

## Single-phase DC Brushless Motor Driver IC

### ■ GENERAL DESCRIPTION

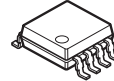
The NJU7360 is a single-phase DC brushless motor driver IC designed for small and high power fan-motor applications.

It provides a low operating current of 2mA (typ.) and low saturation output voltage at high output current operation, which offers a high efficiency motor driving. It also has a high output current capability of 1000mA (peak) and 400mA (continuous). The NJU7360 has a hall bias circuit and hall signal amplifier for output wave optimization, which offers a low noise motor driving. It also has useful functions such as a FG (frequency generator) output for speed detection and thermal shutdown. The NJU7360 is available in a small and thin package of MSOP8 (TVSP8), which provides downsizing and thinning in motor applications.

### ■ FEATURES

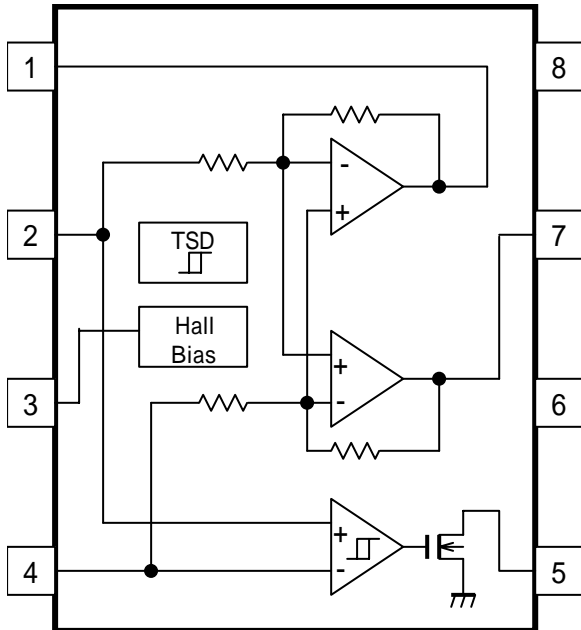
- Operating Voltage  $V_{DD} = 2.2$  to  $5.5V$
- Low Operating Current  $I_{DD} = 2mA$ (typ.)
- Low Saturation Output Voltage  
 $V_{OM} = \pm 0.30V$  @  $I_o = \pm 250mA$
- Thermal Shutdown Circuit
- Frequency Generator Output
- Hall Bias Terminal
- C-MOS Technology
- Package outline MSOP8 (TVSP8)\*  
\*MEET JEDEC MO-187-DA / THIN TYPE

### ■ PACKAGE OUTLINE



**NJU7360RB1**  
( MSOP8 (TVSP8) )

### ■ BLOCK DIAGRAM



### ■ PIN FUNCTION

PIN no.	PIN NAME
1	OUT B
2	IN+
3	HB
4	IN-
5	FG
6	VDD
7	OUT A
8	GND

# NJU7360

## ■ ABSOLUTE MAXIMUM RATINGS

(Ta=25°C)

PARAMETER	RATINGS	SYMBOL (unit)	NOTE
Supply Voltage	+7.0	V <sub>DD</sub> (V)	
Input Voltage	-0.3 to V <sub>DD</sub>	V <sub>ID</sub> (V)	1)
Output Current (Peak)	600	I <sub>O PEAK</sub> (mA)	
FG Output Current	5	I <sub>FG</sub> (mA)	
Operating Temperature Range	-40 to +85	T <sub>opr</sub> (°C)	
Storage Temperature Range	-50 to +150	T <sub>stg</sub> (°C)	
Power Dissipation	400	P <sub>D</sub> (mW)	Device itself
Junction Temperature	150	T <sub>jmax</sub> (°C)	

1): The Input Voltage (V<sub>ID</sub>) never exceeds the Supply Voltage (V<sub>DD</sub>).

