



DC Brushless Motor Driver IC

**PT3016X**  
Frequency Output  
Divide 1/1.5/2

**Applications**

- Single coils DC brushless motor.
- Traditional double coil DC Brushless motor
- DC 1.5V~6.5V.
- **PT3016A(Divide 1) / Four Pole fan**
- **PT3016B(Divide 1.5) / Six Pole fan**
- **PT3016C(Divide 2) / Eight Pole fan**

**Features**

- Motor lock protection
- Built-in protection circuit for transient output
- Frequency Generation output
- Low power dissipation and high driving efficiency
- Ultra-low start voltage

**Input Devices**

- Hall IC

**Specifications**

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

Parameter	Symbol	Conditions	Ratings	Units
Maximum supply voltage	V <sub>DD</sub> <sup>max</sup>		6.5	V
Allowable power dissipation	P <sub>d</sub>		350*	mW
Operating temperature	T <sub>a</sub>		-30 ~ +125	°C
Storage temperature	T <sub>s</sub>		-55 ~ +150	°C
Output Continous current	I <sub>out</sub>	Max.	300	mA
Output Peak current	I <sub>out</sub>	T <sub>s</sub> ≤ 20us Max.	400	mA

\* On 50mm x 50mm x 1.6mm glass epoxy board

**Package: SOT-26**

**Pin Description**

Name	Pin	Description	Type
Vdd	5	DC power supply	P
Gnd	2	DC ground	G
O1	3	First output pin	O
O2	1	Second output pin	O
Hin	4	Hall IC signal input	I
FG	6	Tacho meter output (Frequency Generation)	O

Type Description  
P: Power, G: Ground, O: Output, I: Input

SYMBOLS	DIMENSIONS IN MILLIMETERS		
	MIN	NOM	MAX
A2	0.70	0.80	0.90
A1	0.00	-	0.10
A	1.00	1.10	1.30
b	0.35	0.40	0.50
C	0.10	0.15	0.25
D	2.70	2.90	3.10
E	1.60	1.80	2.00
HE	2.60	2.8	3.00
e	1.7	1.9	2.1
L	0.20	-	-
b1	0.45	0.50	0.55

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**Electrical Characteristics**

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Units
Supply Voltage			1.5		6.5	V
Output Voltage	Sink*1				0.5	V
	Drive*1				Vdd-0.5	V
Output breakdown voltage					12	V
Supply Current		Output open (O1, O2 no load)			<10	mA
Driving Current		RL=12@5V	355	360	368	mA
		RL=15@5V	292	297	300	mA
		RL=30@5V	155	156	157	mA
		RL=47@5V	102	102	102	mA
		RL=100@5V	49	49	49	mA
FG/RD flow-in current		Pull-high resistor is 470ohm@5V		10		mA
FG/RD supply voltage					12	V
Hin Input Voltage	High		Vdd-1.2		VCC	V
	Low		GND		0.3	V
Hin input current					100	uA

\*1: Depend on the RL value.

RL: DC impedance of inductor

**Truth Table**

Hin	O1	O2
H	Sink	Drive
L	Drive	Sink

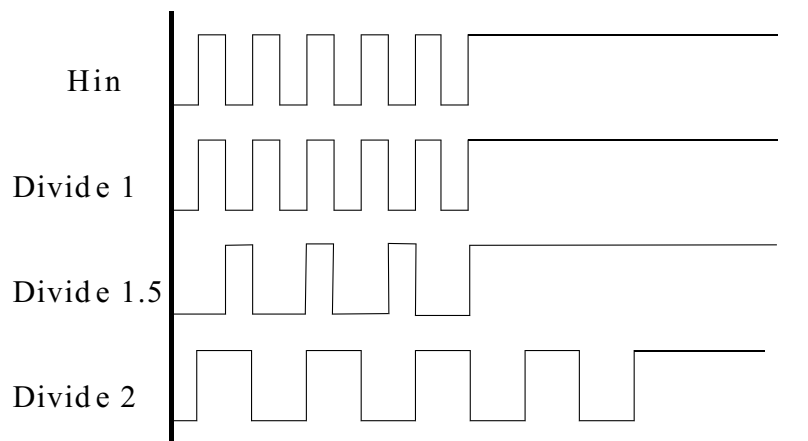


Fig 1. Rotation Frequency T

**Rotation Frequency**

The PT3016 driver IC generates a FG signal for frequency calculation. In general application, the Fan IC will generate a signal to indicate the rotation frequency of different for each motor. The FG will divide the pole number by 1.5, 2, 2.5, 3 and 4 (must be adjusted under IC process). When the motor is stopped, the FG signal will pull high to indicate the stop of the motor was stopped.

