User Manual – AS5304/AS5306 – AB – 2.1

AS5304/AS5306

160-step Linear Incremental Position Sensor with Linear analog and ABI output

Table of Contents

Revision History

Revision	Date	Owner	Description
1.0	01.10.2009		Initial revision
1.1	09.07.2013	azen	Updated to new template

1 General Description

The AS5304 and AS5306 are single-chip IC's with integrated Hall elements for measuring linear motion using multi-pole magnetic strips.

The AS5304/AS5306 are mounted off-axis underneath a multi-pole magnetized strip and provides a quadrature incremental output with 40 pulses per pole period (resolution of 25µm per step) at speeds of up to 20 meters/sec.

A single index pulse is generated once for every pole pair at the Index output. The pole pair length is 4mm (2mm north/ 2mm south). The chip accepts a magnetic field strength down to 5mT (peak).

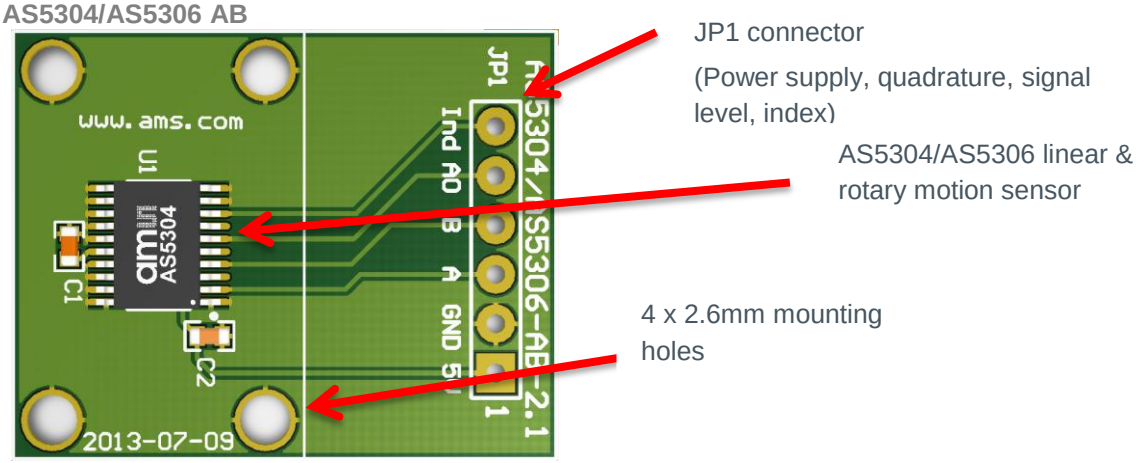
Figure 1:
Linear Position Sensor AS5304 + Multipole Magnetstrip

2 The AS5304/5306 adapter board

2.1 Board description

The AS5304/AS5306 adapter board is a simple circuit allowing, testing and evaluating the AS5304/AS5306 linear encoders quickly without having to build a test fixture or PCB.
The normal operation requires only a 5V power supply, the quadrature AB outputs are attached to a microcontroller of quadrature counter.

