IST8305
3D Magnetometer

Preliminary Datasheet
(Brief)

Table of Contents

1 General Description

iSentek IST8305 is a 3-axis digital magnetometer with iSentek AMR & Hall technology. It is an integrated chip with 3-axis magnetic sensors and control ASIC. IST8305 provides an I^2C digital output with fast mode up to 400 kHz. Wide dynamic range operation, ultra-low hysteresis, high linearity, high output data rate and compact form factor features make it the best candidate for smartphone, wearable and IoT devices.

Features

- Single chip 3-axis magnetic sensor
- Compact form factor, 1.28 x 0.88 x 0.53mm^3, 5-pin WLCSP-BGA package
- I^2C slave, Fast Mode up to 400kHz
- Wide dynamic range of ±1600uT(x, y-axis) and ±2500uT (z-axis)
- Maximum 100Hz output data rate
- High Linearity (<0.5% FS, <0.1% within ±1000uT)
- Ultra-low hysteresis (<0.05%FS)
- Ultra-small package size

Applications

Location based services
Navigation Applications
Digital Compass
Magnetometry
IoT Applications
Gaming

2 Block Diagram, Package Dimension and Application Circuit

2.1 Block diagram

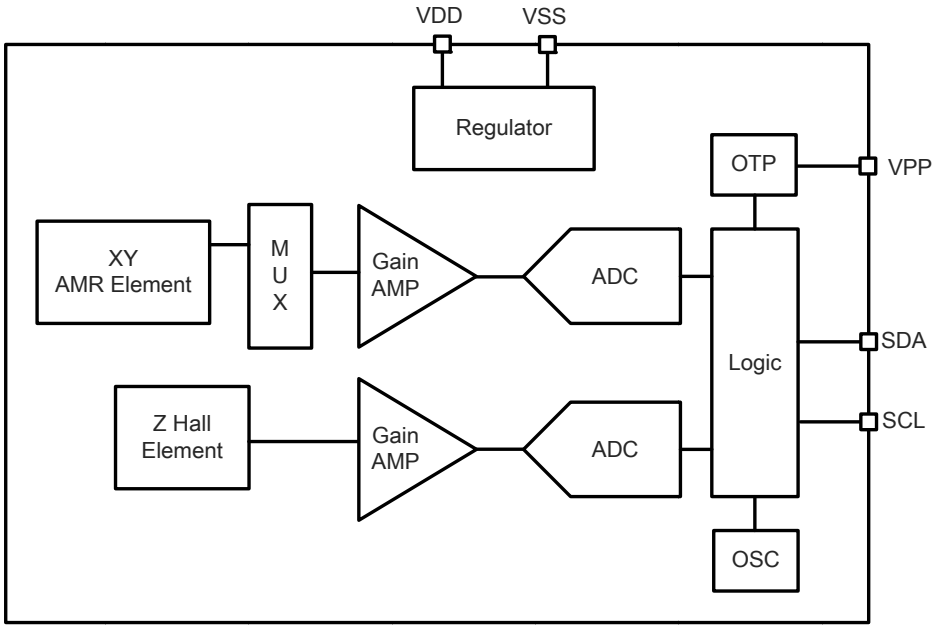


Figure 1. Block Diagram

2.2 Package Dimensions and Pin Description

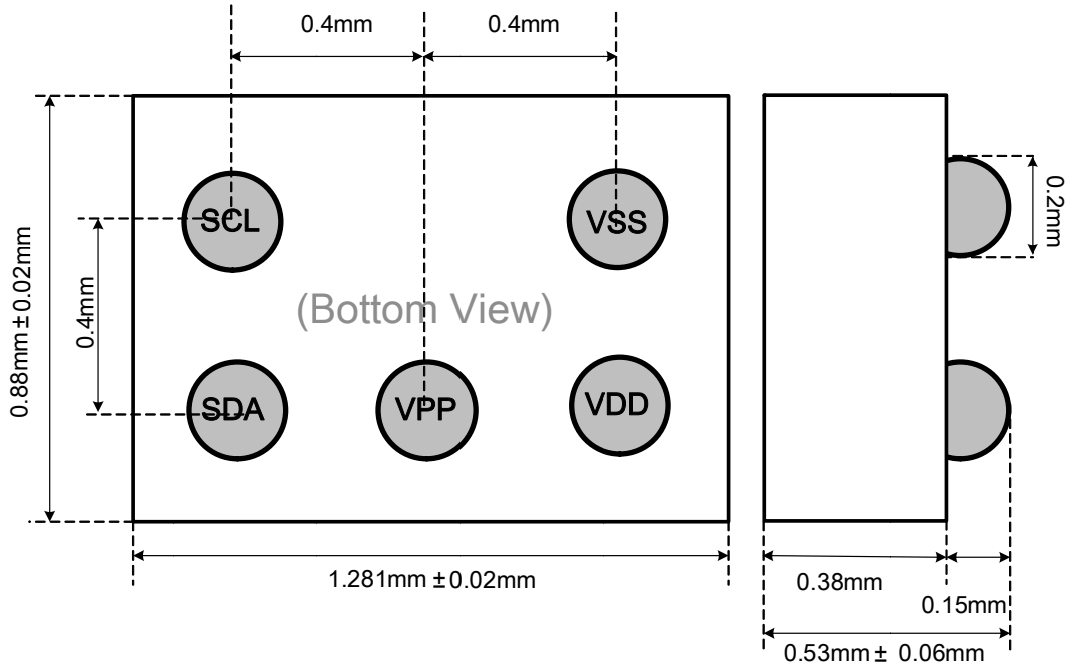


Figure 2. Package Dimensions

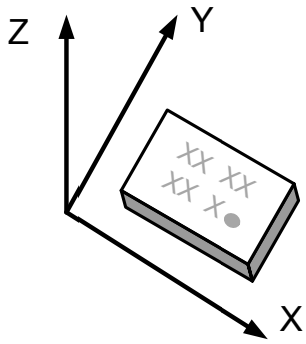
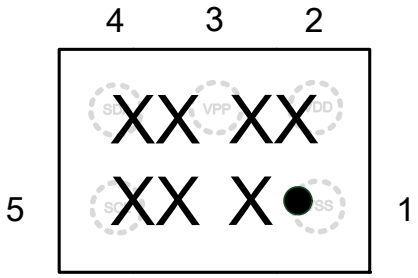


Figure 3.Magnetic Field Directions

2.3 Marking Information

Date code $X_1X_2\,X_3X_4$
Date code $X_5X_6\,X_7$●

X_1: Year
X_2X_3: Week
X_4X_5: Wafer ID
X_6X_7: Product code



IST8305 TOP View

2.4 Pin Configurations and Functions

Pin No	Pin Name	I/O type	Function
1	VSS	Supply	Ground
2	VDD	Supply	Power supply voltage, 1.62~1.98V
3	VPP	I/O	Test pin, floating connection is suggested Otherwise can be connected to VDD **Cannot** be connected to GND
4	SDA	I/O	I^2C data
5	SCL	I	I^2C clock