## ■ RECOMMENDED OPERATING CONDITIONS

(Ta=25°C, V<sub>DD</sub>=5V)

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Supply Voltage	V <sub>DD</sub>	-	2.2	5.0	5.5	V
Input Common Mode Voltage Range	V <sub>ICM</sub>	-	0.4	-	4.0	V

## ■ ELECTRICAL CHARACTERISTICS

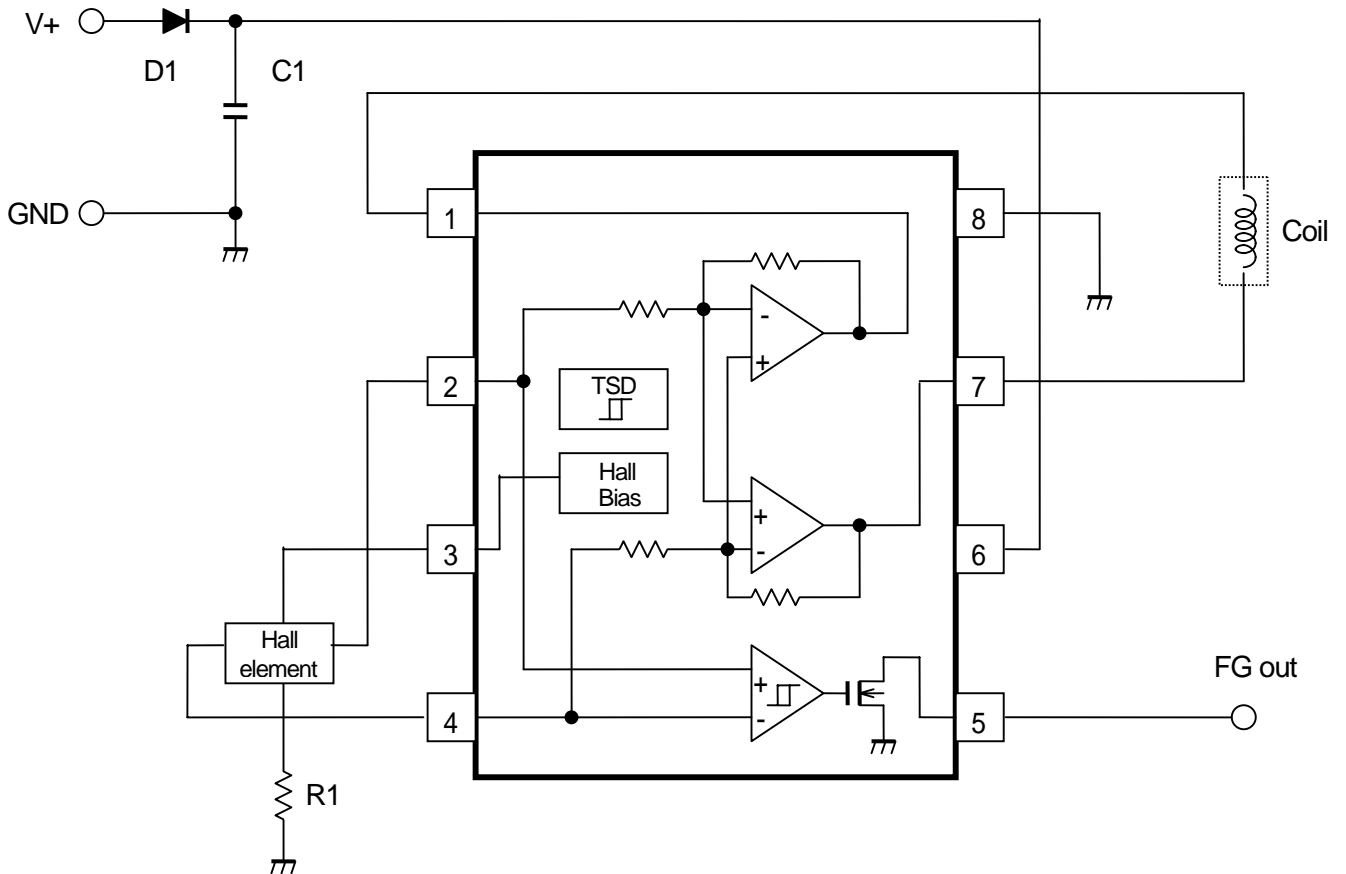
(Ta=25°C, V<sub>DD</sub>= 5V)

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
<b>■ General</b>						
Operating Current	I <sub>DD</sub>	-	-	2.0	5.0	mA
Thermal Shutdown Temperature	T <sub>TSD</sub>	-	-	180	-	°C
Thermal Shutdown Hysteresis	T <sub>HYS</sub>	-	-	50	-	°C
<b>■ Hall Amplifier</b>						
Close Loop Gain	A <sub>V</sub>	-	43	46	49	dB
Input Offset Voltage	V <sub>IO</sub>	-	-12	-	12	mV
<b>■ Output</b>						
Maximum Output Voltage Range	V <sub>OH</sub>	I <sub>o</sub> =250mA	4.55	4.70	-	V
	V <sub>OL</sub>	I <sub>o</sub> = -250mA	-	0.30	0.45	
FGL Output Voltage	V <sub>FG</sub>	R <sub>FG</sub> =10kΩ	-	-	0.3	V
FGH Leak Current	I <sub>FG-LEAK</sub>	-	-	-	5.0	μA
<b>■ Hall Bias</b>						
Hall Bias Voltage	V <sub>HB</sub>	-	1.1	1.3	1.5	V