Figure 2:
AS5304/AS5306 AB



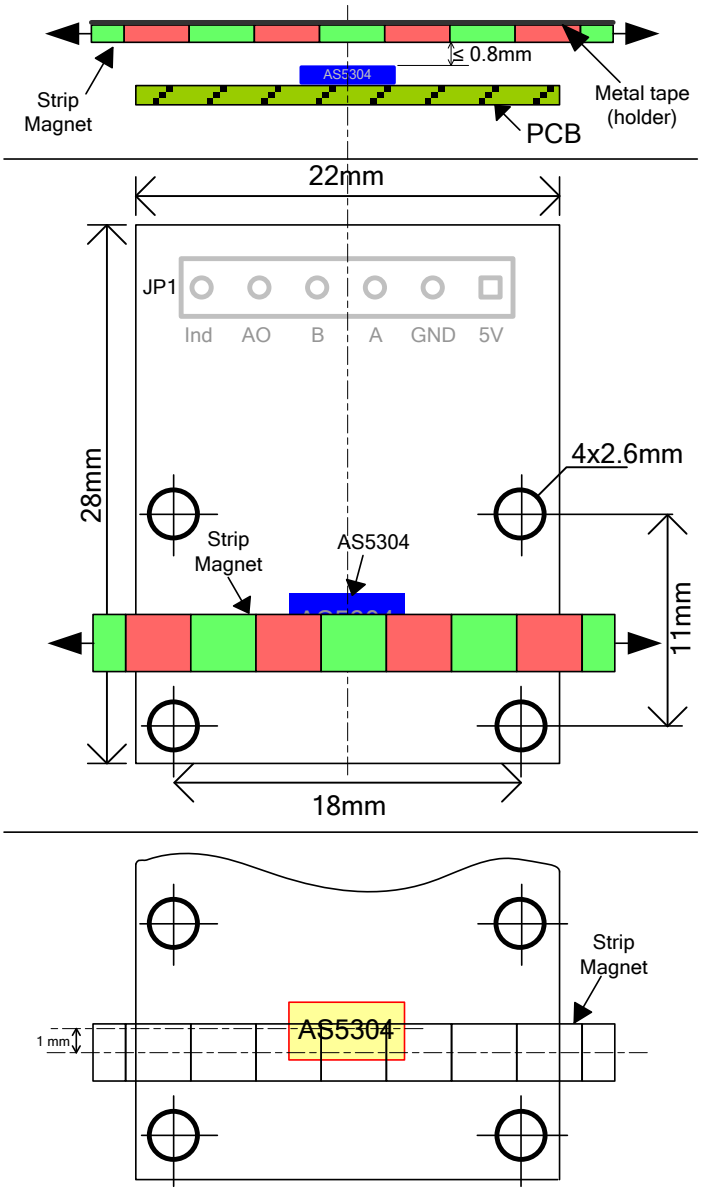
2.2 Mounting the AS5304/AS5306 adapter board

A multipole magnetic strip, pole pair length = 4mm must be placed over the AS5304/AS5306 as shown on Figure 3. The middle axis of the strip and of the AS5304/AS5306 ICs is shifted by 1mm.

The airgap between the magnet and the AS5304/AS5306 casing should be maintained below 0.8mm. Note that the strip side facing the AS5304/AS5306 ICs the opposite side of the metallic tape.

The magnet holder must not be ferromagnetic. Materials as brass, copper, aluminum, stainless steel are the best choices to make this part.

Figure 3:
AS5304/AS5306 adapter board mounting and dimension



3 AS5304/AS5306 adapter board and pinout

Figure 4:
AS5304/AS5306 adapter board connectors and encoder pinout

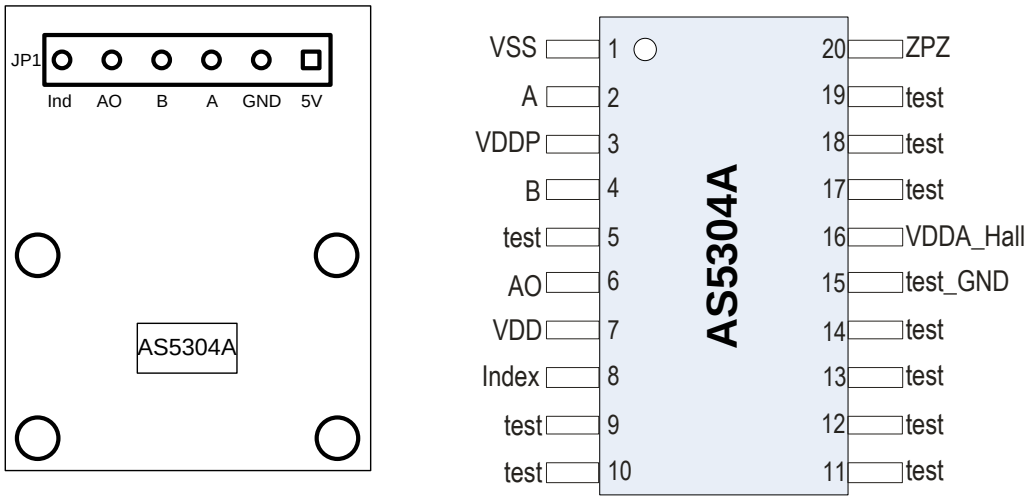


Table 1:
Pin description

JP1 Pin# Board	Pin# AS530X	Symbol	Type	Description
1	3, 7, 16	5V	S	Positive supply voltage, 4.5V to 5.5V
2	1	GND	S	Supply ground
3	2	A	DO	Clock Input of Synchronous Serial Interface; Schmitt-Trigger input
4	4	B	DO	Chip Select for serial data transmission, active high; Schmitt-Trigger input, external pull-down resistor (~50kΩ) required in read-only mode
5	6	AO	AO	Data output / command input for digital serial interface
6	8	INDEX	DO	Command input for digital serial interface. Connect to GND if not used.

