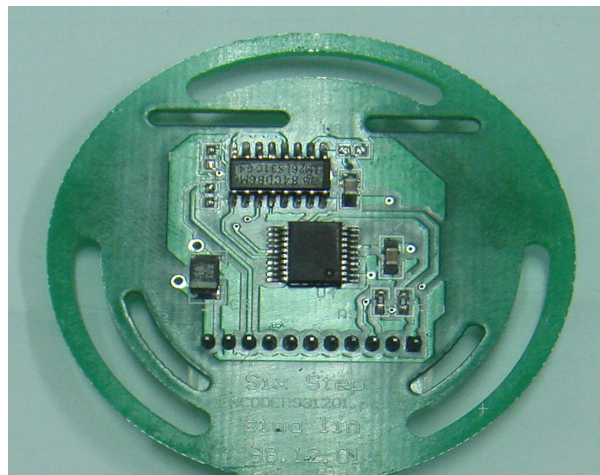PL-0360R Datasheet
Issue 3, Oct 23, 2010

## Magnetic encoder module and Magnetic actuator

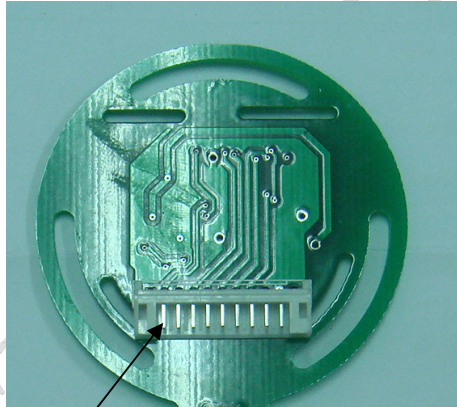## PL-0360R Magnetic encoder module



## Magnetic Actuator

# 1 General Description

The PL-0360R encoder module is designed for easy installation with a self aligning metal mounting flange. The low cost module can be provided with an integrated connector. The encoder module consists of a magnetic actuator and a separate sensor board. An internal voltage regulator allows the PL-0360R to operate at either 5 V supplies.

The PL-0360R module can be used in a wide range of applications rotary switches (human machine interface), AC/DC motor position control and Brushless DC motor position control.

## 2.1 Pin Configuration



| PIN1 H_V | PIN2 H_W | PIN3 H_U | PIN4 A+ | PIN5 A- | PIN6 B+ | PIN7 B- | PIN8 Z- | PIN9 Z+ | PIN10 0V | PIN11 5V |
|---|---|---|---|---|---|---|---|---|---|---|

## 3. Serial Synchronous Interface (SSI)

Normal mode is used for normal operations, whereas extended mode is for accessing the OTP.

| # | cmd | bin | mode | Digital interface @ normal mode |||||||||||||||
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| 23 | WRITE CONFIG 1 | 10111 | write | LP | SM_RES | tst | tst | Hyst <1:0> | | tst | tst | tst | | | | | | | |
| 20 | SET MT COUNTER | 10100 | write | multi-turn-counter <8:0> | | | | | | | | | | | | | | | |

| # | cmd | bin | mode | Digital interface @ normal mode |||||||||||||||
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| 16 | EN PROG | 10000 | write | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 |
| 4 | RD MT COUNTER | 00100 | read | multi-turn-counter <8:0> | | | | | | | | | otp_ok | | | | | | |
| 0 | RD_ANGLE | 00000 | read | lock_adc | agc <5:0> | | | | | | angle <8:0> | | | | | | | | |

## 4 Analog Output

This configuration is similar to the PWM connection (only three lines including supply are required). With the addition of a lowpass filter at the PWM output, this configuration produces an analog voltage that is proportional to the angle. This filter can be either passive (as shown in Figure 1) or active. The lower the bandwidth of the filter, the less ripple of the analog output can be achieved. If the AS5134 angular data is invalid, the PWM output will remain at low state and thus the analog output will be 0V. Pins that are not shown may be left open.

