

YAS525B

MS-1C

Magnetic field Sensor

Overview

YAS525B is the biaxial geomagnetic sensor IC integrating a high sensitivity biaxial magnetic sensor, a buffer amplifier, an AD converter (ADC), a clock generator, and serial data interface (supports I^2C bus) on one chip.

YAS525B allows you to make up a high sensitive, compact and low-power electronic compass in a portable GPS system or a mobile phone.

Features

- A manufacturing process that makes magnetic sensor on a Si wafer with high precision realizes integration with peripheral circuits.
- High sensitive geomagnetic sensor IC is realized by integrating a magnetic sensor and a low noise buffer amplifier.
- High noise immunity is improved by digitizing output from geomagnetic sensor IC.
- External interface supports I²C bus (100kbps/400kbps, slave mode).
- Geomagnetic sensor with superior high board density and low-power consumption.
- Automatic power-down control mode is available after measurements.
- Others.

Manufacturing process	CMOS + Magnetic Sensor
Package	Lead-free 8-ball WLCSP Package (YAS525B-WZ)
Power supply voltage	$2.5 \sim 3.3 \mathrm{V}$
Operating temperature	-20 \sim +85°C
Power consumption during operation	10mW (VDD=3.0V, when magnetic field is measured.)
Magnetic sensor section	
Measuring magnetic field range	±300µT
Resolution	$\leq 0.6 \mu T/count$
Measuring time	within 10ms/magnetic sensor mono-axial measurement

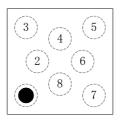
YAMAHA CORPORATION -

YAS525B CATALOG CATALOG No.: LSI-BAS525B21 2007.6

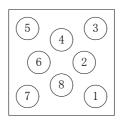
YAMAHA

Pin Description

Here is a figure for pin assignment and a table for pin descriptions.



8Pin WLCSP Top View



8Pin WLCSP Bottom View

Pin No.	Name	I/O		Function
1	T2	I+	Test input	(Use in non-connection)
2	VSS	-	Ground	
3	T1	I+	Test mode	(Use in non-connection)
4	SCL	Is	Serial Clock	
5	NC	-	Non-connection	
6	VDD	-	Power supply	(typ 3V)
7	NC	-	Non-connection	
8	SDA	Is/Od	Serial data	

Pin 1 and pin 3 are used in non-connection. Note: Pin 5 is connected to pin 7 in the chip.

- : Input with pull-up resistor $\mathbf{I}+$
- Is : Schmitt trigger input
- Od : Open drain output

Pin Functions

• Power Supply (VDD, VSS)

These pins are for power supply of YAS525B.

• Serial Data Interface (SCL, SDA)

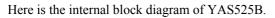
- SCL Serial clock input pin.
 - This pin is used with an external pull-up register.
- SDA Serial data input/output pin.

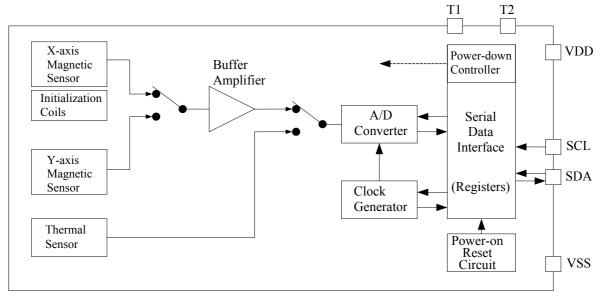
This pin is used with an external pull-up register.

- \bullet Others (T1, T2)
 - T1 - Test mode control pin.
 - Use this pin in non-connection.
 - T2 - Test input pin. Use this pin in non-connection.

YAS525B

Block Diagram





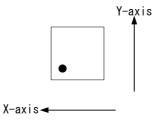
Block Diagram



Function Descriptions

- Analog Circuit Section
 - O Magnetic Sensor

A sensor for X-axis and Y-axis is embedded independently. (As for sensitivity direction of X-axis and Y-axis, see the following figure.)



Chip alignment and X,Y-axis

O Buffer Amplifier

The amplifier amplifies a signal from the magnetic sensor output.

O Thermal Sensor

The sensor is a thermal sensor for the compensation of temperature characteristics of the magnetic sensor.

O A/D Converter (ADC)

The ADC converts magnetic sensor output and temperature sensor output into digital data.