**Lock Protection**

In order to protect the motor and reduce the power dissipation. When the motor contacts the outside force, the Fan IC when stop driving the coil after the motor is lock over 0.25 seconds and restarts the motor after stop the motor 1.75 seconds. Figure-2 shows the timing diagram between the hall input signal and driver state. Whenever the motor stops over 0.25 second by outside force, the Fan IC will shutdown to stop the driving output, and after 1.75 seconds, the Fan IC will turn on again.

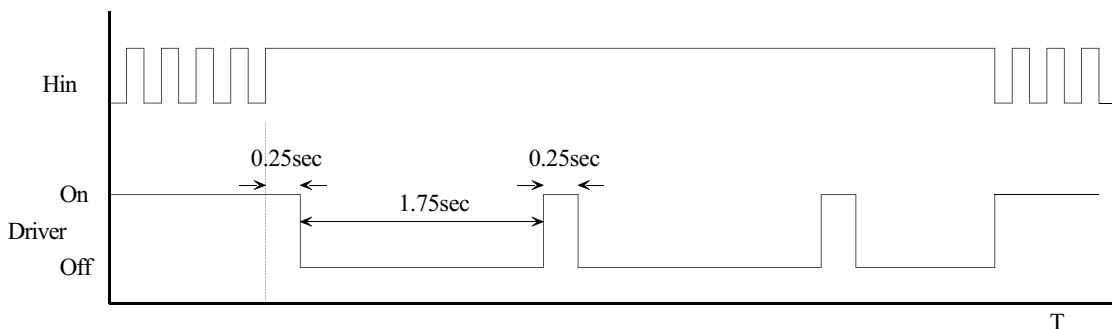


Fig 2. Lock Protection

The driver IC architecture block diagram is showed as Figure-3

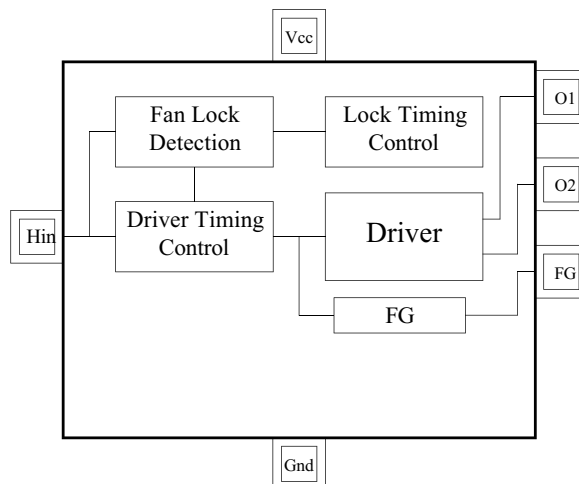
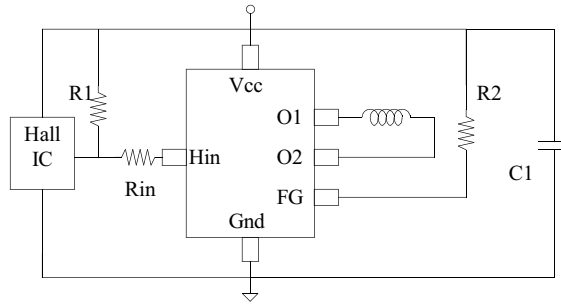


