Hall Effect Switch IC with Complementary Output

Features

- Operates from 2.4 V to 24 V supply voltage
- Operates with magnetic fields from DC to 15 kHz
- On-chip Hall Sensor
- On-chip temperature compensation circuitry minimizes shifts in on and off points and hysteresis over temperature and supply voltage

Functional Description

The WSH1230 integrates a Hall sensor with complementary dual-output drivers on a single chip. When the front side detects a south-pole magnetic field (S), Output 1 switches from high to low, while Output 2 simultaneously switches from low to high. When a north-pole magnetic field (N) is detected, the outputs revert to their original states. This symmetrical output behavior makes the device ideal for speed sensing, revolution counting, positioning, and brushless DC motor (BLDC) applications.

The device incorporates a temperature-compensated voltage regulator, a differential amplifier, a hysteresis controller, and two open-collector output drivers capable of sinking up to 20 mA. An on-chip protection resistor safeguards against reverse power connection.

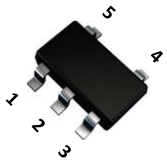
Its temperature-dependent bias increases the supply voltage to the Hall elements and adjusts the switching thresholds to compensate for the reduced magnetic induction at elevated temperatures. As a result, the sensor maintains precise switching points across the full operating temperature range of −40 °C to +125 °C and supports supply voltages from 2.4 V to 24 V.

Pin Definition

Name	P / I / O	Pin# (TO-94)	Pin# (SOT-25)	Description
Vdd	P	1	4	Positive Power Supply
Vout1	O	2	5	Output Pin 1
Vout2	O	3	3	Output Pin 2
Gnd	P	4	2	Ground
NC	-	-	1	NC

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

Absolute Maximum Rating (at Ta = 25˚C)

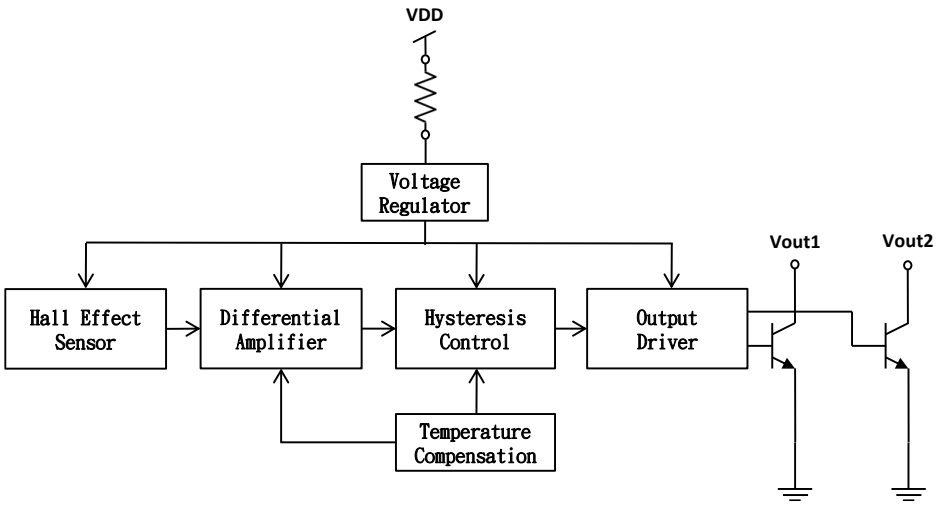


Supply Voltage, Vdd ---------- **26V**
Output Breakdown Voltage, Vout(breakdown) ------ **26V**
Magnetic Flux Density, B ---------- **Unlimited**
Reverse Protection Voltage, Vr ---------- **-0.5V**
Output ON Sink ---------- **20mA**
Operating Temperature Range, Ta ----------
---------- **-40ºC to +125ºC**
Storage Temperature Range, Ts ----------
---------- **-65ºC to +150ºC**
Power Dissipation, Pd
TO-94 ---------- **500mW**
SOT-25 ---------- **350mW**

Electrical Characteristics (Ta = +25˚C, Vcc = 2.4 to 24V)