O Clock Generator

The clock generation section supplies clocks for ADC and digital circuits.

O Power-on Reset

The section detects a rising of the power-on and initializes circuits.

O Initialization Coil

The coil is used when the magnetic sensor cannot give original characteristics due to receiving strong magnetic field. Generating magnetic field by the initialization coil initializes the magnetic sensor characteristics.

The initialization coil is operated by setting Config register CONFR [3:0].

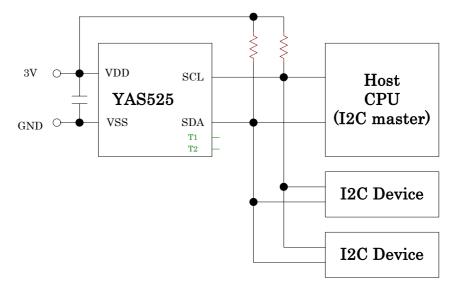
• Digital Circuit Section

O Serial Data Interface

YAS525B serial data interface supports I²C serial interface and operates in the slave mode.

Example of System Configuration

Here is an example of system configuration.



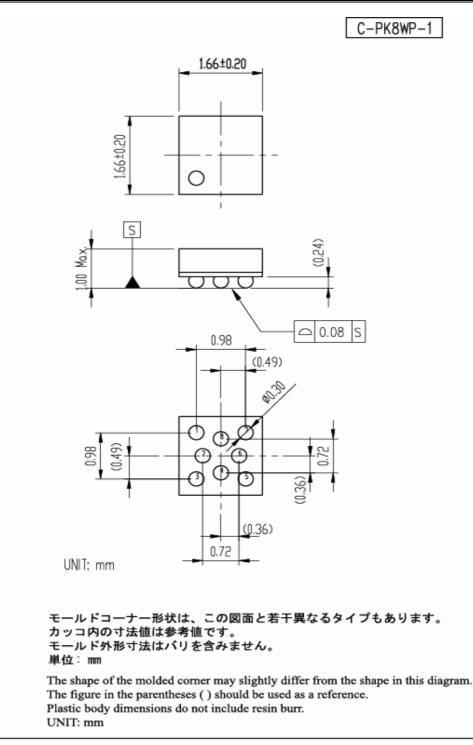
Example of system configuration



■ Package Outline Drawing

Caution

- * The product of the WLCSP package should be used under light-shielded conditions.
- Since the WLCSP package has a structure that a silicon wafer is exposed, if light (such as sunlight) hits the wafer, the device may malfunction (leak current increase etc.) due to electric charge internally generated by the photoelectric effect.
- * Please mount the package without underfill because temperature correction may not be normally performed when mounting YAS525B on a board.



注) 表面実装LSIは、保管条件、及び半田付けについての特別な配慮が必要です。 詳しくはヤマハ代理店までお問い合わせください。

Note: The storage and soldering of LSIs for surface mounting need special consideration. For detailed information, please contact your local Yamaha agent.





