



## Hall Effect Sensor IC with Thermal Lock Protection and Auto Restart Function

### 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 **600mA** for driving large load.
- Lower current change rate reduces the peak output voltages during switching.
- Available in rugged low profile SOT-25 , SIP-4L packages.
- Built-in **FG** output.
- Built-in protection diode for reverse power supply fault.
- Built-in **thermal lock protection** and **auto-restart** function.

### General Description:

WSH412 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 600mA current load and an open-collector frequency generator capable of sinking 10mA current load. An on-chip protection diode is implemented to prevent reverse power fault. And built-in **thermal lock protection** and **auto-restart** function is suitable for super high speed fan. It can replace the function of lock protection and auto restart function. The power will be shutdown automatically at 130°C to prevent the coils be damaged and auto-restart after cooling down.

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. WSH412 are rated for operation over temperature range from -20° C to 100°C and voltage ranges from 2.8V to 20V.

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



### Pin Descriptions: SOT-25

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

### 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

### 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

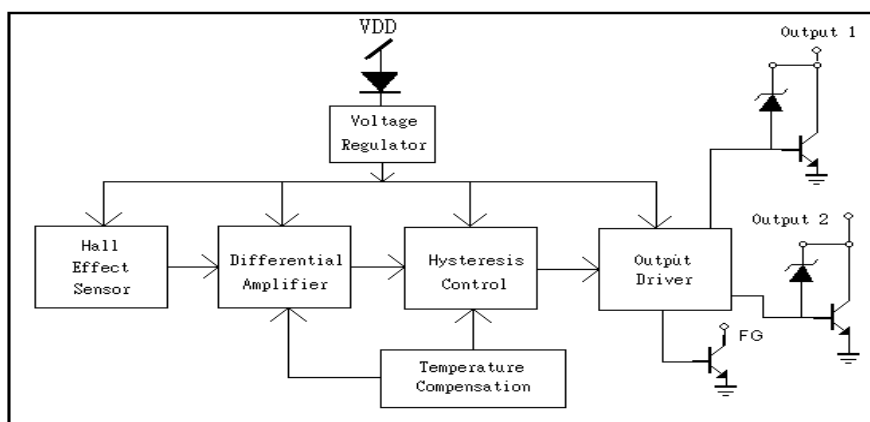
### Absolute Maximum Rating (at Ta=25° C)

Supply Voltage	Vcc	-----	20V
Output / FG breakdown Voltage	Vout/Vfg	-----	25V
Magnetic flux density	B	-----	Unlimited
Reverse Protection Voltage	Vr	-----	20V
Output Current	Ic	-----	500mA
Hold current	Ih	-----	600mA
Peak current	Ip	-----	800mA
FG ON Current (continuous)	If	-----	20mA
Operating Temperature Range	Ta	-----	(-20°C to +100°C)
Storage Temperature Range	Ts	-----	(-65°C to +150°C)
Package Power Dissipation	Pd	-----	350mw for SOT-25 500mw for SIP-4L SIP-5L

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**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 B > Bop	—	0.15	0.4	V
FG Saturation Voltage	Vfg(sat)	Vcc=20V, If=10mA 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	—	20	30	mA
Output / FG Rising Time	Tr	Vcc=12V, RL=820Ω CL=20Pf	—	3.0	10	us
Output / FG Falling Time	Tf	Vcc=12V, RL=820Ω CL=20Pf	—	0.3	1.5	us
Output / FG Time Differential	Δt	Vcc=12V, RL=820Ω CL=20Pf	—	0.3	3	us