Characteristic	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Supply Voltage	Vcc	—	2.4	—	24	V
Output Saturation Voltage	Vout (sat)	Vcc=12V, Ic=10mA, B>Bop	—	0.2	0.6	V
Output Leakage Current	Ileakage	Vcc=12V, B<Brp	—	< 0.1	10	μA
Supply Current	Isupply	Vcc=12V, Output Open	—	2.0	5	mA
Output Rise Time	Tr	Vcc=12V, RL=2kΩ, CL=20pf	—	1.0	10	μs
Output Falling Time	Tf	Vcc=12V, RL=2kΩ, CL=20pf	—	0.3	1.5	μs

Function Block



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Magnetic Characteristics

Characteristic	Symbol	Grade	Min.	Typ.	Max.	Unit
Operating Point	Bop	A	+5	+30	+50	Gauss
		B		+50	+70	Gauss
		C			+120	Gauss
Release Point	Brp	A	-50	-30	-5	Gauss
		B	-70	-50		Gauss
		C	-120			Gauss
Hysteresis Window	Bhys			60	100	Gauss

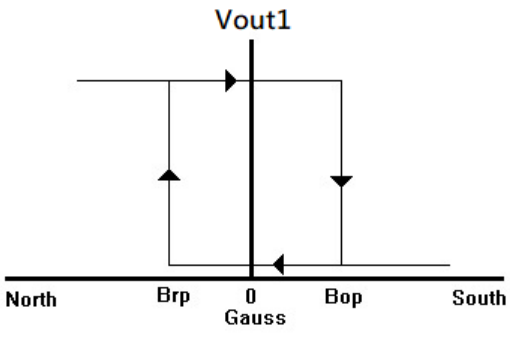
★ **"+" means South magnetic field.**

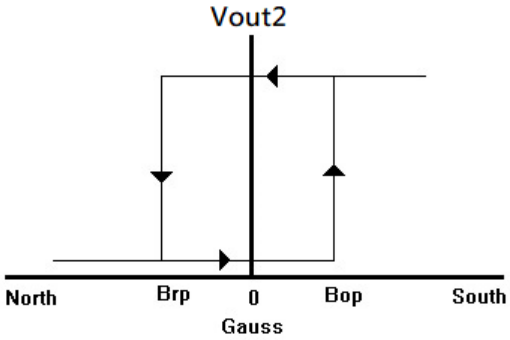
★ **1 mT = 10 Gauss**

Ordering Information

WSH1230-XPAN ☐ (TO-94) **WSH1230-XPDN ☐ (SOT-25)** ↑ **Grade** **Halogen Free**	**Grade** **1. 50 Gauss** **2. 70 Gauss** **3. 120 Gauss**