Pin types:

S: supply pin

DO: digital output

AO: analog output

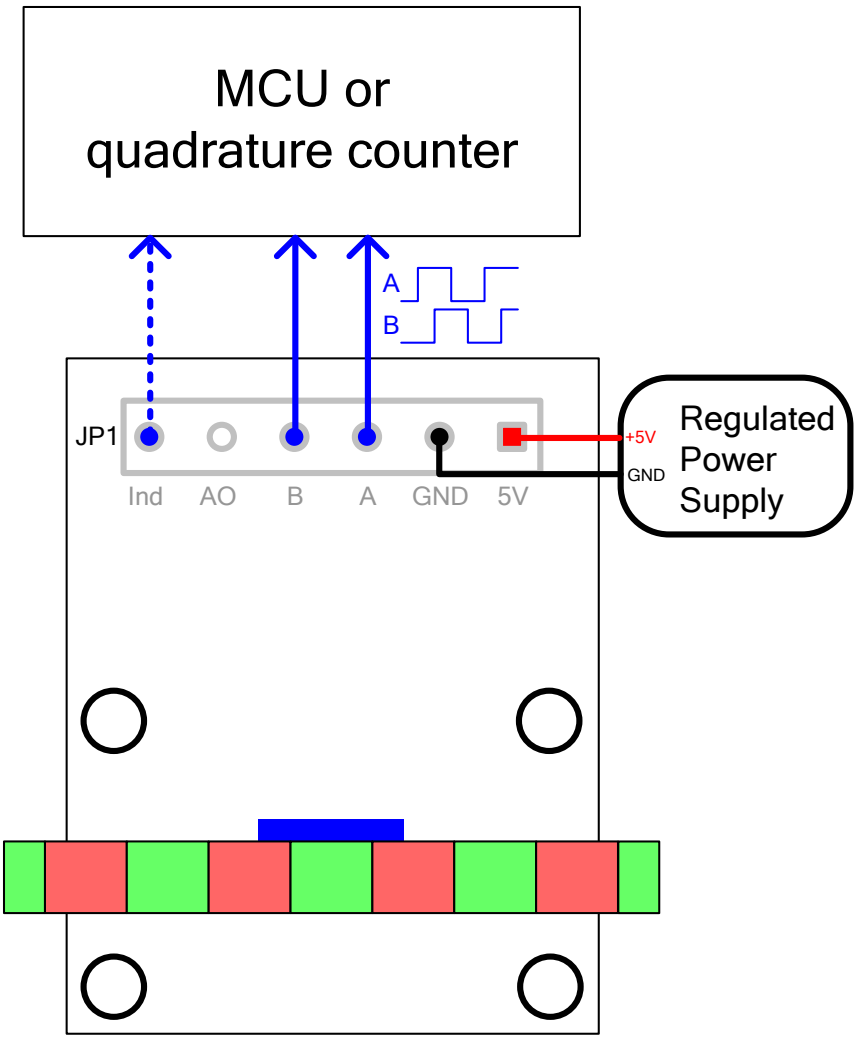
4 Operation cases

Connect a regulated power supply on 5V (pin #1) and GND (pin #2).

Connect the A and B outputs to a quadrature counter or microcontroller inputs. The index output is optional, if a pulse is needed at each magnet pole pair transition.

For more information, please refer to the AS5304/AS5306 datasheet.