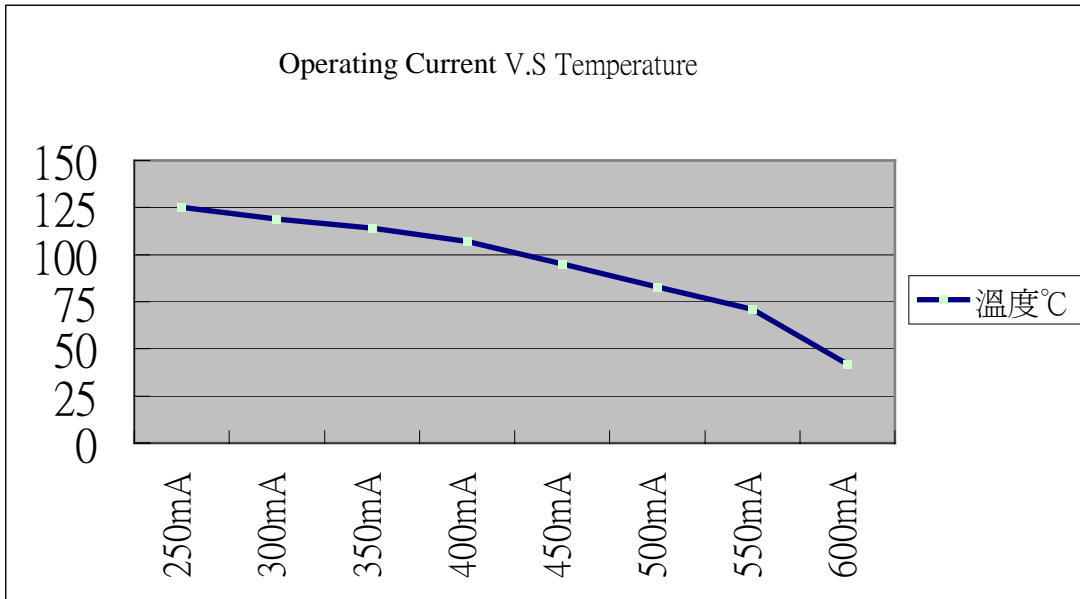
**Function Block:**

**Magnetic Characteristics:**

Characteristics	Symbol	Quantity	Ta= -20°C to +100°C			Unit
			Min	Typ.	Max	
Operate Point	Bop	Grade A		25	50	Gauss
		Grade B		30	70	
		Grade C		50	120	
Release Point	Brp	Grade A	-50	-25		Gauss
		Grade B	-70	-30		
		Grade C	-120	-50		
Hysteresis Window	Bop-Brp			40	200	Gauss

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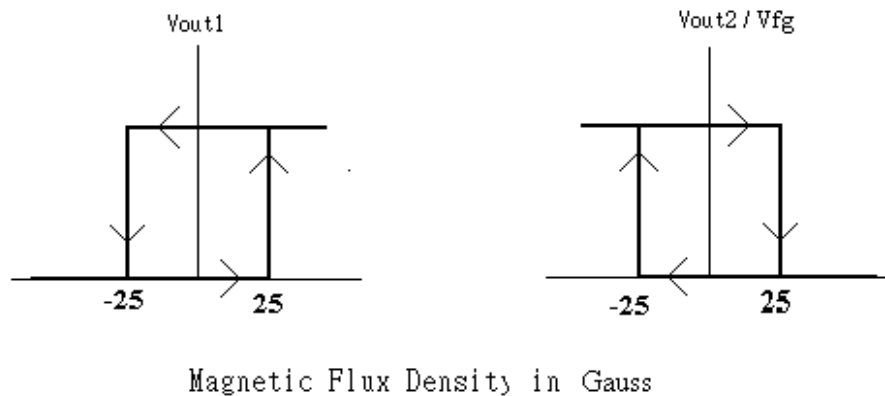
Operating Current vs. Thermal Protection temperature



Ordering Information:

<p>SIP- 4L: WSH412-XPAN <input type="checkbox"/></p> <p>SOT-25: WSH412-XPDN <input type="checkbox"/></p> <p style="text-align: center;">└─┬─┘ Elec. Grade</p> <p><b>N: Non-lead Process</b></p>	<p>Elec. Grade</p> <p>SIP-4L</p> <p><b>1:</b> A Grade (50 Gauss)</p> <p><b>2:</b> B Grade (70 Gauss)</p> <p><b>3:</b> C Grade (120 Gauss)</p> <p>SOT-25:</p> <p><b>1:</b> A Grade (50 Gauss)</p> <p><b>2:</b> B Grade (70 Gauss)</p>
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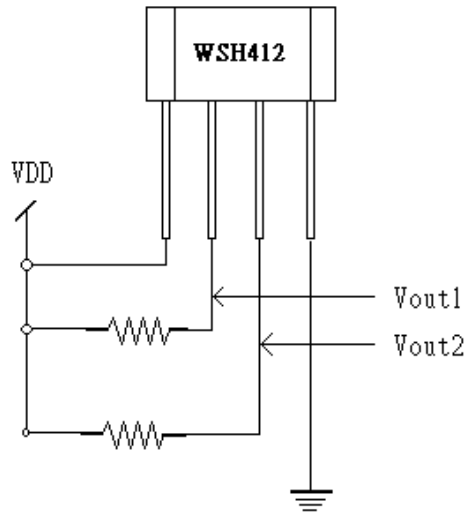
WSH412 Complementary Output1 vs. Output2/Vfg



