



DC Brushless Motor Driver IC

PT-308F-B/PAVB

PWM Speed Control

Applications

- Double coils DC brushless motor.
- DC 4V ~ 18V.

Features

- PWM speed control
- Motor lock protection and automatic restart
- Rotate Detection output(Alarm)
- Frequency Generation output
- Low power dissipation and high driving efficiency

Input Devices

- Hall IC

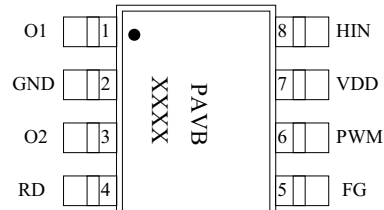
Specifications

Absolute Maximum Ratings (Ta = 25°C)

Parameter	Symbol	Conditions	Ratings	Units
Maximum supply voltage	V_{DD}^{max}		18	V
Allowable power dissipation	P_d		650*	mW
Operating temperature	Ta		-30 ~ +100	°C
Storage temperature	Ts		-55 ~ +150	°C
Output current	I_{out}	Continoue	750	mA
		Peak	950	mA

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

Package: SOP8



Pin Description

Name	Pin	Description	Type
O1	1	First output pin	O
GND	2	DC ground	G
O2	3	Second output pin	O
RD	4	Rotation Detector, L: Rotation, H: Stop	O
FG	5	Frequency Generation	O
PWM	6	Pulse width modulation speed control	I
VDD	7	DC power supply	P
HIN	8	Hall IC signal input	I

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Electrical Characteristics

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Units
Supply Voltage	V_{DD}		4		18	V
Output Sink Voltage	$V_{DS(ON)}$	$R_L=15@12V$	0.68	0.75	0.9	V
Output Breakdown Voltage	$V_{BV(ON)}$		18	22	30	V
Supply Current	I_{DD}	Output open@12V			10	mA
Driving Current	I_O	$R_L=15@12V$	735	750	755	mA
		$R_L=20@12V$	562	570	575	mA
		$R_L=30@12V$	384	385	389	mA
		$R_L=50@12V$	234	235	236	mA
		$R_L=100@12V$	119	119	119	mA
FG/RD flow-in Current	I_{FG}/I_{RD}	Pull-high resistor is 470ohm@12V		25		mA
FG/RD Supply Voltage					18	V
FG Frequency		Hall IC input signal divide one				
Hin Input Voltage	High		$V_{DD}-1.2$		V_{DD}	V
	Low		GND		0.3	V
Hin Input Current	I_{IN}	Hin=12V		85		uA
PWM Input Current		$V_{DD}=12V$		10		uA
PWM vs Duty Ratio		see Fig. 1				

R_L : DC impedance of inductor

Truth Table

Hin	O1	O2
H	GND	VDD
L	VDD	GND

PWM Speed Control

This Driver IC uses the pulse width modulation (PWM) to control motor's speed. Motor's speed is controlled by the PWM input voltage to adjust the PWM duty ratio (see figure 1). The PWM's control has two modes. One is the digital control, 0V for full speed and V_{dd} for low speed. The other is linear control, which can linear control the PWM duty ratio from 100/0 to 35/65.

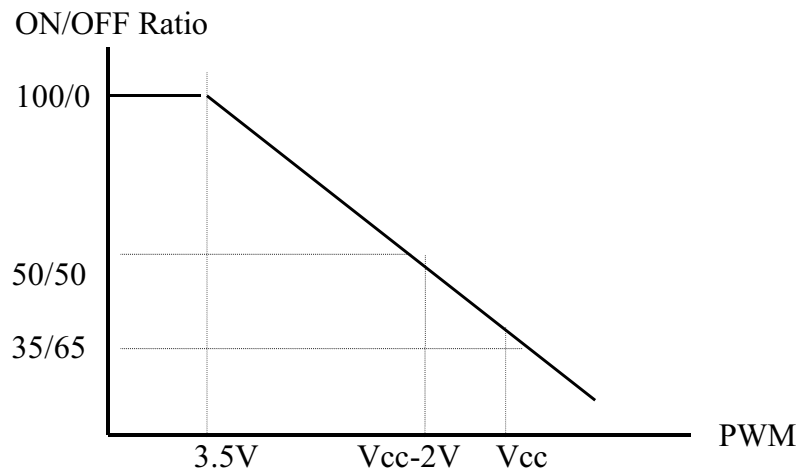


Fig 1. PWM Speed Control

Rotation Frequency and Detector

This driver IC outputs the FG and RD signals for some special applications. For FG application, the driver IC will generate square wave to indicate the motor rotation frequency. According to the motor internal structure, the pole number is different for different motors. The FG will output the real motor's rotation frequency by dividing the pole number. For RD application, the driver IC will output a high signal to indicate the stop of the motor and a low signal to indicate the normal operation of the motor.