## Figure 1. Data Transmission with Pulse Width Modulated (PWM) Output



3
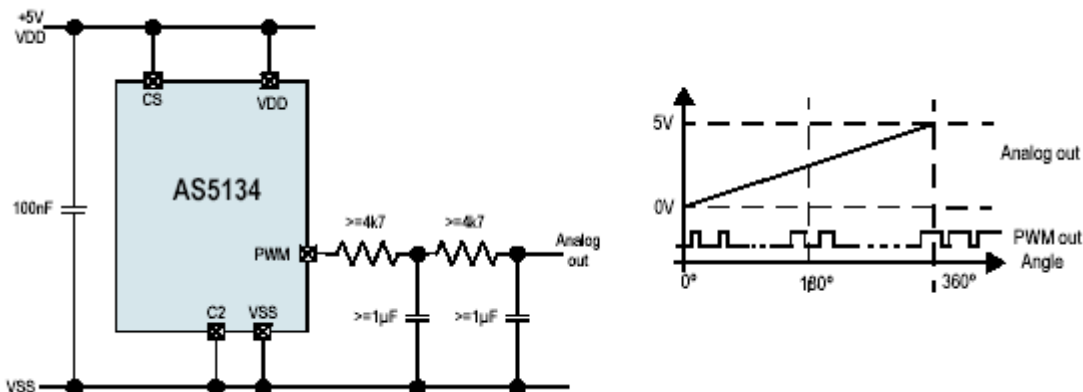
# 5 Quadrature A/B/Index Output

The phase shift between channel A and B indicates the direction of the magnet movement. Channel A leads channel B at a clockwise rotation of the magnet (top view) by 90 electrical degrees. Channel B leads channel A at a counter-clockwise rotation.
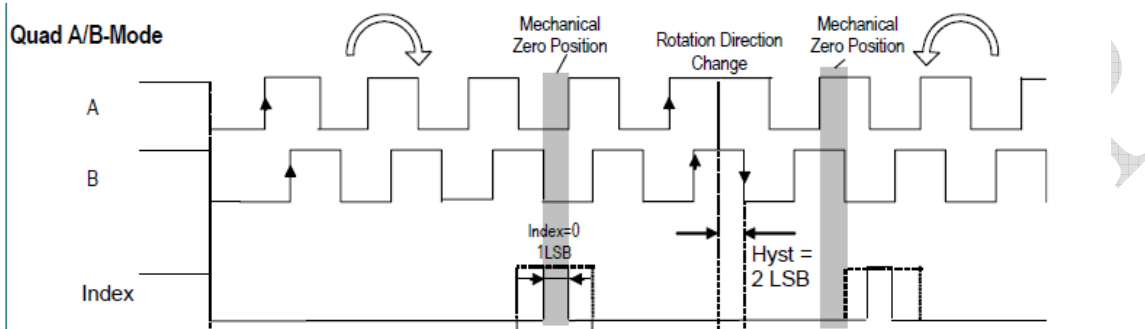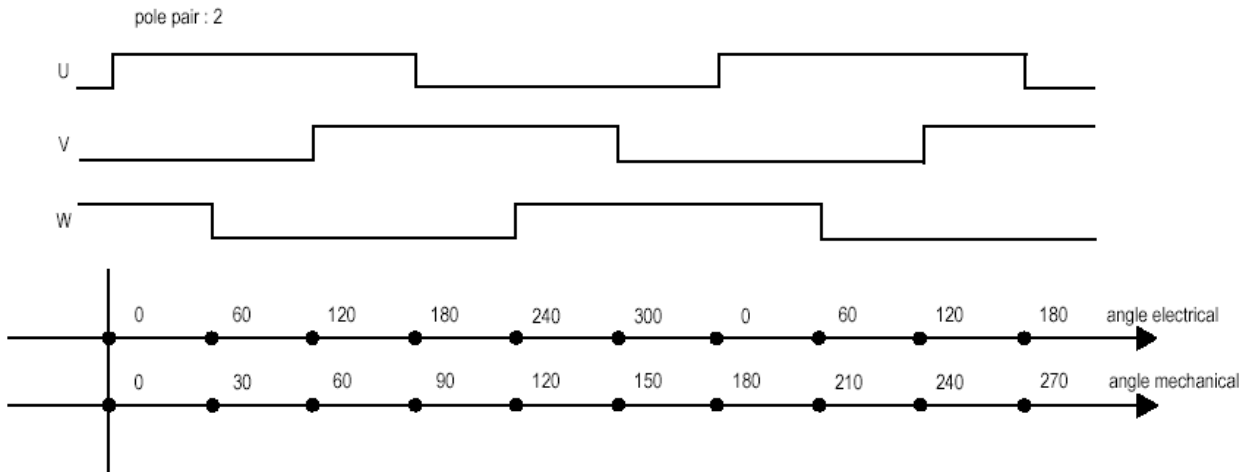


## 5.1 Programming Options for the Quadrature Signals A/B/Index

| Abi (13:12) | | Function: output multiplexer for pin A,B,I |
|---|---|---|
| 0 | 0 | A → pin A, B → pin B, I(index) → pin I default value) |
| 0 | 1 | step → pin A, direction → pin B, I(index) → pin I |
| 1 | 0 | pulse → pin A, direction → pin B, I(index) → pin I |
| 1 | 1 | off: LO → pin A, LO → pin B, LO → pin I |

## 6. Brushless DC Motor Commutation Mode

The BLDC signals will be used to control the electrical angle information – according to the amount of pole pairs and the actual mechanical angle position.

$$\alpha_{electrical} := \alpha_{mechanical} * n_{pole\_pairs}$$



### 6.1 Programming Options for the Commutation Signals U/V/W

| uvw (11:9) | | | Function |
|---|---|---|---|
| 0 | 0 | 0 | BLDC Pole Pairs : 1 → electrical angle of 60º := mechanical angle: 60º |
| 0 | 0 | 1 | BLDC Pole Pairs : 2 → electrical angle of 60º := mechanical angle: 30º |
| 0 | 1 | 0 | BLDC Pole Pairs : 3 → electrical angle of 60º := mechanical angle: 20º |
| 0 | 1 | 1 | BLDC Pole Pairs : 4 → electrical angle of 60º := mechanical angle: 15º |
| 1 | 0 | 0 | BLDC Pole Pairs : 5 → electrical angle of 60º := mechanical angle: 12º |
| 1 | 0 | 1 | BLDC Pole Pairs : 6 → electrical angle of 60º := mechanical angle: 10º |
| 1 | 1 | 1 | off → LO pad U,V,W, PWM |

# 7  Package Drawings & Magnetic Actuator