## ■ INPUT-OUTPUT TRUTH TABLE

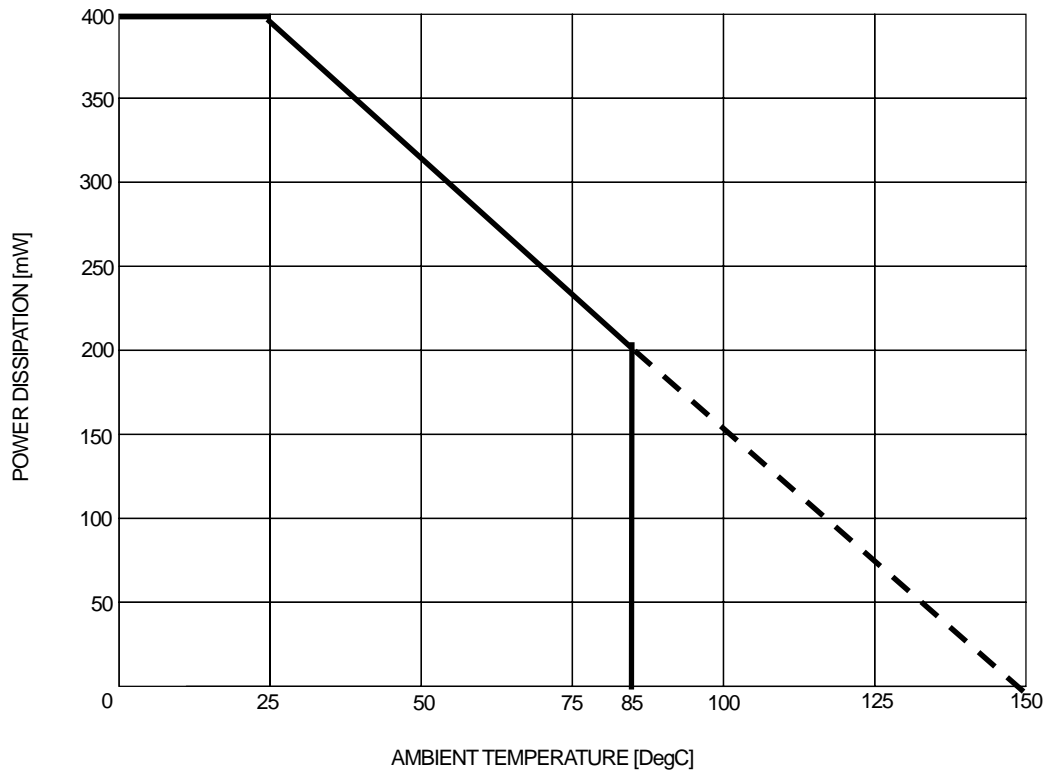
IN+	IN-	OUTA	OUTB	FG
H	L	H	L	L (Output TR : ON)
L	H	L	H	Z (Output TR : OFF)

