YAMAHA

YAS529

MS-3C

Magnetic field Sensor

■ Overview

YAS529 is the Triaxial Geomagnetic Sensor IC integrating buffer amplifier, A/D converter, clock generator, and serial data interface circuit (supports I2C bus) on one chip package.
YAS529 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 Si wafer with high precision realizes integration with peripheral circuits on one chip.
- High sensitive geomagnetic sensor IC is realized by integrating magnetic sensors and low noise amplifiers.
- High noise immunity is improved by digitizing output from geomagnetic sensor IC.
- External interface supports I^2C bus (100kbps/400kbps, slave mode).
- Geomagnetic sensor with superior high board density and low-power consumption.
- Automatic power-down control mode is available after geomagnetic measurements.
- Three A/D input pins for an inclination sensor
- Power-down control of an inclination sensor with a standby pin by the use of the General-Purpose Output (GPO) Pin
- Others.

Manufacturing process	CMOS + Magnetic Sensor
Package	Lead-free 10-pin WLCSP package (YAS529-PZ)
Supply voltage for core	2.5 V to 3.6 V
Supply voltage for Interface	1.65 V to VDD (Operating temperature : -20 to +95 °C)
	2.30 V to VDD (Operating temperature : -40 to +95 °C)
Operating temperature	-40 to +95 °C (Supply for the interface : 2.30V to VDD)
Consumption current during operation.	
Magnetic field measurement	4 mA (VDD = 3.0 V)
Magnetic sensor section	
Measuring magnetic field range ..	±300 μT
Resolution	≦0.6 μT/count (X,Y), ≦1.2 μT/count (Z)
Measuring time	
Magnetic sensor measurement	within 10 ms (Three axes collective measurement)
Inclination sensor A/D	within 10 ms (Three axes collective measurement)

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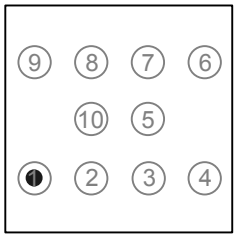
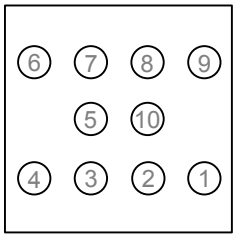
YAS529 CATALOG
CATALOG No.: LSI-BAS529A20
2007.6

■ Pin Description

Here are figures for pin assignment and a table for pin descriptions.



10-pin WLCSP Top View



10-pin WLCSP Bottom View

Pin Descriptions

Pin No.	Pin Name	I/O	Function
1	GPO	O	General-purpose output pin
2	VSS	-	Ground
3	AIZ	A	A/D input 3
4	AIX	A	A/D input 1
5	AIY	A	A/D input 2
6	VDD	-	Power supply for core (Typ. 3 V)
7	SDA	I/Od	Serial data
8	SCL	I	Serial clock
9	IOVDD	-	Power supply for interface (Typ. 1.8V)
10	RSTN	Is	Device initialization

Note)
Connecting AIZ to VDD is recommended when used by connecting a biaxial inclination sensor.
When the inclination sensor is not used, connecting AIX, AIY, and AIZ to VSS is recommended.
No Schmitt circuit is used for SCL and SDA input pins.

A : Analog input
I : Digital input
Is : Schmitt input
Od : Open drain output
O : Output

■ Pin Functions

● Power Supply (VDD, IOVDD, VSS)

These pins are for power supply of YAS529.

VDD	: Power Supply for core
IOVDD	: Power Supply for the Interface
VSS	: Ground

● Serial Data Interface (SCL, SDA, RSTN, GPO)

SCL	: Serial clock input pin These pins are used with an external pull-up resistor.
SDA	: Serial data input/output pin These pins are used with an external pull-up resistor.
RSTN	: Serial data interface reset pin "L" releases I^2C bus. When not used, connect to IOVDD pin.
GPO	: General-purpose output pin