Fig. 3. Driver IC Architecture

Application circuits

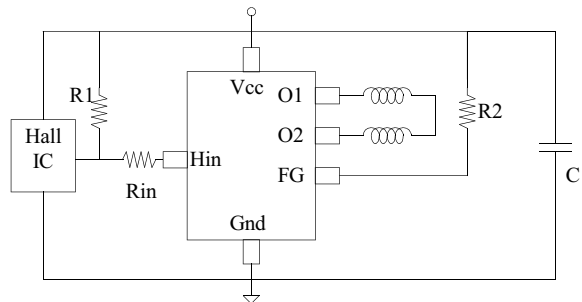
1. Signal Coil



Rin: 470K ohm  
 R1: Depend on the Hall IC Specification  
 R2: 470 ohm ~ 4.7K ohm  
 C1: 0.22uf

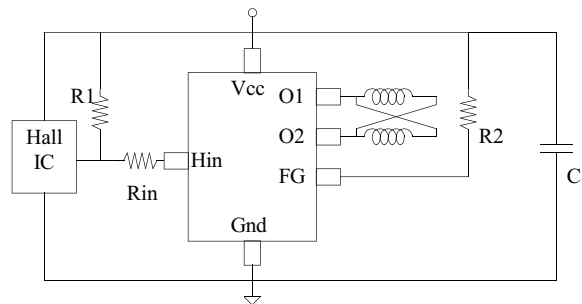
2. Double Coil

Type 1



Rin: 470K ohm  
 R1: Depend on the Hall IC Specification  
 R2: 470 ohm ~ 4.7K ohm  
 C1: 0.22uf

Type 2

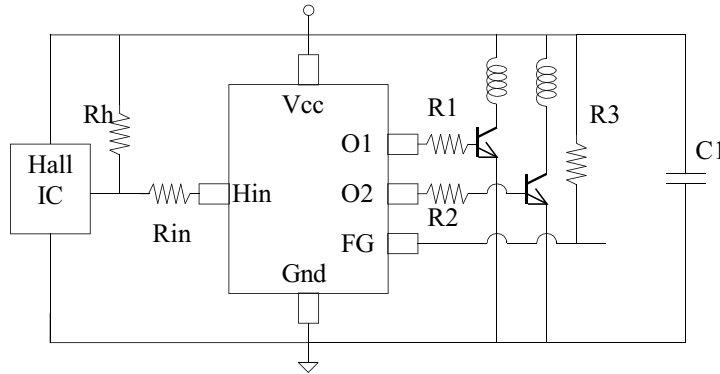


Rin: 470K ohm  
 R1: Depend on the Hall IC Specification  
 R2: 470 ohm ~ 4.7K ohm  
 C1: 0.22uf

### Application circuits

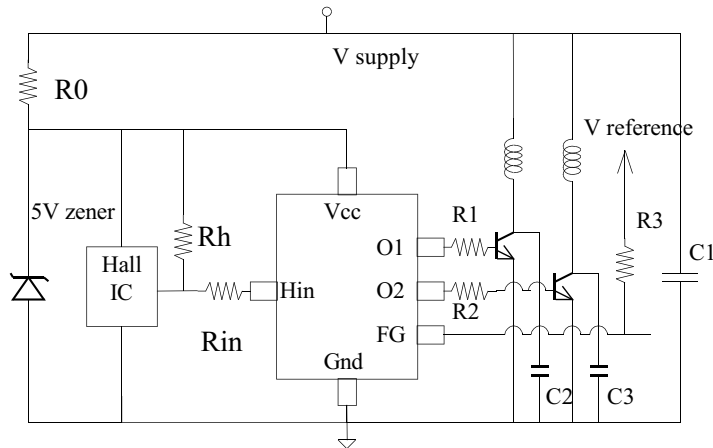
#### High driving application:

Type 1



Rh: Depend on the Hall IC Specification  
 Rin: 470K ohm  
 R1, R2: Depend on driving current  
 R3: 470 ohm ~ 4.7K ohm  
 C1: 0.22uf (optional)