Lock Protection

In order to protect the motor, the driver IC will stop to driving the coil when the motor is locked over 0.4 seconds. Then, it restarts to drive the motor after 2.8 seconds. Figure 2 shows the timing diagram between the hall input signal and driver's output state.

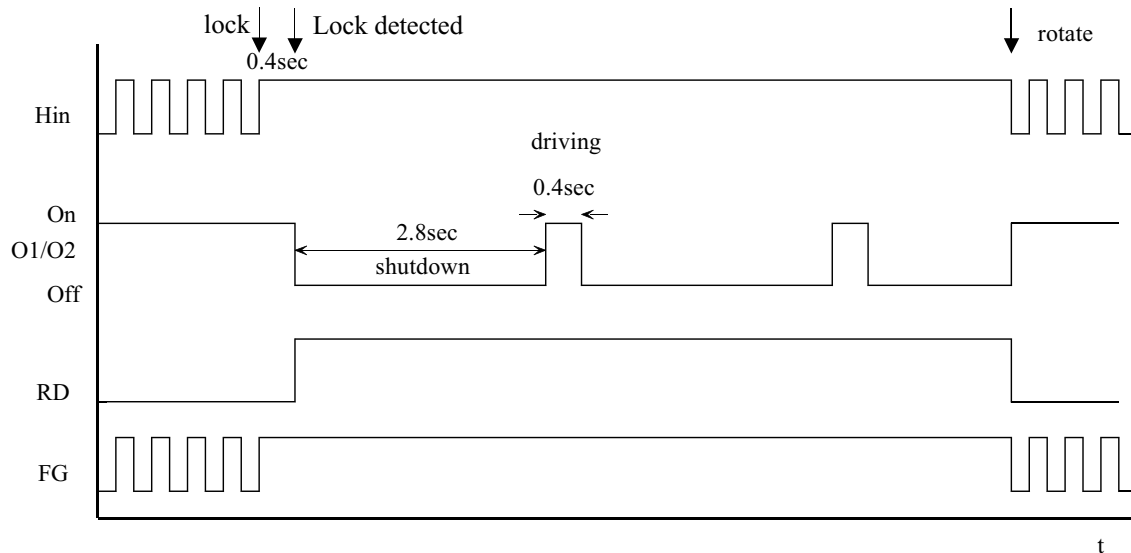