● Analog Input

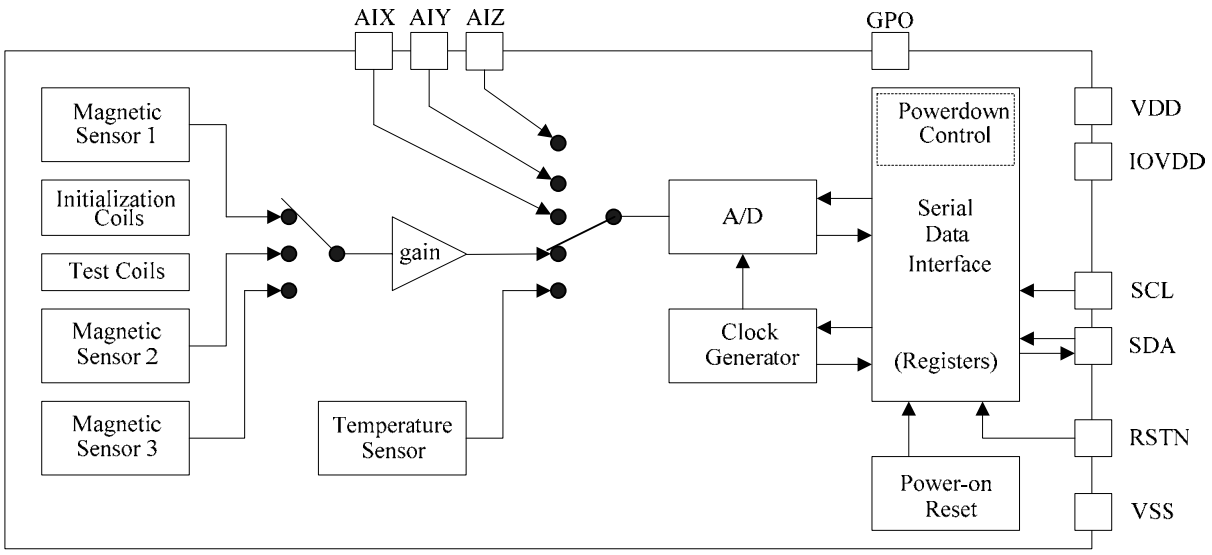
AIX, AIY, AIZ : A/D input pin

Connecting AIZ to VDD is recommended when used by connecting a biaxial inclination sensor.

When the inclination sensor is not used, connecting AIX, AIY, and AIZ to VSS is recommended.

■ Block Diagram

Here is the internal block diagram of YAS529.



Block Diagram

■ Function Descriptions

● Analog Circuit Section

○ Magnetic Sensor

YAS529 includes three Magnetic Sensors.
Only the sensor of an axis to measure at the time of magnetic field measurement is operated.

○ Buffer Amplifier

The buffer amplifier amplifies a signal output from the bridge of magnetic sensor.
The amplifier operates only when magnetic field measurement is made.

○ Temperature Sensor

This is the sensor to correct the temperature characteristics of the magnetic sensor.
The sensor operates only when temperature is measured.

○ A/D Converter (ADC)

The A/D converter converts input signals from magnetic sensor output amplified by the buffer amplifier, temperature sensor output, and external input pin.
The converter operates only when a measurement is performed.

○ Clock Generator

The clock generator supplies clocks to ADC and digital circuits.
The generator operates only when a measurement is performed.

○ Power-on Reset

The Power-on Reset circuit detects a rising edge of the supply voltage for the core and initializes the circuits.

○ Initialization Coil

The coils are used when the magnetic sensor cannot exert the original characteristics due to receiving high magnetic field.
Generating magnetic field with the initialization coils initializes the magnetic sensor characteristics.

○ Analog External Input A/D

The A/D measures values from analog external input.
Input range is from 0.5 to 2.5V. One count of A/D converter is about 3.0mV.

● Digital Circuit Section

○ Serial Data Interface

YAS529 serial data interface supports I^2C bus serial interface and operates in the slave mode.

SCL (SCL) : Serial clock input pin
SDA (SDA) : Serial data input/output pin

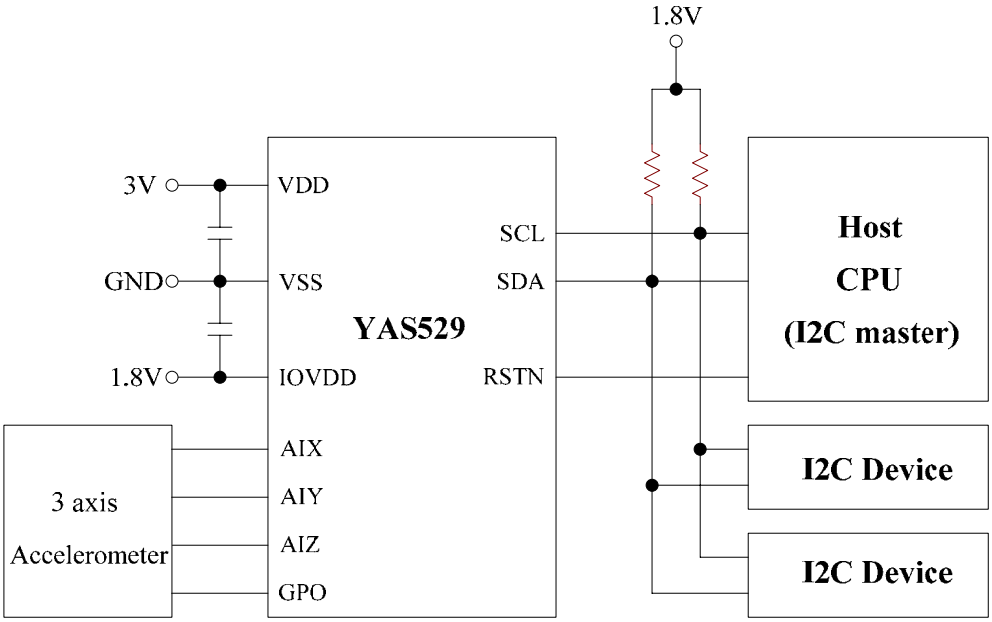
Communication is performed through the above pins.