## ■ APPLICATION CIRCUIT EXAMPLE

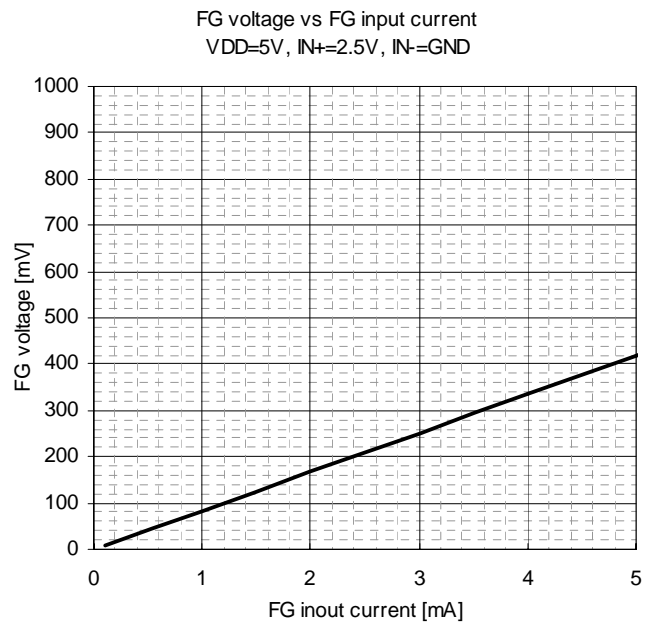
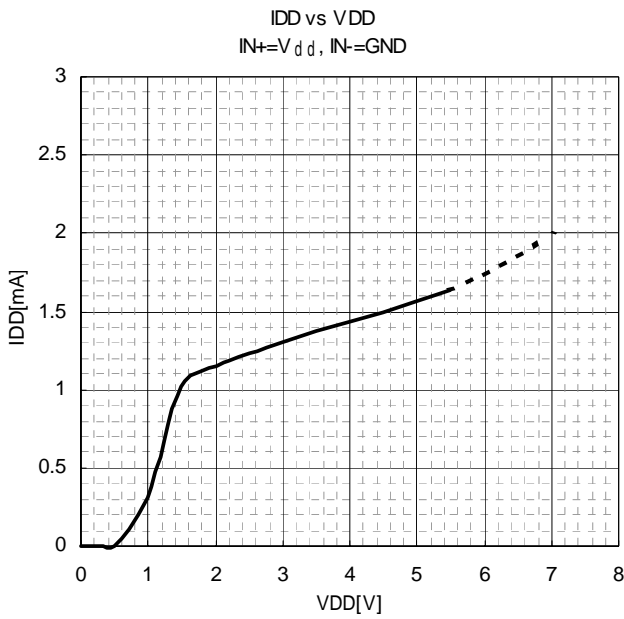


