

# PT3921A Single coil Hall Driver IC

## Applications

- Single coil DC brushless motor
- Support pre-driver application

## Features

- Built-in hall sensor
- Single phase full wave driver
- Soft switching output driver
- Motor locked protection and automatic restart
- Built-in hysteresis comparator
- Built-in zener diode
- High balance and low thermal drift magnetic sensing
- Low power consumption and high driving efficiency

## Specifications

### Absolute Maximum Ratings (Ta=25°C)

| Parameter                   | Symbol | Conditions | Rating            | Units |
|-----------------------------|--------|------------|-------------------|-------|
| Maximum supply voltage      | VDDmax |            | 18                | V     |
| Allowable power dissipation | Pd     |            | 568 <sup>*1</sup> | mW    |
| Operating temperature       | Ta     |            | -40~+100          | °C    |
| Storage temperature         | Ts     |            | -50~+150          | °C    |
| Max. output current         | Iomax  | 0.5sec     | 800 <sup>*2</sup> | mA    |
| Junction Temperature        | Tj     |            | 150               | °C    |
| Thermal resistance          | Raj    |            | 220               | °C/W  |

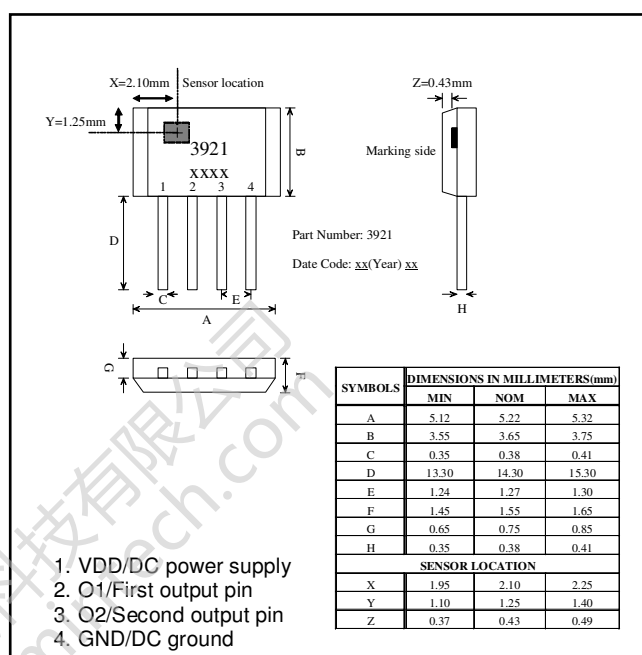
\*1: Reduced by 4.5mW for each increase in Ta of 1°C over 25°C When mounted on 50mm x 50mm x 1.6mm glass epoxy board

\*2: Should not exceed Pd

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## Package: TO-92-4pin



1. VDD/DC power supply
2. O1/First output pin
3. O2/Second output pin
4. GND/DC ground

**Electrical Characteristics (T<sub>A</sub>=+25°C, V<sub>DD</sub>=12V)**

| Characteristic       | Symbol              | Test Condition            | Min.                 | Typ.                 | Max. | Units |
|----------------------|---------------------|---------------------------|----------------------|----------------------|------|-------|
| Supply Voltage       | V <sub>DD</sub>     |                           | 2.4                  |                      | 17   | V     |
| Output High Voltage  | V <sub>OH(ON)</sub> | @ I <sub>OUT</sub> =300mA | V <sub>DD</sub> -0.6 | V <sub>DD</sub> -0.4 |      | V     |
| Output Low Voltage   | V <sub>OL(ON)</sub> | @ I <sub>OUT</sub> =300mA |                      | 0.3                  | 0.4  | V     |
| Output Voltage Clamp | V <sub>BV</sub>     |                           | 18                   |                      |      | V     |
| Supply Current       | I <sub>DD</sub>     | Output open               |                      | 6                    | 10   | mA    |
| Shutdown Time        | T <sub>SD</sub>     |                           | 2.1                  | 2.8                  | 3.5  | S     |
| Restart Time         | T <sub>RS</sub>     |                           | 0.3                  | 0.4                  | 0.5  | S     |

**Magnetic Characteristics (T<sub>A</sub>=+25°C, V<sub>DD</sub>=12V)**

|               |                  |  |     |     |    |   |
|---------------|------------------|--|-----|-----|----|---|
| Operate Point | B <sub>OP</sub>  |  | 5   | 15  | 35 | G |
| Release Point | B <sub>RP</sub>  |  | -35 | -15 | -5 | G |
| Hysteresis    | B <sub>HYS</sub> |  | 20  | 30  | 60 | G |

**General Specifications**

The PT3921A is designed for magnetic actuating using a bipolar magnetic field. The built-in dynamic offset cancellation of pre-amplifier stage achieves optimal symmetrical magnetic sensing. The output driver provides a linear drive to eliminate switching noise. This Hall-effect IC is optimal for DC brushless fan application. The supply voltage range is from 2.4V to 17V and the output current is 400mA.