Fig 2. Lock Protection

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

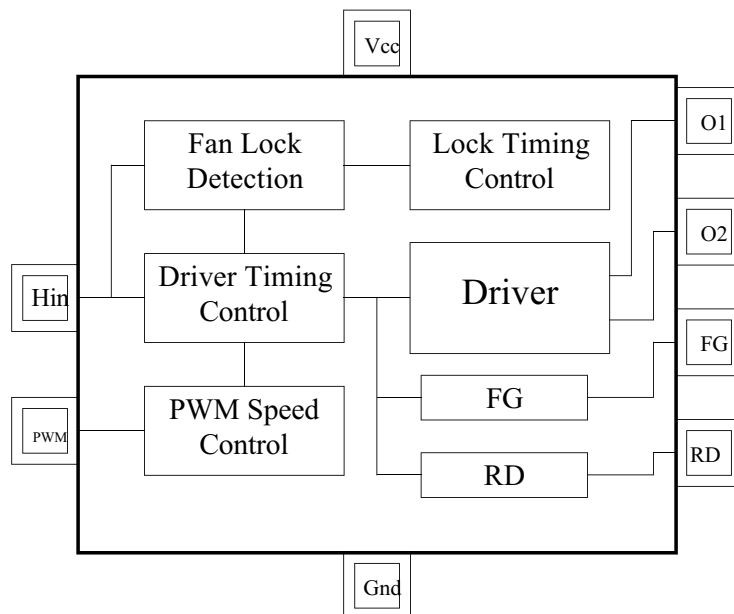
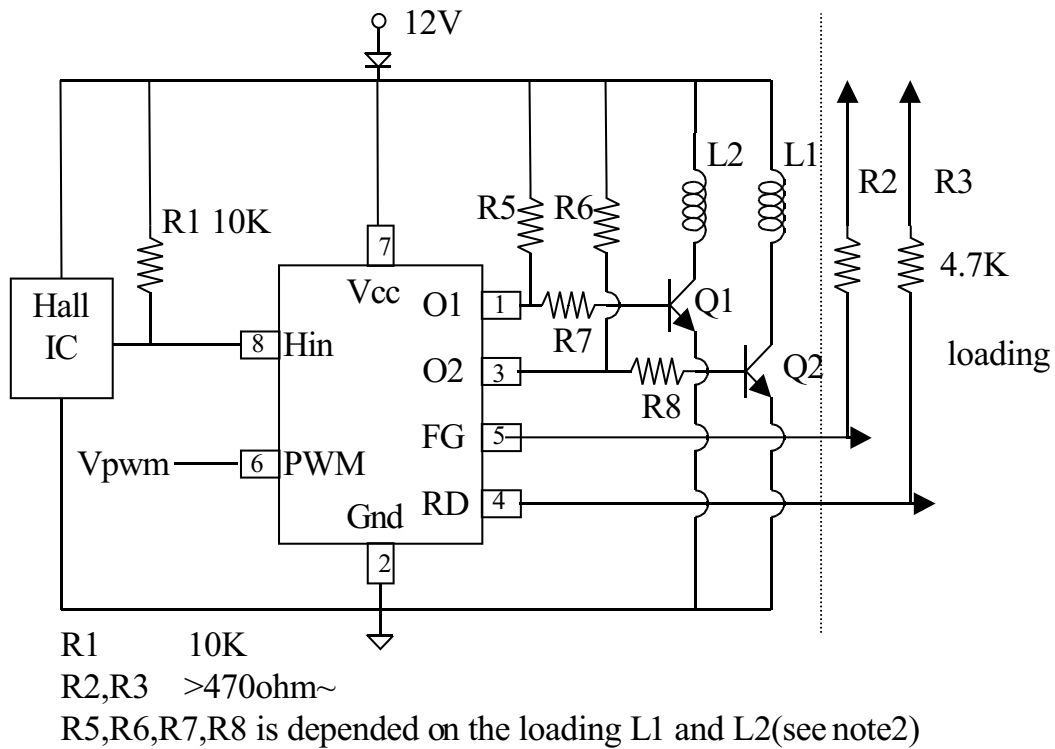


Fig. 3. Driver IC Architecture

Application circuits Double coil

1. Voltage Control

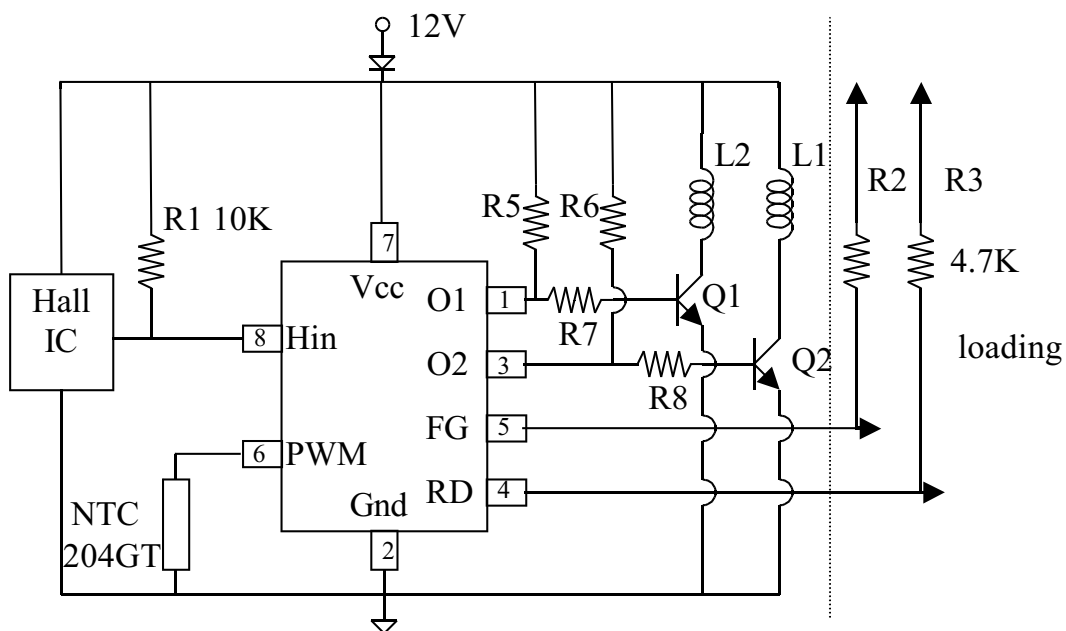


Example :