MEMO

IMPORTANT NOTICE

- 1. YAMAHA RESERVES THE RIGHT TO MAKE CHANGES TO ITS PRODUCTS AND TO THIS DOCUMENT WITHOUT NOTICE. THE INFORMATION CONTAINED IN THIS DOCUMENT HAS BEEN CAREFULLY CHECKED AND IS BELIEVED. HOWEVER, YAMAHA SHALL ASSUME NO RESPONSIBILITIES FOR INACCURACIES AND MAKE NO COMMITMENT TO UPDATE OR TO KEEP CURRENT THE INFORMATION CONTAINED IN THIS DOCUMENT.
- 2. THESE YAMAHA PRODUCTS ARE DESIGNED ONLY FOR COMMERCIAL AND NORMAL INDUSTRIAL APPLICATIONS, AND ARE NOT SUITABLE FOR OTHER USES, SUCH AS MEDICAL LIFE SUPPORT EQUIPMENT, NUCLEAR FACILITIES, CRITICAL CARE EQUIPMENT OR ANY OTHER APPLICATION THE FAILURE OF WHICH COULD LEAD TO DEATH, PERSONAL INJURY OR ENVIRONMENTAL OR PROPERTY DAMAGE. USE OF THE PRODUCTS IN ANY SUCH APPLICATION IS AT THE CUSTOMER'S OWN RISK AND EXPENSE.
- 3. YAMAHA SHALL ASSUME NO LIABILITY FOR INCIDENTAL, CONSEQUENTIAL OR SPECIAL DAMAGES OR INJURY THAT MAY RESULT FROM MISAPPLICATION OR IMPROPER USE OR OPERATION OF THE PRODUCT.
- 4. YAMAHA MAKES NO WARRANTY OR REPRESENTATION THAT THE PRODUCTS ARE SUBJECT TO INTELLECTUAL PROPERTY LICENSE FROM YAMAHA OR ANY THIRD PARTY, AND YAMAHA MAKES NO WARRANTY OR REPRESENTATION OF NON-INFRINGEMENT WITH RESPECT TO THE PRODUCTS. YAMAHA SPECIFICALLY EXCLUDES ANY LIABILITY TO THE CUSTOMER OR ANY THIRD PARTY ARISING FROM OR RELATED TO THE PRODUCTS INFRINGEMENT OF ANY THIRD PARTY'S INTELLECTUAL PROPERTY RIGHTS, INCLUDING THE PATENT, COPYRIGHT, TRADEMARK OR TRADE SECRET RIGHTS OF ANY THIRD PARTY.
- 5. EXAMPLES OF USE DESCRIBED HEREIN ARE MERELY TO INDICATE THE CHARACTERISTICS AND PERFORMANCE OF PRODUCTS. YAMAHA SHALL ASSUME NO RESPONSIBILITY FOR ANY INTELLECTUAL PROPERTY CLAIMES OR OTHER PROBLEMS THAT MAY RESULT FROM APPLICATIONS BASED ON THE EXAMPLES DESCRIBED HEREIN. YAMAHA MAKES NO WARRANTY WITH RESPECT TO THE PRODUCTS, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR USE AND TITLE.
- 6. YAMAHA MAKES EVERY EFFORT TO IMPROVE THE QUALITY AND RELIABILITY OF ITS PRODUCTS. HOWEVER, ALL SEMICONDUCTOR PRODUCTS FAIL WITH SOME PROBABILITY. THEREFORE, YAMAHA REQUIRES THAT SUFFICIENT CARE BE GIVEN TO ENSURING SAFE DESIGN IN CUSTOMER PRODUCTS SUCH AS REDUNDANT DESIGN, ANTI-CONFLAGRATION DESIGN, AND DESIGN FOR PREVENTING MALFUNCTION IN ORDER TO PREVENT ACCIDENTS RESULTING IN INJURY OR DEATH, FIRE OR OTHER SOCIAL DAMAGE FROM OCCURRING AS A RESULT OF PRODUCT FAILURE.
- 7. INFORMATION DESCRIBED IN THIS DOCUMENT: APPLICATION CIRCUITS AND ITS CONSTANTS AND CALCULATION FORMULAS, PROGRAMS AND CONTROL PROCEDURES ARE PROVIDED FOR THE PURPOSE OF EXPLAINING TYPICAL OPERATION AND USAGE. THEREFORE, PLEASE EVALUATE THE DESIGN SUFFICIENTLY AS WHOLE SYSTEM UNDER THE CONSIDERATION OF VARIOUS EXTERNAL OR ENVIRONMENTAL CONDITIONS AND DETERMINE THEIR APPLICATION AT THE CUSTOMER'S OWN RISK. YAMAHA SHALL ASSUME NO RESPONSIBILITY FOR CLAIMS, DAMAGES, COSTS AND EXPENSES CAUSED BY THE CUSTOMER OR ANY THIRD PARTY, OWING TO THE USE OF THE ABOVE INFORMATION.

Notice The specifications of this product are subject to improvement changes without prior notice.

	Address inquiries to: Semiconductor Sales & Marketing Department	
AGENT		
	■ Head Office 203, Matsunokijima, Iwata, Shizuoka, 438-0192, Japan Tel. +81-539-62-4918 Fax. +81-539-62-5054	
	■ Tokyo Office 2-17-11. Takanawa, Minato-ku, Tokyo, 108-8568, Japan Tel. +81-3-5488-5431 Fax. +81-3-5488-5088	
	■ Osaka Office 3-12-12, Minami Senba, Chuo-ku, Osaka City, Osaka, 542-0081, Japan Tel. +81-6-6252-6221 Fax. +81-6-6252-6229	