**Lock Protection**

In order to protect the motor, the driver IC will be shutdown to drive the coil when the motor is locked over 0.4 seconds. Then, it restarts to drive the motor after 2.8 seconds. Figure 1 shows the timing diagram between the hall input signal and driver's output state.

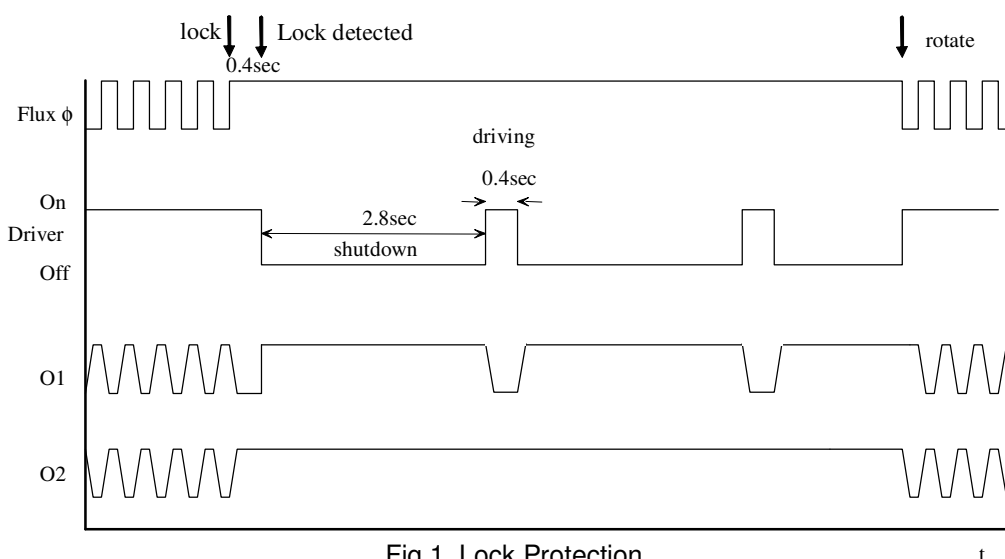


Fig 1. Lock Protection

### Hall Sensor

This Hall effect sensor IC integrates the sensor, pre-amplifier with dynamic offset cancellation and the hysteresis comparator in single chip. The hysteresis characteristic is illustrated in Fig. 2 and the threshold of the magnetic flux density is  $\pm 15$  Gauss.

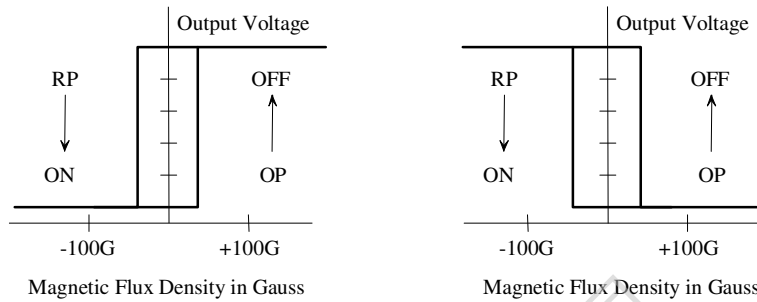


Fig 2. Magnetic Hysteresis Characteristics

The Hall IC architecture block diagram is shown in Fig. 3.