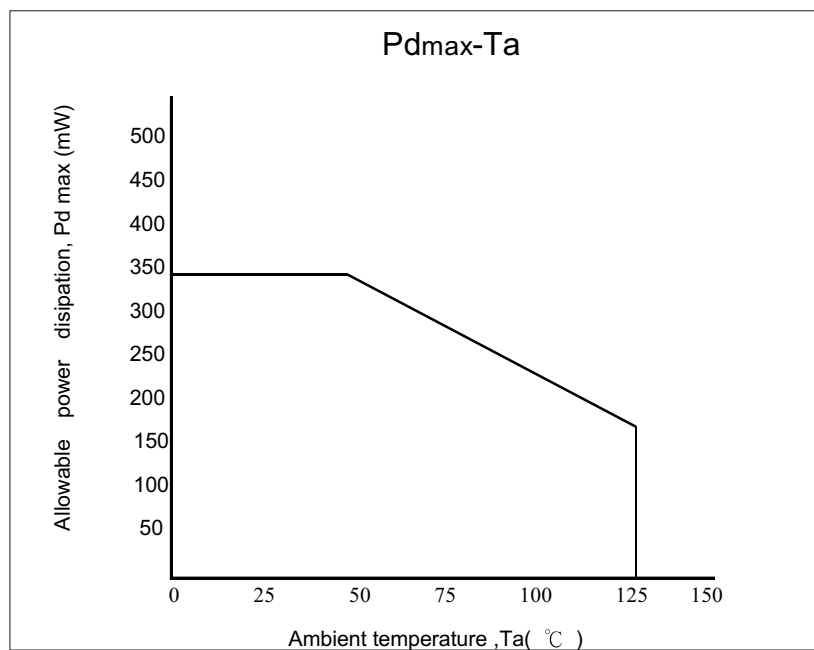
Type 2



Rh: Depend on the Hall IC Specification  
 Ra: 470K ohm  
 R0: Depend on the power dissipation and the driving ability  
 R1, R2: Depend on the external NPN driving ability  
 R3: 470 ohm ~ 4.7K ohm  
 C1: 0.22uf (optional)  
 C2,C3: 0.22u~5u (optional)

### The Power dissipation curve

The power dissipation of the IC depends on the driving current and the ambient temperature. And it is important to ensure the application's loading not over the allowable consumerism of the IC package. The allowable power dissipation versus temperature is show as follow:



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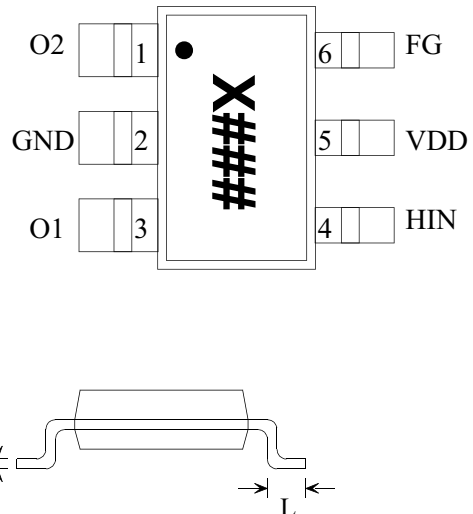
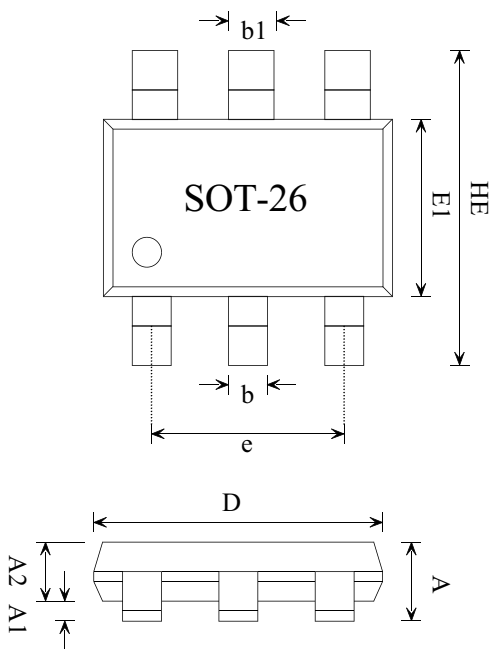
Specifications and information herein are subject to change without notice.

# PT3016X

Package: SOT-26

## Marking Notice

**X### : PT-3016**  
**X = A ---divide 1**  
**X = B ---divide 1.5**  
**X = C ---divide 2**  
**### --- Year, Week Code.**



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