 2.2 Package Dimensions and Pin Description

#### IST8308 LGA Top View (Looking Through)

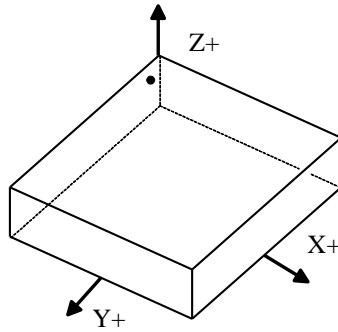


Unit: mm  
Tolerance: ±0.1mm

IST8308 LGA Side View



IST8308 3D Top View



Unit: mm  
Tolerance: ±0.1mm

Pin <sup>*1</sup>	Name	Function
1	SCL	I <sup>2</sup> C serial clock
2	AVDD	Analog supply voltage, 2.4~3.6V
3	NC	Not use
4	NC	Not use
5	CAD0	I <sup>2</sup> C slave address
6	CAD1	I <sup>2</sup> C slave address
7	VPP	Test pin, connect to DVDD or keep floating <sup>*2</sup>
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 (but not necessary).
15	DRDY	Data ready indication, output pin only
16	SDA	I <sup>2</sup> C serial data

<sup>\*1</sup> Please refer to Figure 2 on datasheet page 7.

<sup>\*2</sup> Please keep RSTN and CAD1 floating if VPP is floating.