○ General-Purpose Output (GPO) Pin

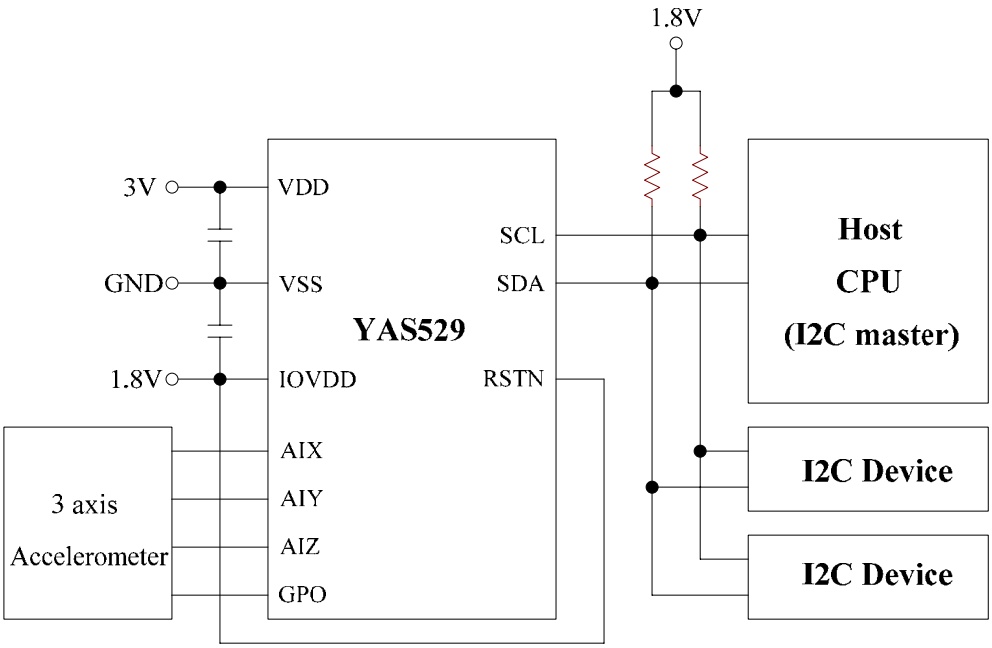
YAS529 has GPO as general-purpose output pin. This output pin can be used for purposes such as power-down control of an inclination sensor with standby pin.

■ Example of System Configuration

Here is an example of system configuration.
When RSTN pin is not used, connect it to IOVDD pin.



Example of system configuration



Example of system configuration (RSTN pin is not used)

■ 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 YAS529 on a board.**

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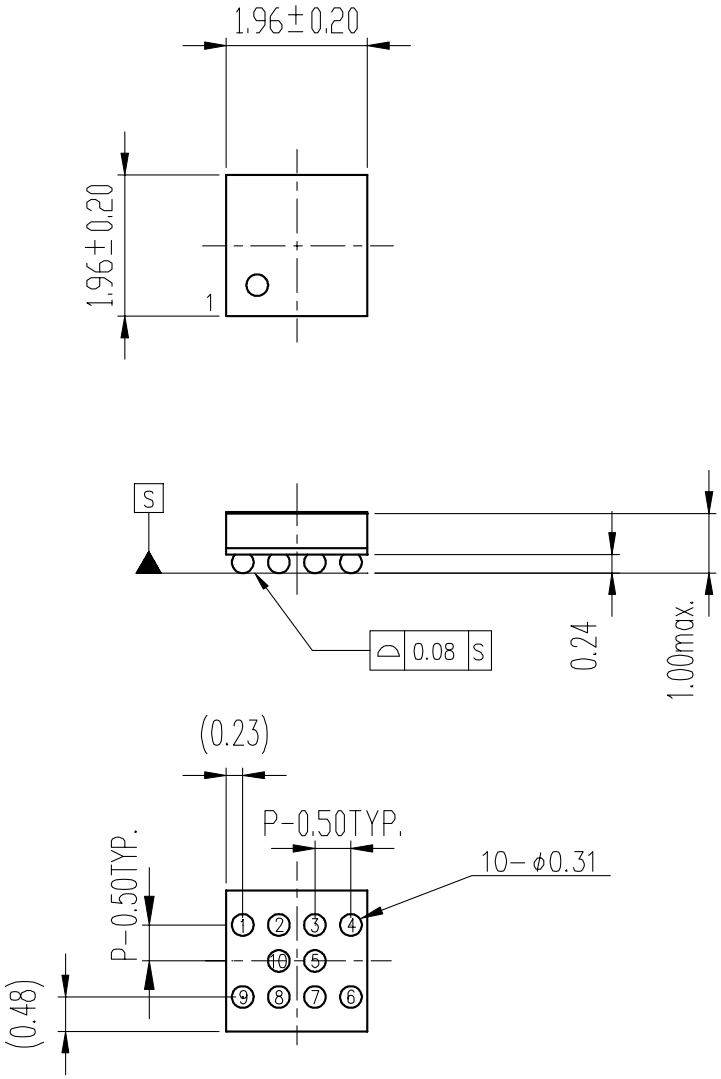

カッコ内の寸法値は参考値です。
外形寸法はバリを含みます。
単位： mm

The figure in the parentheses ( ) should be used as a reference.
The dimensions include burr.
UNIT: mm

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.

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