



# PT3935

## 24V Single coil Hall Driver IC with RD output

### 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
- RD output
- 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		34.5	V
Allowable power dissipation	Pd		658 <sup>*1</sup>	mW
Operating temperature	Ta		-40~+100	°C
Storage temperature	Ts		-50~+150	°C
Max. output current	I <sub>OMAX</sub>	0.5sec	800 <sup>*2</sup>	mA
Thermal resistance	Θ <sub>aj</sub>		190	°C/W
Maximum Junction temperature	T <sub>jmax</sub>		150	°C

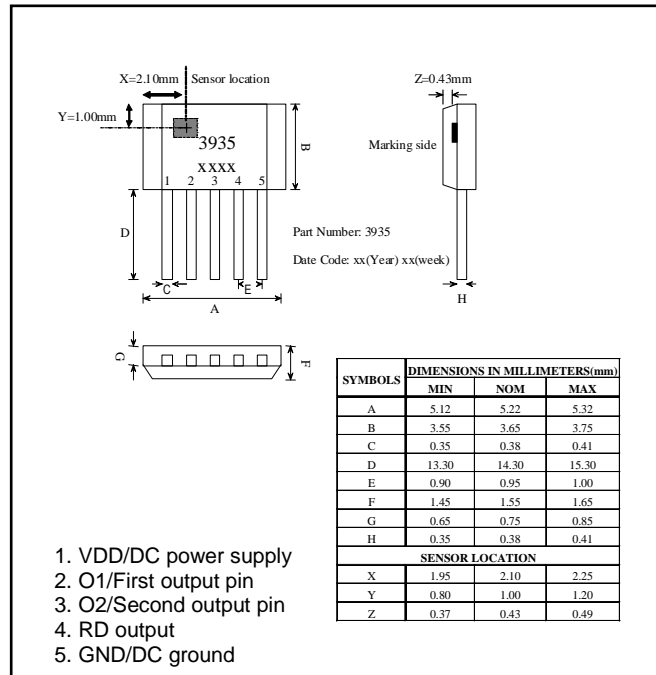
\*1: Reduced by 5.26mW for each increase in Ta of 1°C over 25°C When mounted on 50mm x 50mm x 1.6mm glass epoxy board

\*2: Should not exceed Pd

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### Package: TO-92-5pin



**Electrical Characteristics (T<sub>A</sub>=+25°C, V<sub>DD</sub>=24V)**

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Units
Supply Voltage	V <sub>DD</sub>		4.5		30	V
Output High Voltage	V <sub>OH(ON)</sub>	@ I <sub>OUT</sub> =200mA	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> =200mA		0.4	0.6	V
Output Voltage Clamp	V <sub>BV</sub>		35			V
Supply Current	I <sub>DD</sub>	Output open		6	10	mA
RD output voltage	V <sub>RD</sub>				30	V
RD sink voltage	V <sub>DSRD</sub>	I <sub>RD</sub> =5mA		0.2	0.3	V
Shutdown Time	T <sub>SD</sub>		2.8	3.5	4.2	S
Restart Time	T <sub>RS</sub>		0.4	0.5	0.6	S

**Magnetic Characteristics (T<sub>A</sub>=+25°C, V<sub>DD</sub>=24V)**

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

**General Specifications**

The PT3935 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 4.5V to 30V.