V_{PWM}	PWM Ratio(on/off)	FAN Speed
0V~12V	100%~35%	Full speed ~ Low speed
GND	100%	Full speed
VDD	35%	Low speed

Application Circuits / Double Coil

2. Thermistor

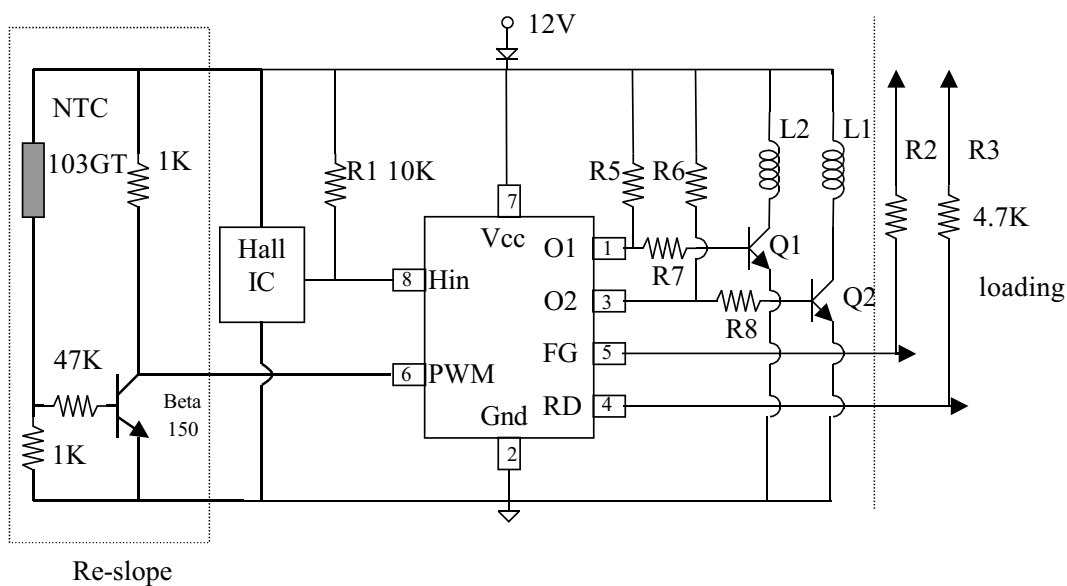


Example :

NTC 204GT Temp.(C)	Thermistor Kohm	PWM Ratio(on/off)	FAN Speed
0	720.3	48%	Low speed
10	421.8	54%	
20	254.6	62%	
30	158.2	71%	
40	100.8	80%	
50	65.85	90%	
60	43.99	100.0%	Full speed