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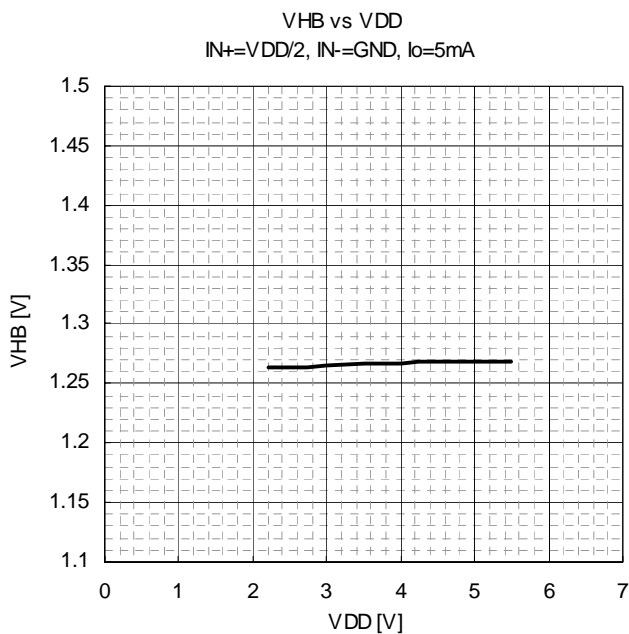
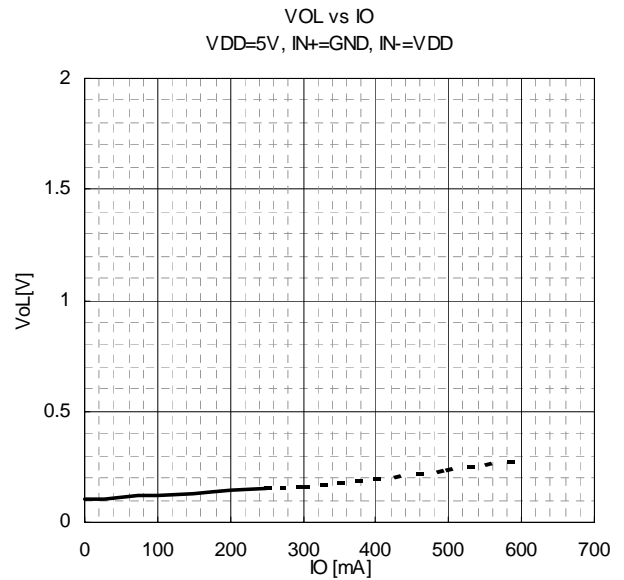
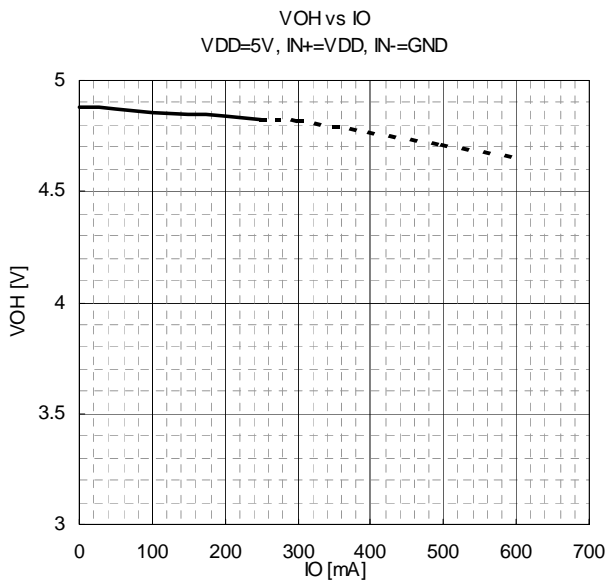
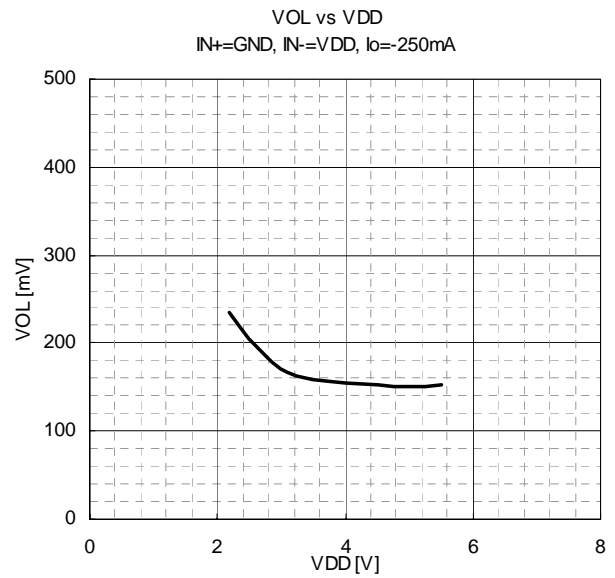
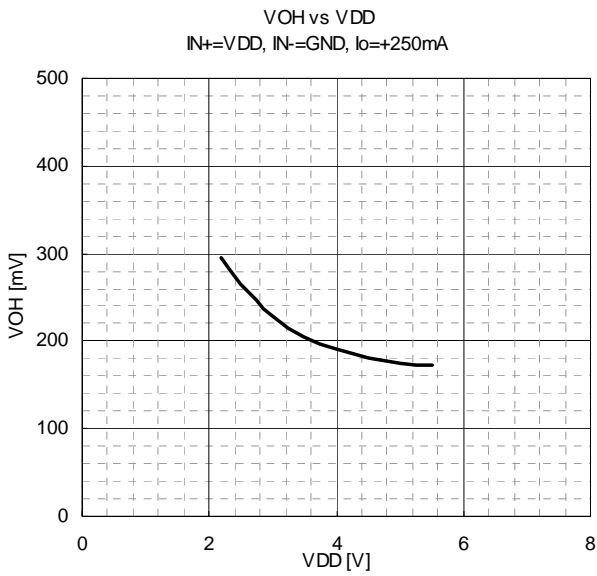
## ■ POWER DISSIPATION



