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**Hall Effect Sensor IC with Complementary Output Drivers and Frequency Generator**

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**Features:**

- Operate from 2.8V to 20V supply voltage.
- On-chip Hall sensor.
- Internal bandgap regulator allows temperature compensated operations and a wide operating voltage range.
- High output sinking capability up to 400mA for driving large load.
- Lower current change rate reduces the peak output voltages during switching.
- Available in rugged low profile SIP-4L/SIP-5L packages.
- Built-in protection diode for reverse power supply fault.

**General Description:**

WSH410 is designed to integrate Hall sensor with complementary output drivers and frequency generator together on the same chip, it is suitable for speed measurement, revolution counting, positioning, and DC brushless motors. It includes a temperature compensated voltage regulator, a differential amplifier, a Hysteresis controller, two open-collector output drivers capable of sinking 400mA current load. An on-chip protection diode is implemented to prevent reverse power fault.

The temperature-dependent bias increases the supply voltage of the hall plates and adjusts the switching points to the decreasing induction of magnets at higher temperatures. Subsequently, the open collector output switches to the appropriate state. WSH410 are rated for operation over temperature range from  $-20^{\circ}\text{C}$  to  $125^{\circ}\text{C}$  and voltage ranges from 2.8V to 20V.

**Pin Descriptions: SIP-4L**

| Name | P/I/O | Pin# | Description           |
|------|-------|------|-----------------------|
| Vcc  | P     | 1    | Positive Power Supply |
| OUT1 | O     | 2    | Output Pin #1         |
| OUT2 | O     | 3    | Output Pin #2         |
| Vss  | P     | 4    | Ground                |

Winson reserves the right to make changes to improve reliability or manufacturability.

**Pin Descriptions: SIP-5L**

| Name | P/I/O | Pin# | Description           |
|------|-------|------|-----------------------|
| Vcc  | P     | 1    | Positive Power Supply |
| OUT1 | O     | 2    | Output Pin #1         |
| OUT2 | O     | 3    | Output Pin #2         |
| FG   | O     | 4    | Frequency Generator   |
| Vss  | P     | 5    | Ground                |

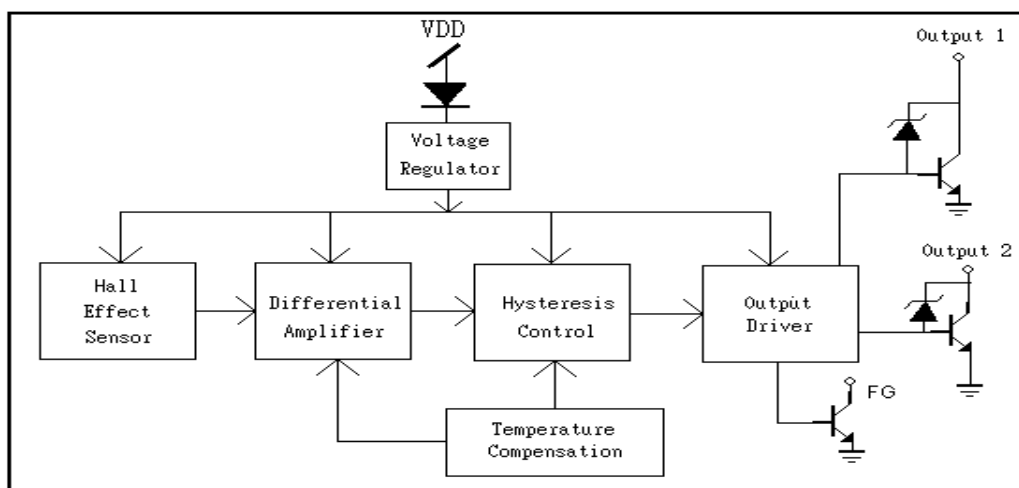
**Absolute Maximum Rating (at Ta=25° C)**

|                               |          |                            |
|-------------------------------|----------|----------------------------|
| Supply Voltage                | Vcc      | 20V                        |
| Output / FG breakdown Voltage | Vout/Vfg | 25V                        |
| Magnetic flux density         | B        | Unlimited                  |
| Reverse Protection Voltage    | Vr       | 20V                        |
| Output Current continuous     | Ic       | 300mA                      |
| Hold current                  | Ih       | 400mA                      |
| Peak current                  | Ip       | 800mA                      |
| FG ON Current (continuous)    | If       | 20mA                       |
| Operating Temperature Range   | Ta       | (-20°C to +125°C)          |
| Storage Temperature Range     | Ts       | (-65°C to +150°C)          |
| Package Power Dissipation     | Pd       | 500mw for SIP-4L<br>SIP-5L |