Application Circuits / Double Coil

3. Thermistor(NTC) for High slope temperature control

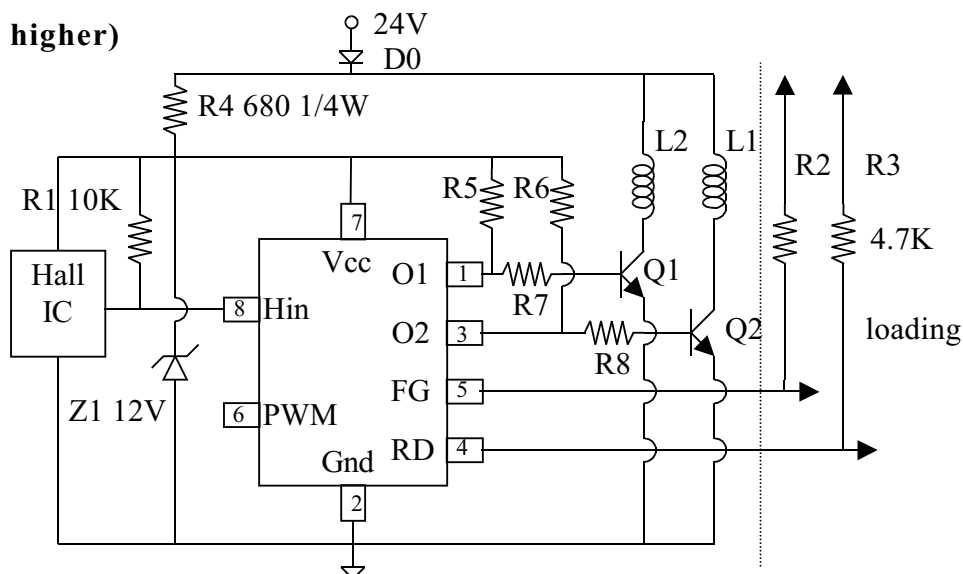


Example :

NTC 103GT Temp.(C)	Thermistor Kohm	PWM Ratio(on/off)	FAN Speed
20	12.64	35%	Low speed
30	7.968	50%	
40	5.164	70%	
50	3.436	90%	
60	2.341	100.0%	Full speed

Application Circuits / Double Coil

4. 24V (or higher)



R1: 10K
R2, R3 470ohm~
Z1: V_Z=12V, 1/2W

Note1: The connection of PWM pin refers the connection of 12V.

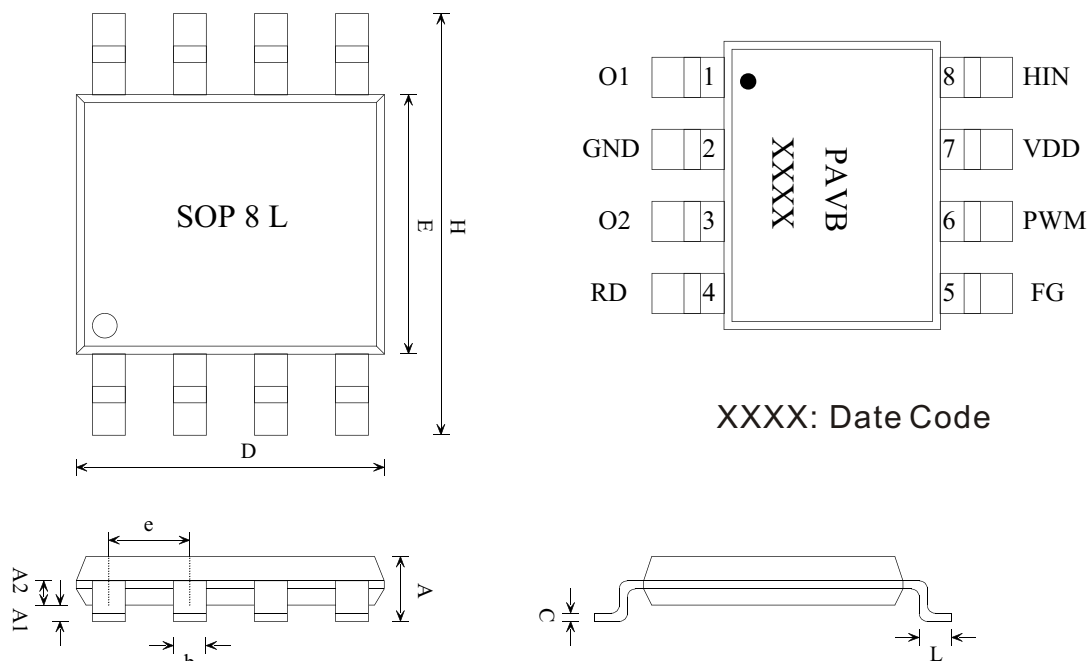
Note2: The value of R4, R5, R6, R7, R8 is depend on the characteristics of L1 and L2. (ex. R4: 680 1/4W, R5, R6: 2.2K, R7, R8: 680)

Note3: The FG and RD are open drain outputs. Their High level can be defined by end user. The R2, R3 are the loading of FG and RD.

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Package Outline



SYMBOLS	DIMENSIONS IN MILLIMETERS(mm)		
	MIN	NOM	MAX
A	1.47	1.60	1.73
A1	0.10	-	0.30
A2	-	1.45	-
b	0.33	0.41	0.51
C	0.19	0.20	0.25
D	4.80	4.85	4.95
E	3.81	3.91	3.99
H	5.79	5.99	6.20
e	-	1.27	-
L	0.38	0.71	1.27