2.3 Application Circuit

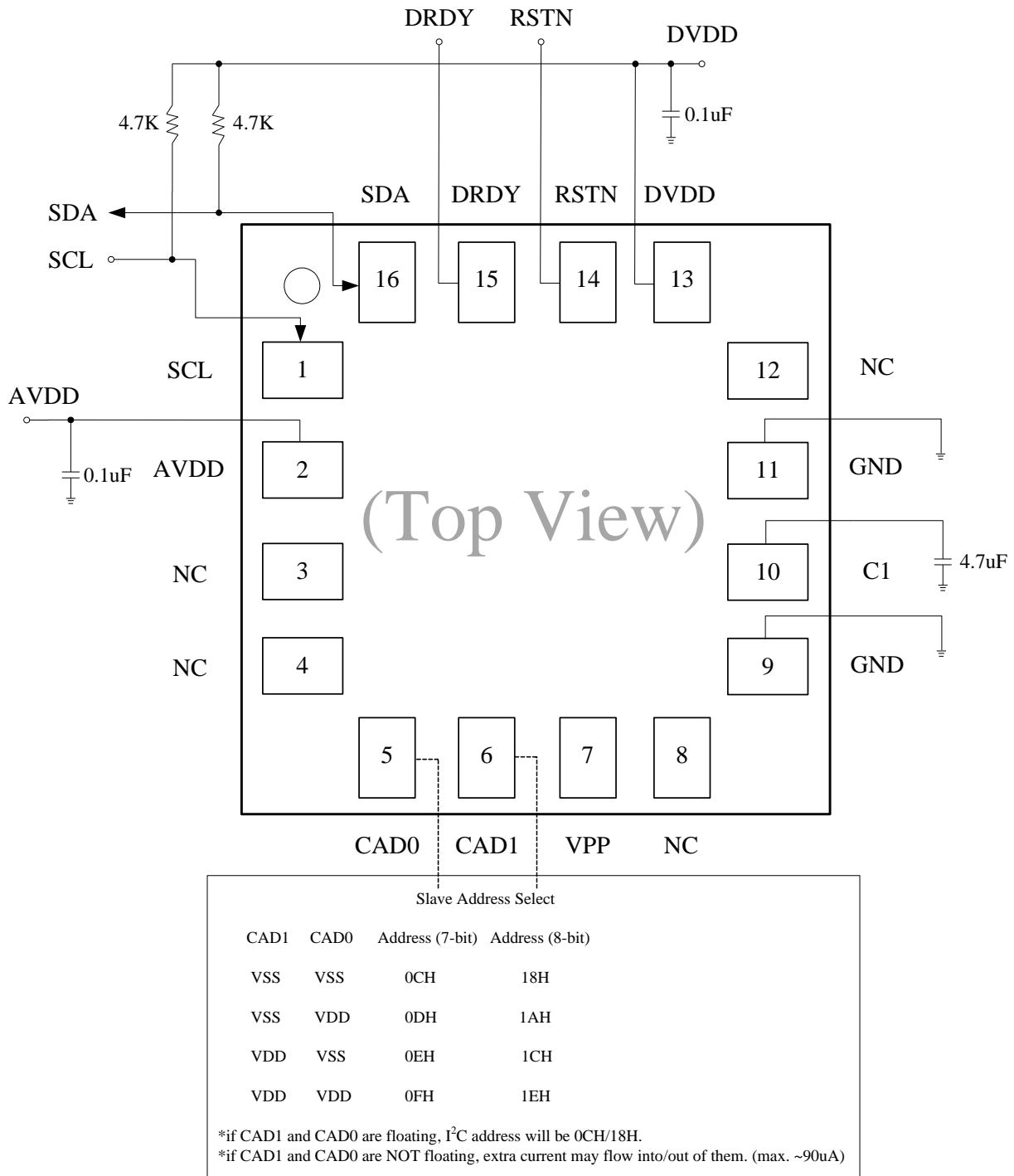


Figure 2. Application Circuit

### 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* <sup>1</sup>	VESD_HBM	-4000 to 4000	V
Electrostatic Discharge Voltage* <sup>2</sup>	VESD_MM	-300 to 300	V
Electrostatic Discharge Voltage* <sup>3</sup>	VESD_CDM	-700 to 700	V
Reflow Classification	JESD22-A113 with 260°C Peak Temperature		

- 1. Human Body Model (HBM)
- 2. Machine Model (MM)
- 3. Charge Device Model (CDM)

#### 3.2 Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit
Operating Temperature	TA	-40		+85	°C
Analog Supply Voltage	AVDD	2.4	3.3	3.6	V
Digital Supply Voltage	DVDD	1.72	1.8	3.6	V

#### 3.3 Electrical Specifications

(Operating conditions: TA=+25°C; AVDD=2.5V; 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 with OSR* <sup>1</sup> =2 setting, 10 sps 20 sps 50 sps 100 sps 200 sps				µA
					120	
					220	
					520	
					950	
Suspend Current	ISPD			2		µA

Output Data Rate (ODR)	ODR				200* <sup>2</sup>	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

1. Register OSRCNTL(0x41) controls OSR setting.
2. 200Hz ODR can be achieved with  $OSR \leq 8$ .

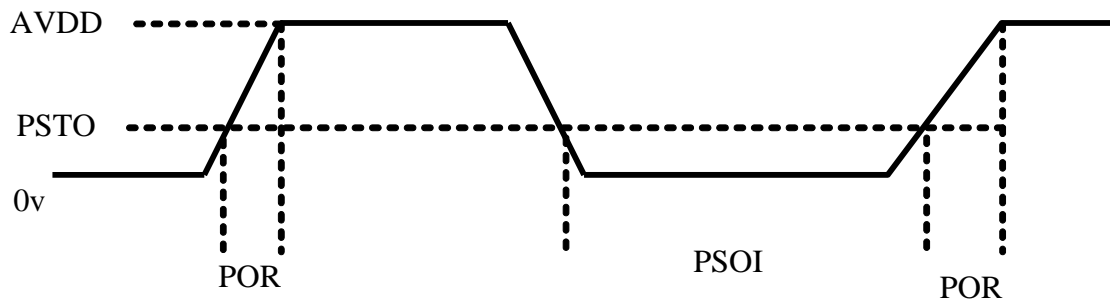
### 3.4 Magnetic Sensor Specifications

(Operating conditions:  $T_a = +25^\circ\text{C}$ ;  $AVDD = 2.5\text{V}$ ;  $DVDD = 1.8\text{V}$ ;  $4.7\mu\text{F}$  ceramic capacitors tied to C1 pin with maximum allowed line width and 5mm distance.)

Parameter	Symbol	Condition	Min.	Typ.	Max	Unit
Dynamic Range	DR	$T_A = 25^\circ\text{C}$		$\pm 500$		$\mu\text{T}$
Linearity	LIN	$\pm 200 \mu\text{T}$		0.1		%FS
Resolution	RESO	DR setting: $\pm 200 \mu\text{T}$		0.075		$\mu\text{T}/\text{LSB}$
		DR setting: $\pm 500 \mu\text{T}$		0.15		
Sensitivity	SEN	DR setting: $\pm 200 \mu\text{T}$		13.2		LSB/ $\mu\text{T}$
		DR setting: $\pm 500 \mu\text{T}$		6.6		
Zero Gauss Offset	ZGD			$\pm 0.3$		$\mu\text{T}$
Hysteresis	HS			0.1		%FS
Sensitivity Temperature Drift	TD_S	$-40 \sim 85^\circ\text{C}$		$\pm 0.023$		%/ $^\circ\text{C}$
Zero-B Offset Temperature Drift	TD_O	$-40 \sim 85^\circ\text{C}$		0.027		$\mu\text{T}/^\circ\text{C}$



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=0.7volt  
 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, IST8308 transits to Stand-By mode.

## 4 Ordering Information

Order Number	Package Type	Packaging
IST8308	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](mailto:sales@isentek.com) or visit us online at [www.isentek.com](http://www.isentek.com).

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