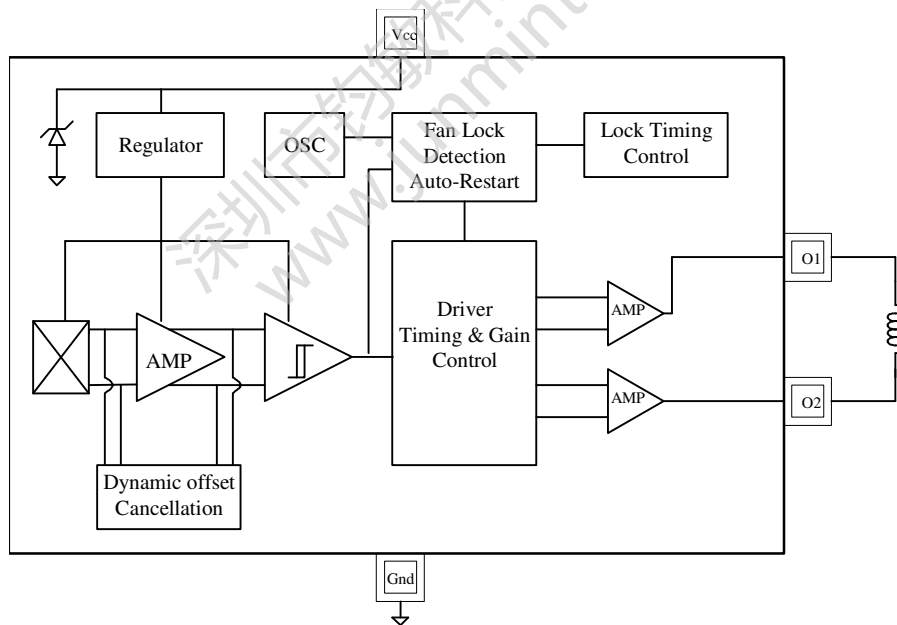
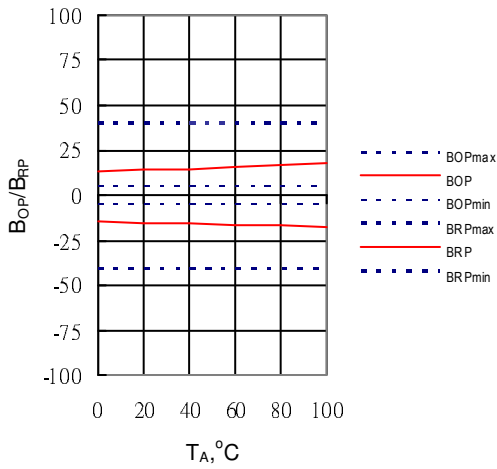
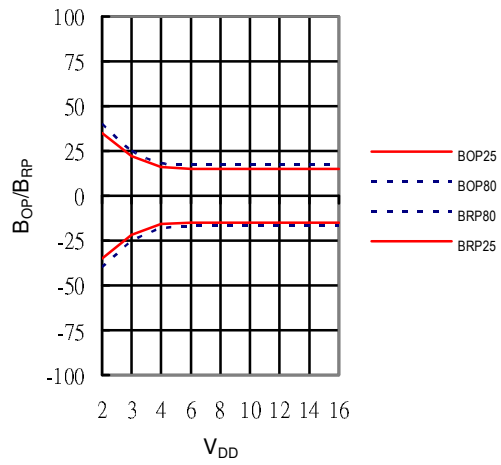
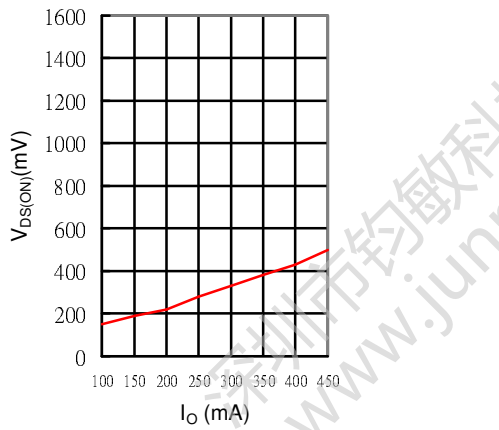
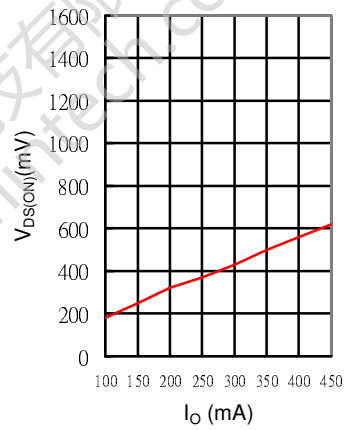
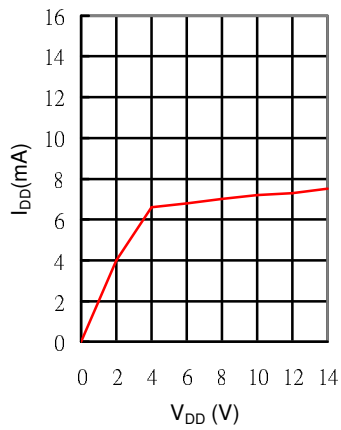
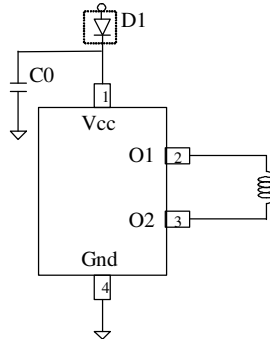


Fig. 3 Hall IC Architecture

**B<sub>OP</sub>, B<sub>RP</sub> versus temperature**

**B<sub>OP</sub>, B<sub>RP</sub> versus supply voltage**

**VOL(ON) versus I<sub>O</sub> current**

**VOH(ON) versus I<sub>O</sub> current**

**IDD versus power supply**


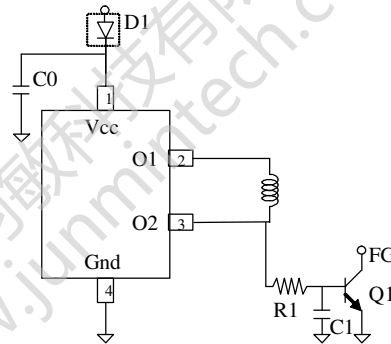
**Application circuits**

**5V/12V application**



C0: decoupling capacitor 1nF or 0.01uF

**FG output circuit**



R1: Bias resistor 10K for Q1

C1: Filter capacitor 0.01uF

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