PROLIFIC TECHNOLOGY INC.

PT3921A
Single coil Hall Driver IC

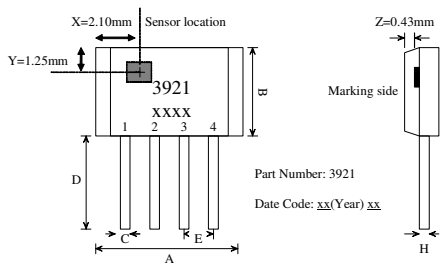
Applications

- 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

Package: TO-92-4pin



SYMBOLS	DIMENSIONS IN MILLIMETERS(mm)		
	MIN	NOM	MAX
A	5.12	5.22	5.32
B	3.55	3.65	3.75
C	0.35	0.38	0.41
D	13.30	14.30	15.30
E	1.24	1.27	1.30
F	1.45	1.55	1.65
G	0.65	0.75	0.85
H	0.35	0.38	0.41
SENSOR LOCATION			
X	1.95	2.10	2.25
Y	1.10	1.25	1.40
Z	0.37	0.43	0.49

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

Specifications

Absolute Maximum Ratings (Ta=25℃)

Parameter	Symbol	Conditions	Rating	Units
Maximum supply volatge	VDDmax		18	V
Allowable power dissipation	Pd		568*1	mW
Operating temperature	Ta		-40~+100	℃
Storage temperature	Ts		-50~+150	℃
Max. output current	Iomax	0.5sec	800*2	mA
Junction Temperature	Tj		150	℃
Thermal resistance	Raj		220	℃/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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Electrical Characteristics (T_A=+25°C, V_{DD}=12V)

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Units
Supply Voltage	V_{DD}		2.4		17	V
Output High Voltage	$V_{OH(ON)}$	@ I_{OUT} =300mA	V_{DD}-0.6	V_{DD}-0.4		V
Output Low Voltage	$V_{OL(ON)}$	@ I_{OUT} =300mA		0.3	0.4	V
Output Voltage Clamp	V_{BV}		18			V
Supply Current	I_{DD}	Output open		6	10	mA
Shutdown Time	T_{SD}		2.1	2.8	3.5	S
Restart Time	T_{RS}		0.3	0.4	0.5	S
Magnetic Characteristics (T_A=+25°C, V_{DD}=12V)						
Operate Point	B_{OP}		5	15	35	G
Release Point	B_{RP}		-35	-15	-5	G
Hysteresis	B_{HYS}		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.

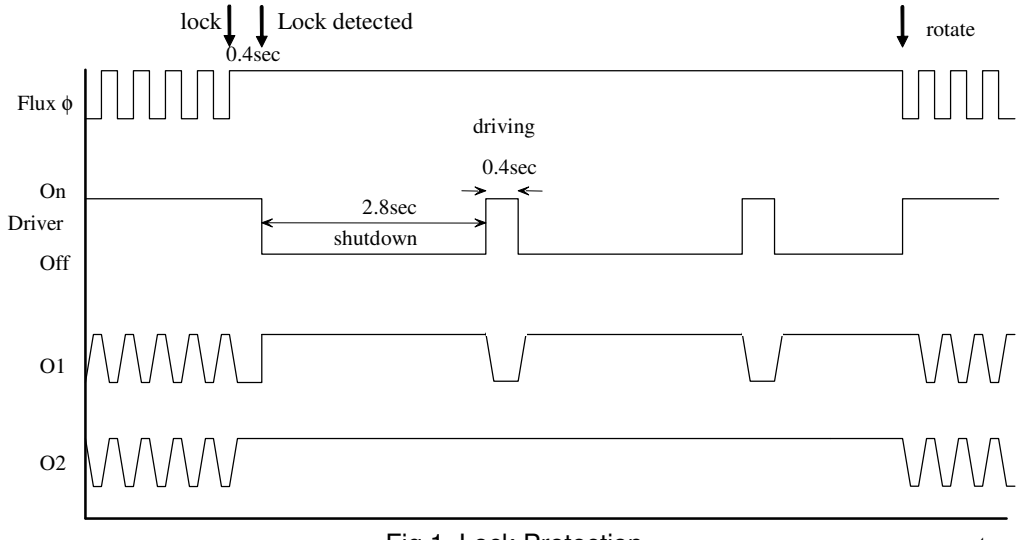


Fig 1. Lock Protection

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 +-15 Gauss.