**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.

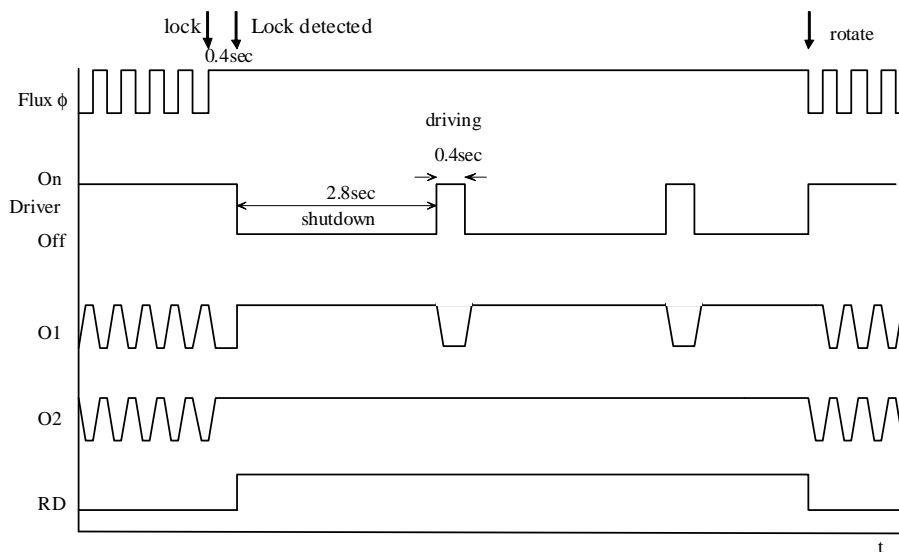


Fig 1. Lock Protection

### 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.

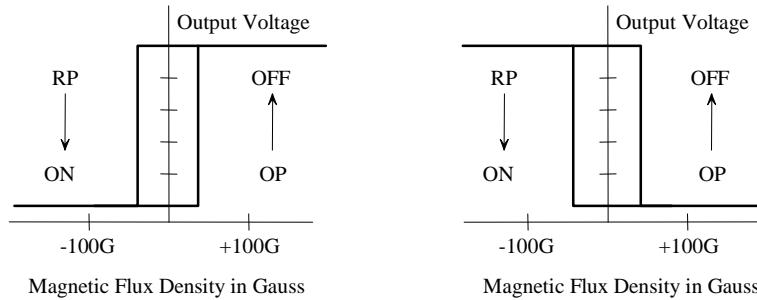


Fig 2. Magnetic Hysteresis Characteristics

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

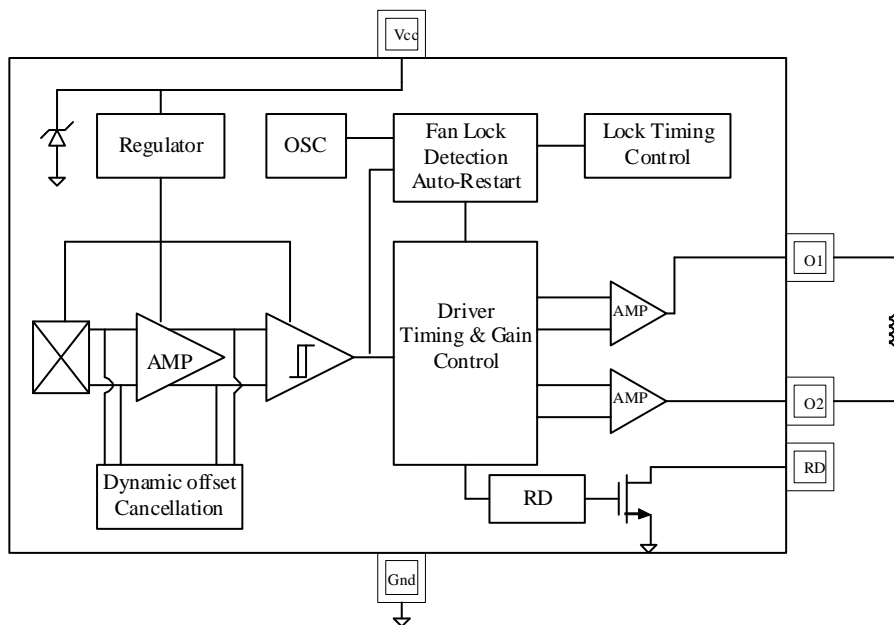
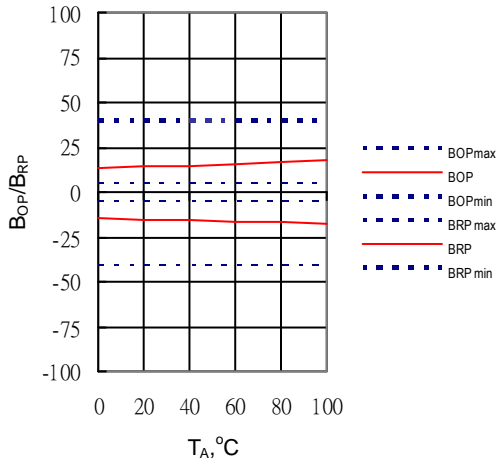
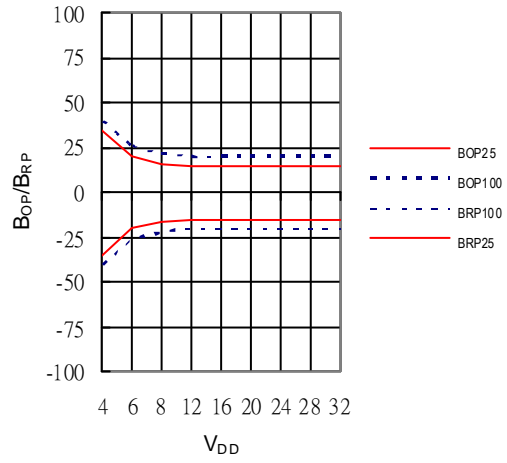
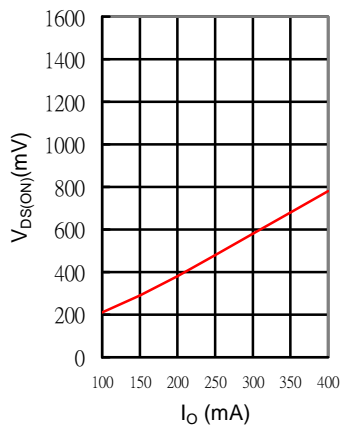
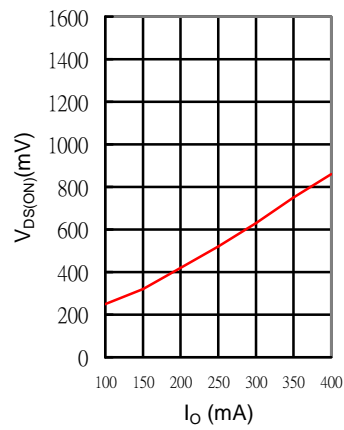
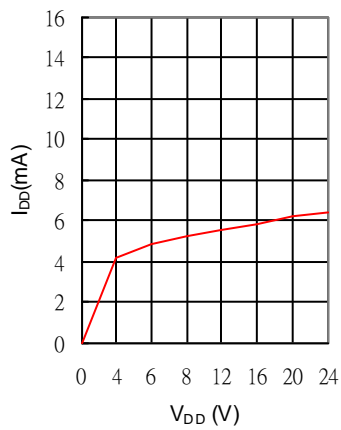
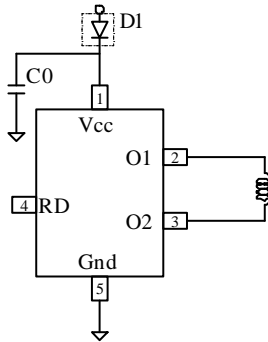