**Electrical Characteristics: (T=+25°C, Vcc=2.8V to 20V)**

| Characteristic                | Symbol    | Test Conditions              | Min | Typ  | Max | Units |
|-------------------------------|-----------|------------------------------|-----|------|-----|-------|
| Supply Voltage                | Vcc       | —                            | 2.8 | —    | 20  | V     |
| Output Saturation Voltage     | Vout(sat) | Vcc=20V, Ic=200mA<br>B > Bop | —   | 0.2  | 0.4 | V     |
| FG Saturation Voltage         | Vfg(sat)  | Vcc=20V, If=10mA<br>B > Bop  | —   | 0.15 | 0.4 | V     |
| Output Leakage Current        | Ileakage  | Vcc=20V, B < Brp             | —   | <0.1 | 10  | UA    |
| Supply Current                | Isupply   | Vcc=20V, Output & FG Open    | —   | 14   | 25  | MA    |
| Output / FG Rising Time       | Tr        | Vcc=12V, RL=820Ω<br>CL=20Pf  | —   | 3.0  | 10  | Us    |
| Output / FG Falling Time      | Tf        | Vcc=12V, RL=820Ω<br>CL=20Pf  | —   | 0.3  | 1.5 | Us    |
| Output / FG Time Differential | △t        | Vcc=12V, RL=820Ω<br>CL=20Pf  | —   | 0.3  | 3   | Us    |

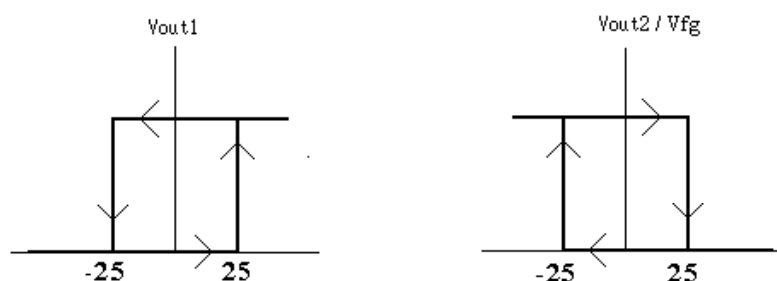
Winson reserves the right to make changes to improve reliability or manufacturability.

**Function Block:**

**Magnetic Characteristics:**

| Characteristics   | Symbol  | Quantity | Ta= -20°C to +90°C |          | Unit  |
|-------------------|---------|----------|--------------------|----------|-------|
|                   |         |          | Min                | Typ. Max |       |
| Operate Point     | Bop     |          |                    | 70 120   | Gauss |
| Release Point     | Brp     |          | -120               | -70      | Gauss |
| Hysteresis Window | Bop-Brp |          |                    | 40 200   | Gauss |

**Ordering Information:**

|                       |                                       |
|-----------------------|---------------------------------------|
| SIP- 4L: WSH410-XPAN3 | (120 Gauss) <b>N:Non-lead Process</b> |
| SIP- 5L: WSH410-XPCN3 | (120 Gauss)                           |

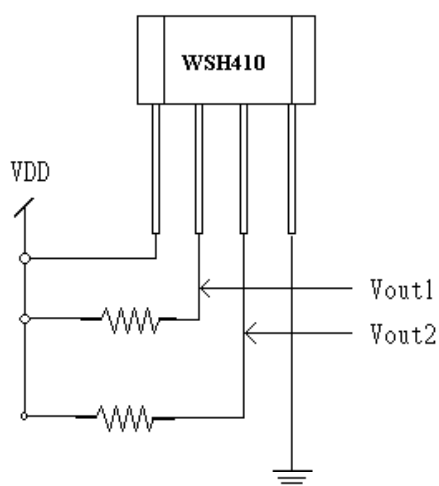
**WSH410 Complementary Output1 vs.Output2/Vfg**


Magnetic Flux Density in Gauss

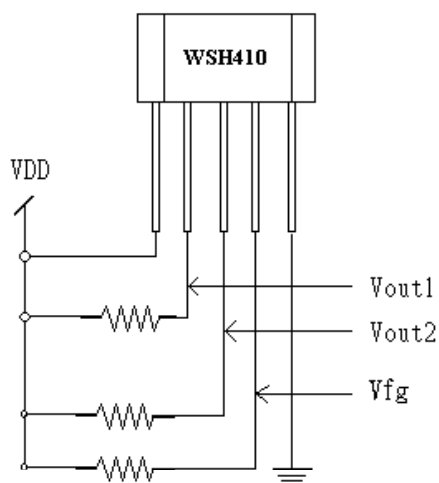
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## Test Circuit:

### SIP-4L



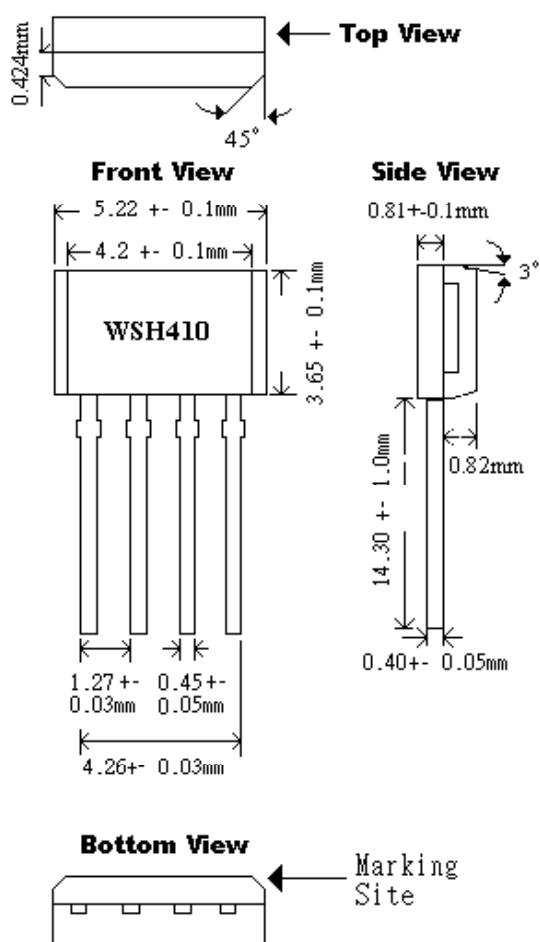
### SIP-5L



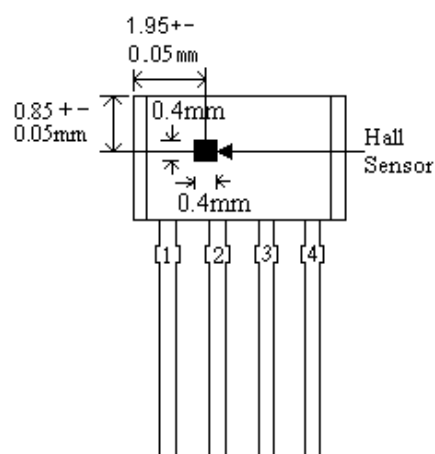
## Package Information:

SIP-4L

### Package Dimension



### Hall Sensor Location

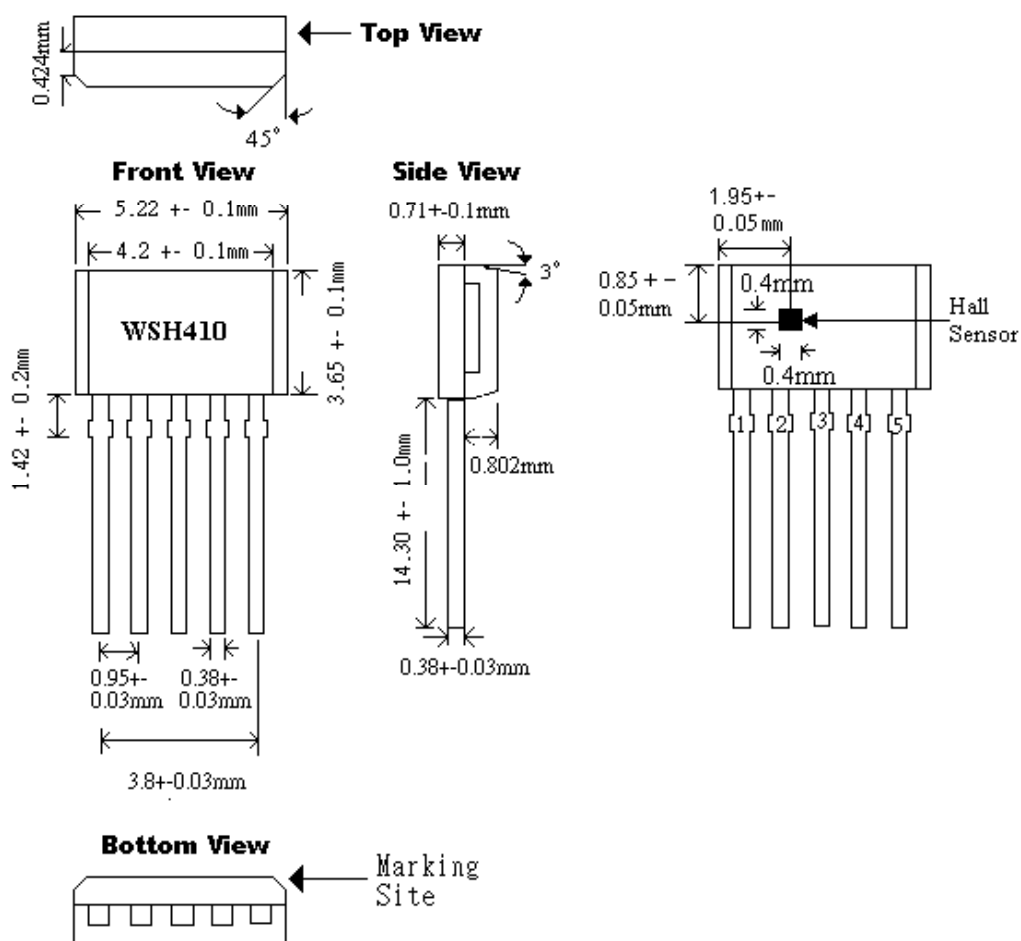


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SIP-5L

## Package Dimension

## Hall Sensor Location



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## Application Circuit:

### SIP-4L

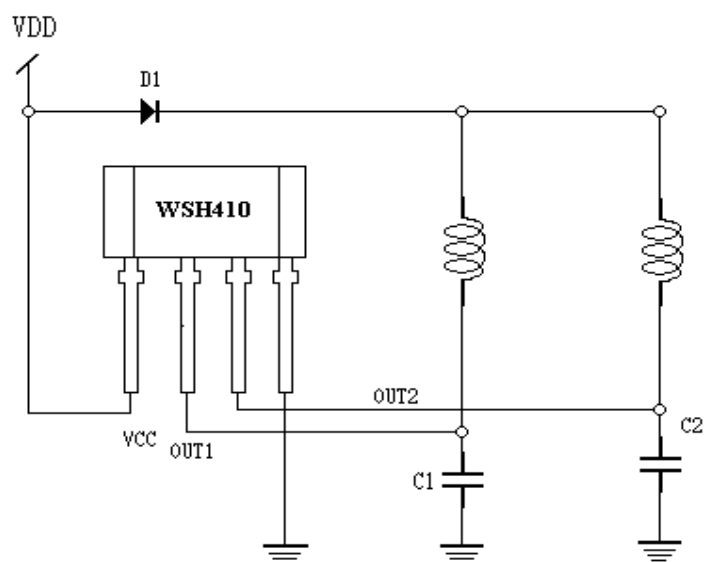


Figure 1.

### SIP-5L

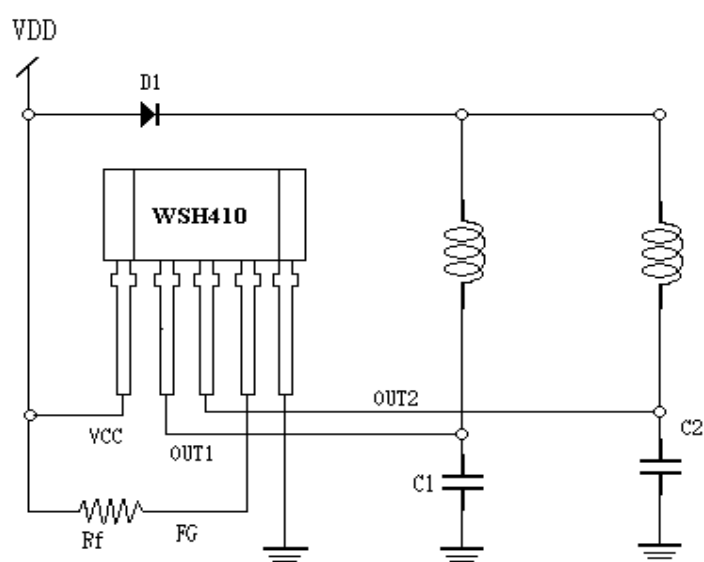


Figure 2.

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