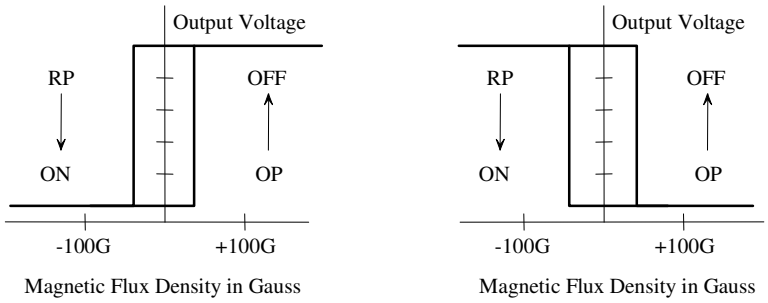


Fig 2. Magnetic Hysteresis Characteristics

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

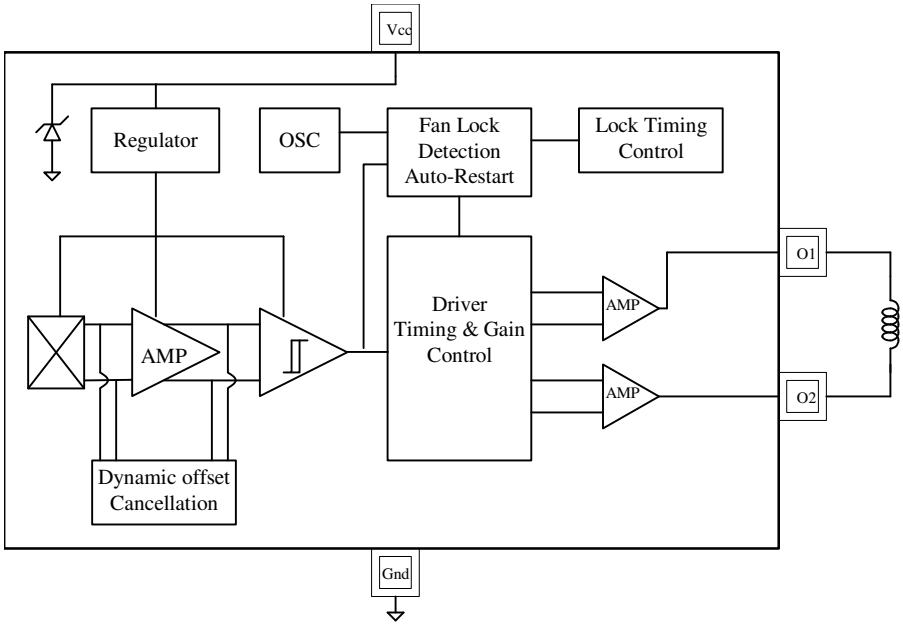
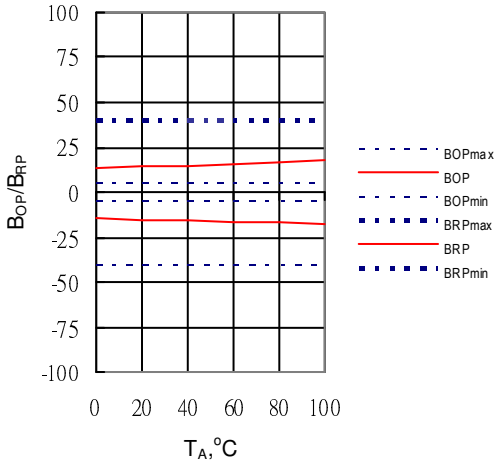
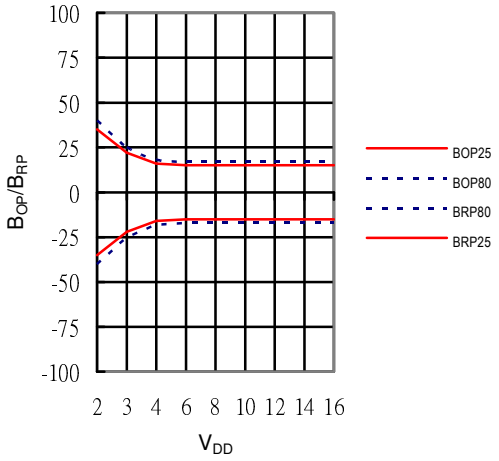


Fig. 3 Hall IC Architecture

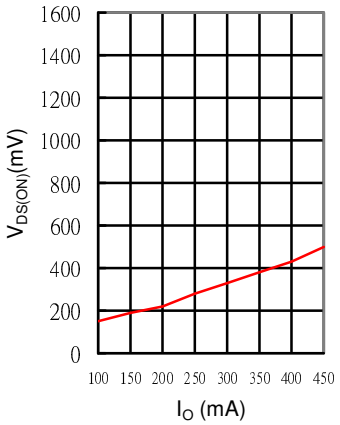
B_{OP}, B_{RP} versus temperature



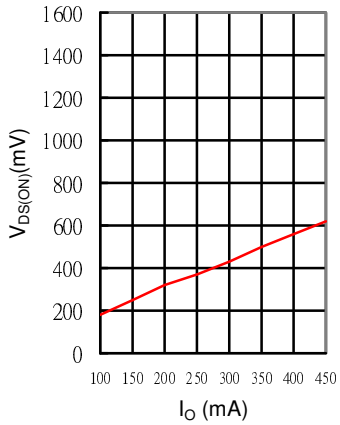
B_{OP}, B_{RP} versus supply voltage



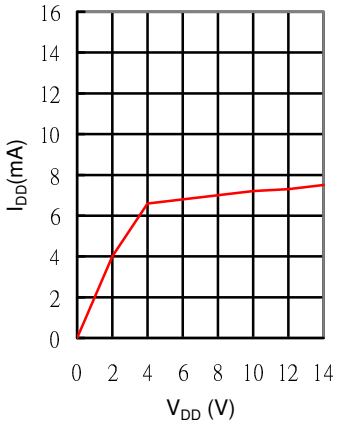
VOL(ON) versus I_O curremt



VOH(ON) versus I_O curremt

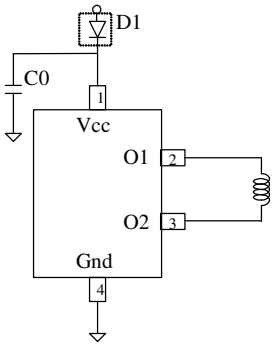


IDD versus power supply



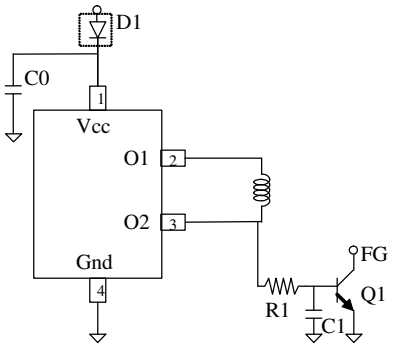
Application circuits

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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