2.5 Application Circuit

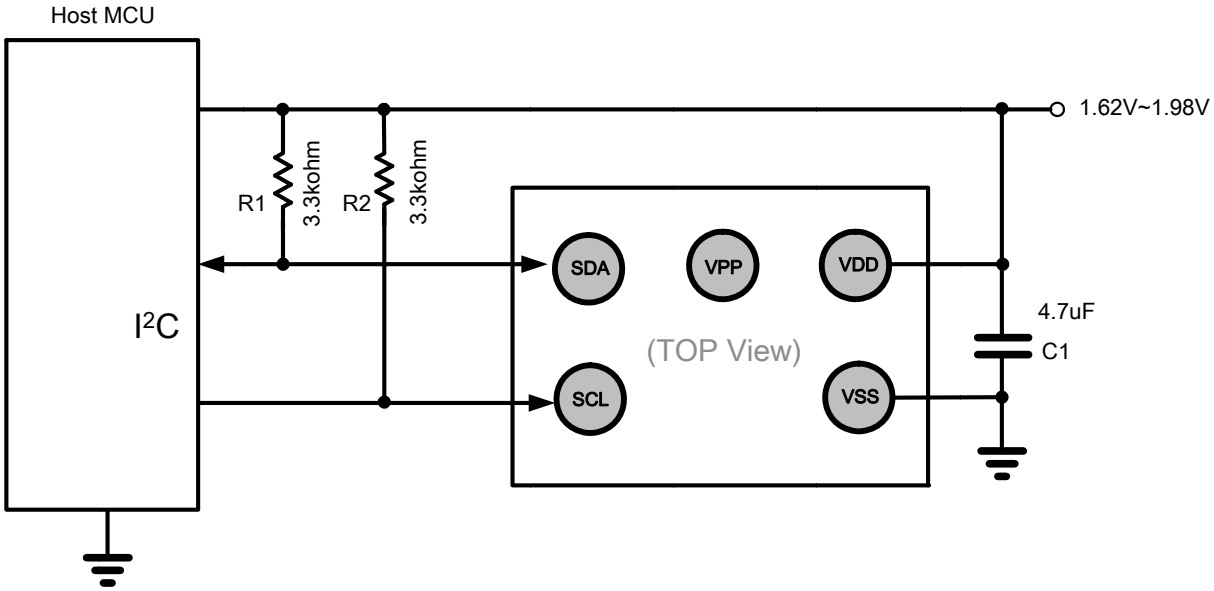


Figure 4. Application Circuit

3 Electrical Specifications

3.1 Absolute Maximum Ratings

Parameter	Symbol	Limits	Unit
Storage Temperature	TSTG	-40 to +125	°C
Analog Supply Voltage	VDD	-0.3 to +1.98	V
Digital Input Voltage	VIN	-0.3 to VDD+0.3	V
Electrostatic Discharge Voltage*[1]	VESD_HBM	-4000 to 4000	V
Electrostatic Discharge Voltage*[2]	VESD_MM	-350 to 350	V
Electrostatic Discharge Voltage*[3]	VESD_CDM	-700 to 700	V
Reflow Classification	JESD22-A113 with 260°C Peak Temperature		

If the device is used in conditions exceeding these limits, the device may be permanently failed. Device's performance cannot be guaranteed when exceeding these limits.

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	-20		+85	°C
Power Supply Voltage	VDD	1.62	1.8	1.98	V

3.3 Electrical Specifications

(Operating conditions: TA=+25℃; VDD=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
Normal Mode[1]	IDD3A	Full operation, at 10 sps		330		uA
High Precision Operation[2] Current Consumption	IDD3A	Full operation, at 10 sps		550		uA
Low Power Operation[3] Current Consumption	IDD3A	Full operation, at 100 sps		1350		uA

Ultra-Low Power Operation[4] Current Consumption	IDD3A	X & y-axis full operation, z-axis at 1/10 speed, at 10 sps 100 sps		130 390		uA
Suspend Current	ISUP			2		uA
Output Data Rate (ODR)	ODR				100	Hz
Input Low Voltage	VIL		0		VDD *30%	V
Input High Voltage	VIH		VDD *70%		VDD	V
Output Low Voltage	VOL	IOL= +4mA	0		VDD *20%	V
Output High Voltage	VOH	IOH= -100uA (Except SCL and SDA)	VDD *80%		VDD	V

1. Normal Operation: ODR_{max} = 100Hz
2. High Precision Operation: ODR_{max} = 50Hz
3. Low Power Operation: ODR_{max} = 100Hz
4. Ultra-Low Power Operation: ODR_{max} = 100Hz

3.4 Magnetic Sensor Specifications

(Operating conditions: Ta=+25℃; VDD=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	±1000 uT Full range		0.1 0.5		%FS
Resolution	RESO			0.3		uT/LSB
Sensitivity	SEN			3.3		LSB/uT
Hysteresis	HS			0.05		%FS

4 Ordering Information

Order Number	Package Type	Packaging	Temperature Range
IST8305	WLCSP – 5 pins	Tape and Reel: 5k pieces per reel	-20 to +85°C

For more information on iSentek's Magnetic Sensors, please contact us at +86-21-5169-3250 (China), +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.

iSentek reserves the right to make changes to improve reliability, function or design. iSentek does not assume any liability arising out of the application or use of any product or circuit described herein; neither does it convey any license under its patent rights nor the rights of others.

Taiwanese Patents I437249, I420128 and I463160 apply to our magnetic sensor technology described.