Fig. 3 Hall IC Architecture

**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**

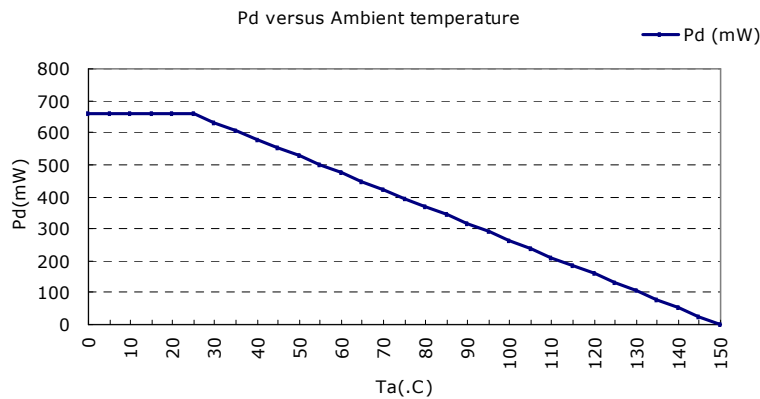


C0: decoupling capacitor 1nF ~ 0.01uF

### Thermal resistance

Parameter	Symbol	Conditions	Rating	Units
Allowable power dissipation	$P_d$		658 <sup>*1</sup>	mW
Junction to ambient thermal resistance	$\theta_{JA}$		190	°C/W
Junction to case thermal resistance	$\theta_{JC}$		80	°C/W
Maximum junction temperature	$T_J$		150	°C

\*1: Reduced by 5.26mW for each increase in Ta of 1°C over 25°C When mounted on 50mm x 50mm x 1.6mm glass epoxy board



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