## ■ TYPICAL CHARACTERISTICS



## ■ TYPICAL CHARACTERISTICS

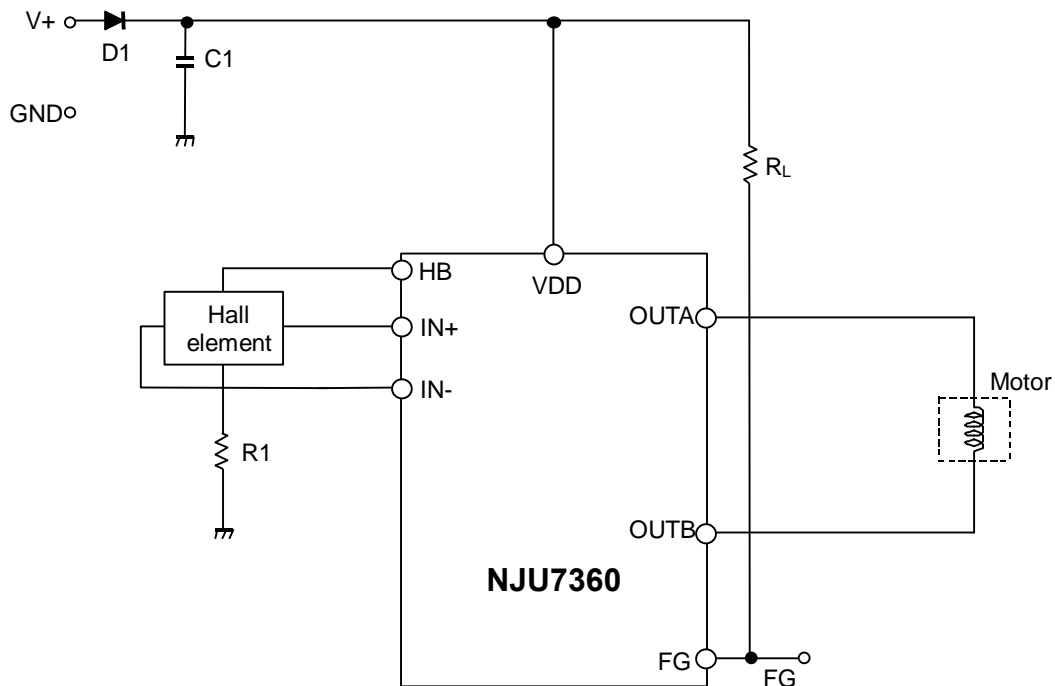


## ■ APPLICATION NOTE

The NJU7360 is a single-phase DC brushless motor driver IC in a small MSOP8 (TVSP8) package. With minimal external components, that can drive up to 250mA of motor current for small fan application.

[Application Circuit Example]

### 1) Hall Bias unused application circuit



[Design Notes]

Above application example is designed for 5V operation with motor current of 250mA. It uses the following components:

Hall elements: HW101A (AKE)

#### 1. Selection of C1 and D1:

C1 is used for a noise reduction purpose. A typical value is 0.1uF.

Optimize the value in actual operating conditions if necessary. D1 is a diode for protection against reverse voltage supply. Silicon rectifier diode (WO3C, 10D1 and equivalent) is appropriate.

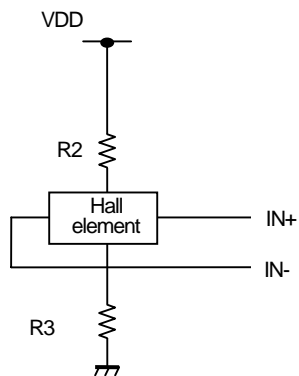
#### 2. Position Detection Circuit Hall Device

##### 2-1. When using HB (R1 design)

By connecting a Hall device to the Hall bias terminal (HB), a constant Hall output amplitude that has good temperature characteristics is obtained, resulting in stable linear drive. If it is necessary to adjust the Hall output amplitude, perform adjustment with R1.

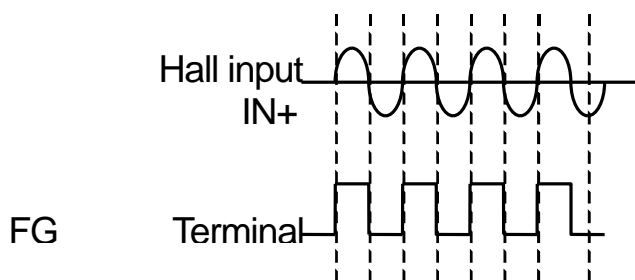
##### 2-2. When using V<sub>DD</sub> (R2 and R3 design)

When it is necessary to increase the Hall bias current to increase the Hall output amplitude, obtain Hall bias from V<sub>DD</sub>. The input bias voltage for the amplifier must be used within the Hall input common mode voltage (0.4 - V<sub>DD</sub>-1 V) including the amplitude of the signal. It is recommended that the Hall bias voltage be one half of the power supply voltage, that is, V<sub>DD</sub>/2.



### 3. Design of FG output resistance ( $R_L$ )

FG Out (FG: Pin5) is an open drain output and  $R_L$  is a pull up register. A typical value of  $R_L$  is 10k $\Omega$ . The timing chart of FG Out is as follows. Note that the pull up resistance shall be connected to below supply voltage.



[CAUTION]  
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