Figure 5:
Using the analog output with the adapter board



5 AS5304 Differences to AS5306

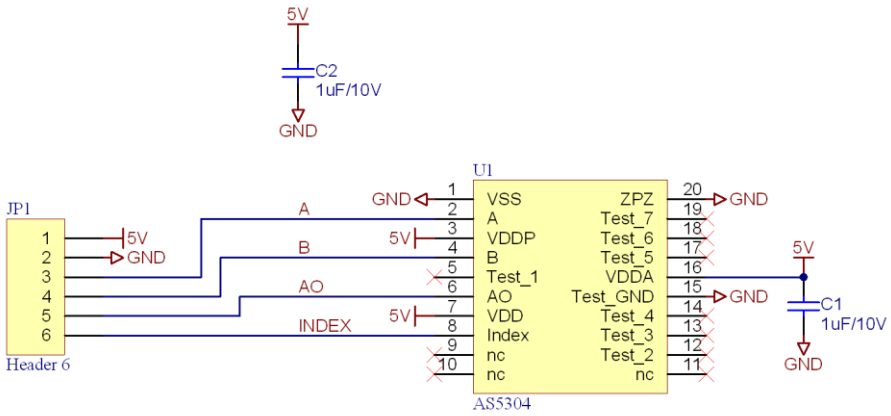
Table 2:
Differences AS5304 & AS5306

Building Block	AS5304	AS5306
Ring magnet radius	2mm	1.2mm
Vertical Distance between Magnet and IC	≤0.8mm	≤0.4mm
Resolution	1 LSB = 25µm	1 LSB = 15µm
Magnetic pole pair lenght	4mm	2.4mm
Magnetic ring diameter = *[pole length] * [number of pole pairs] / π*	4 * 22 / 3.14 = 28.01mm	2.4 * 22 / 3.14 = 16.8mm
Maximum linear travelling speed = *5000 * [pole pair length]*	Max. linear travelling speed = 4mm * 5000 1/sec = 20,000mm/sec = 20m/sec	Max. linear travelling speed = 2.4mm * 5000 1/sec = 12,000mm/sec = 12m/sec
Power supply current	min. 25mA ; max. 35mA	min. 20mA ; max. 30mA

6 AS5304/AS5306 adapter board hardware

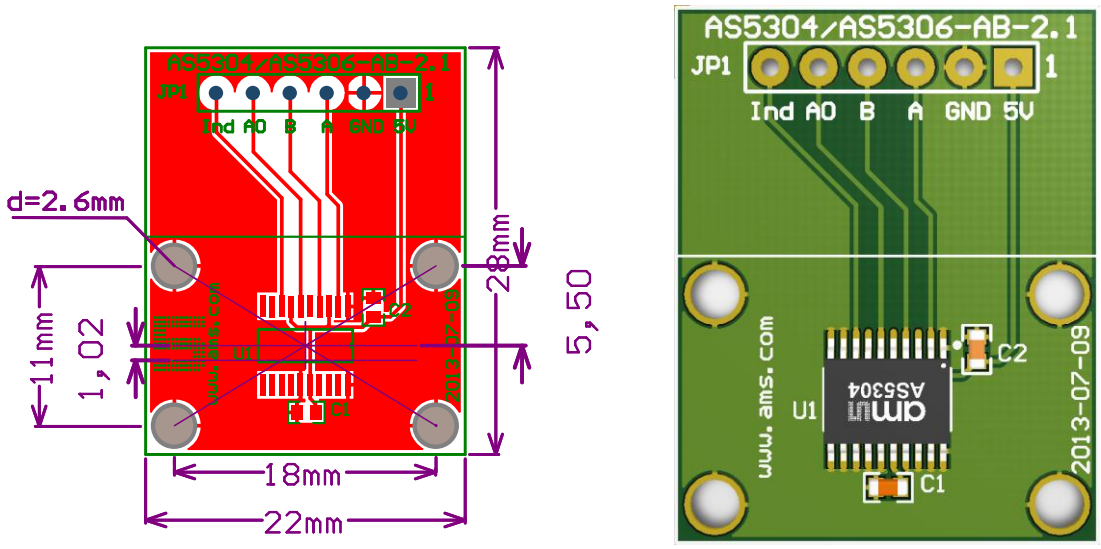
6.1 AS5304/AB5306 – AB – 2.1 Adapterboard schematics

Figure 6:
AS5304/AS5306-AB-2.1 schematics



6.2 AS5304/AS5306 – AB – 2.1 PCB layout

Figure 7:
AS5304/AS5306-AB-2.1 layout



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