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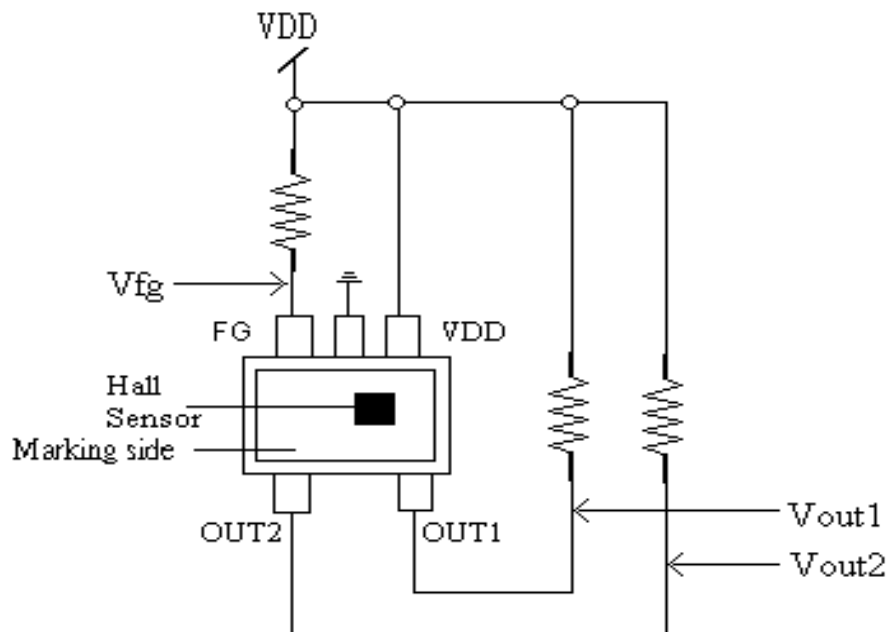
## Test Circuit:

## SIP-4L



## SOT-25

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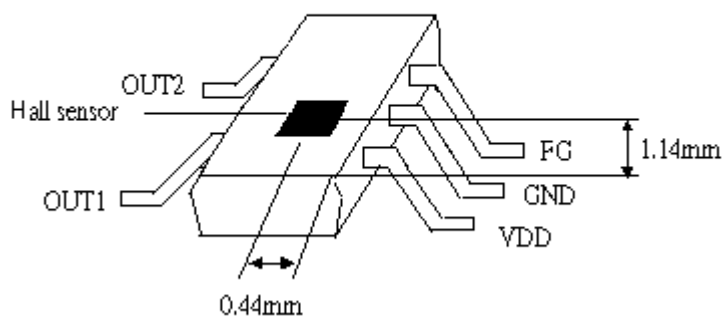
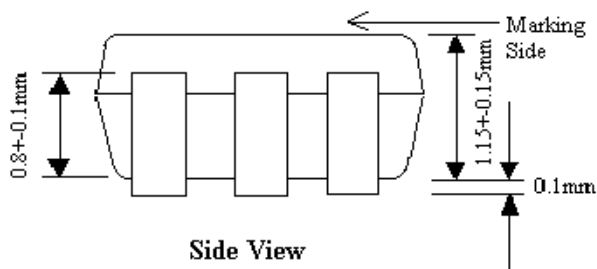
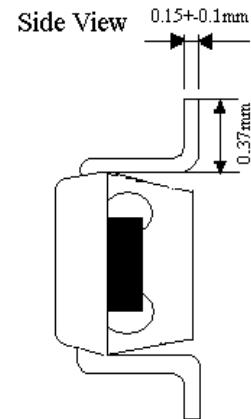
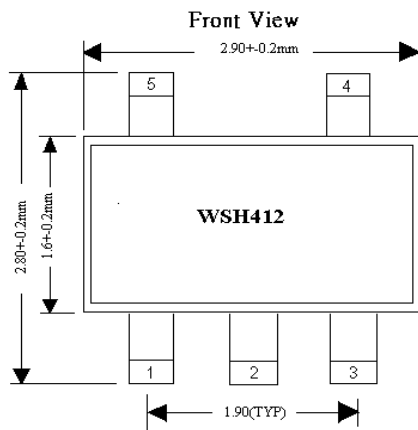
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# WSH412

## Package Information:

### SOT-25



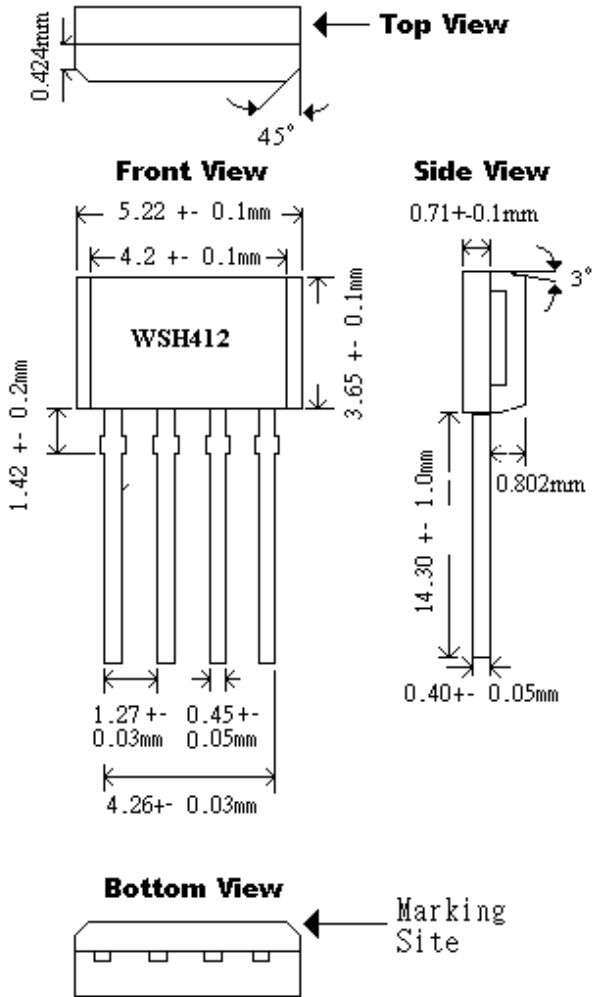
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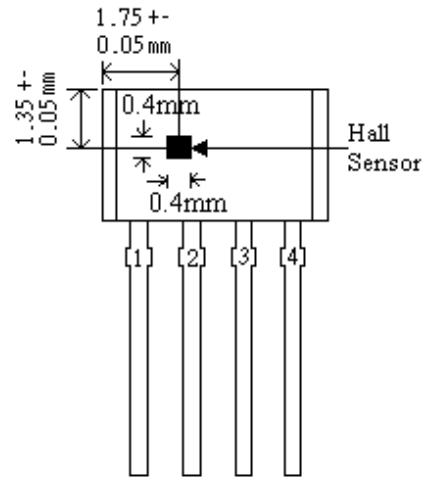
# WSH412

## SIP-4L

### Package Dimension



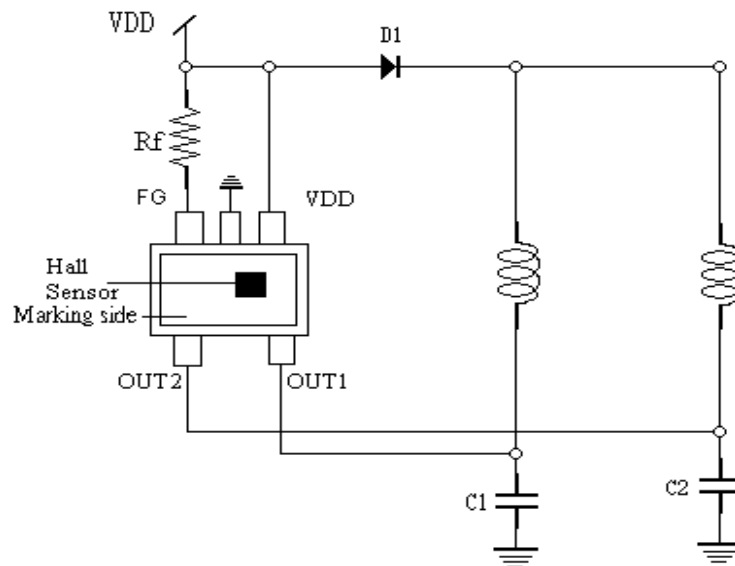
### Hall Sensor Location



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## Application Circuit:

## SOT-25



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Figure 1.

## SIP-4L

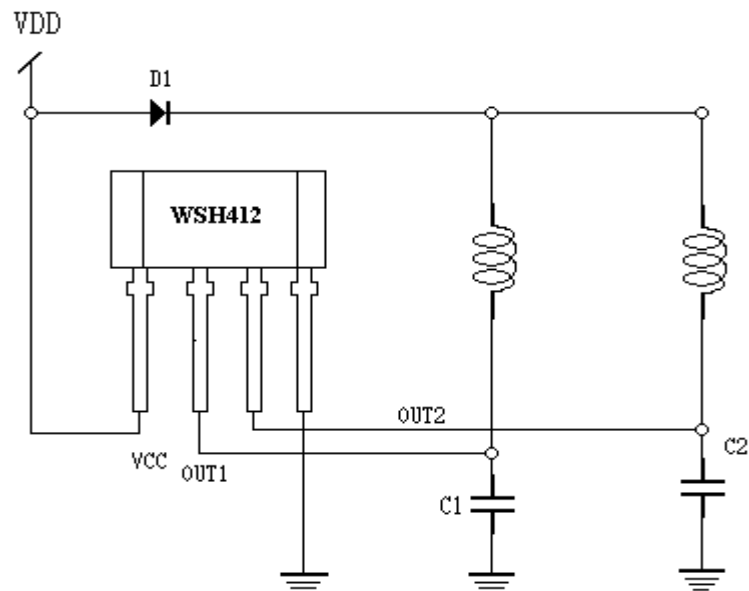


Figure 2.

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