◆ TO-94 – 1000/bag, SOT-25 – 3000/reel





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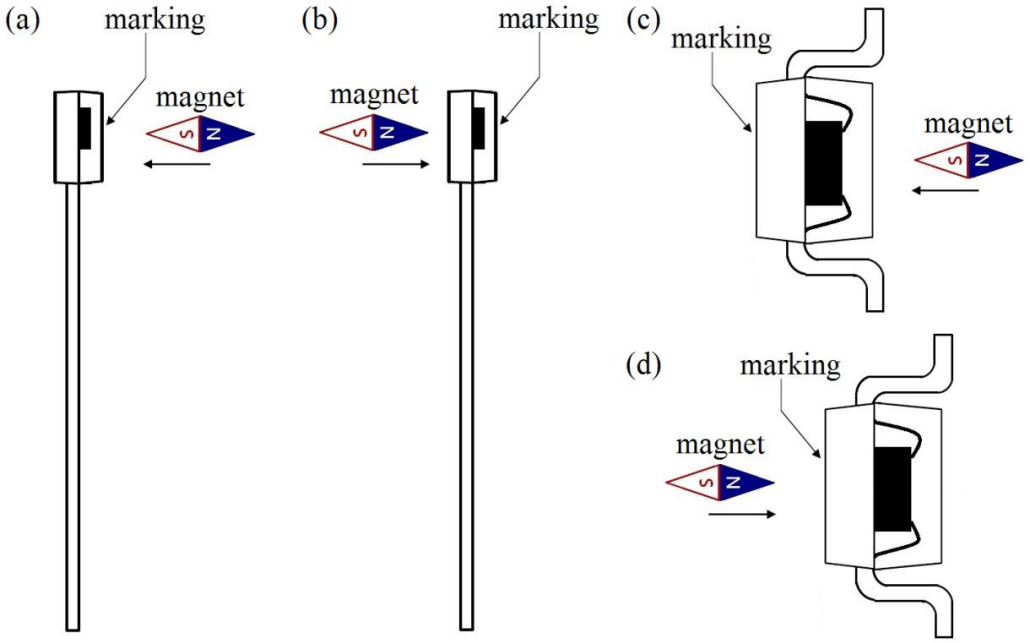
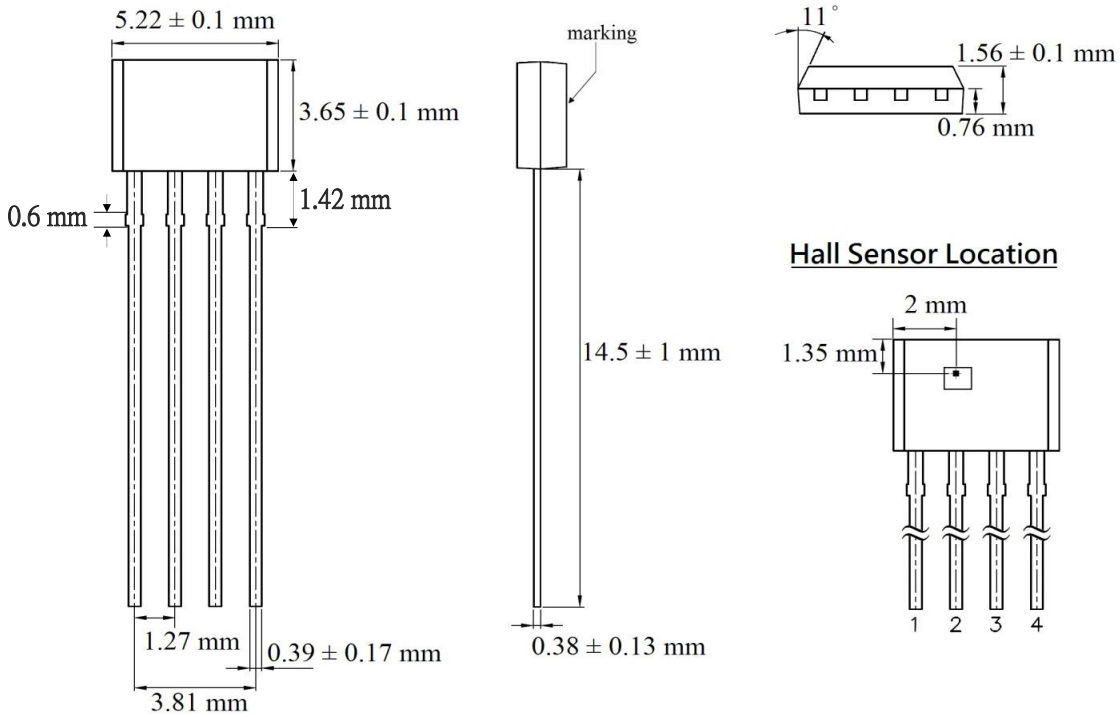
Hall Device Sensing Direction



Package Information

《TO-94》



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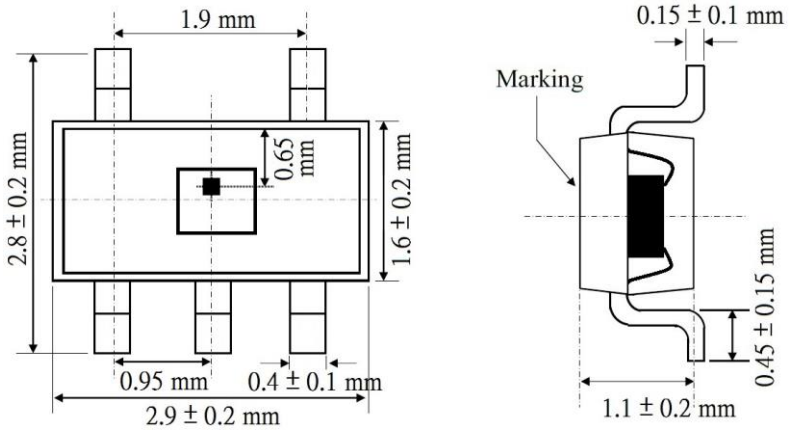
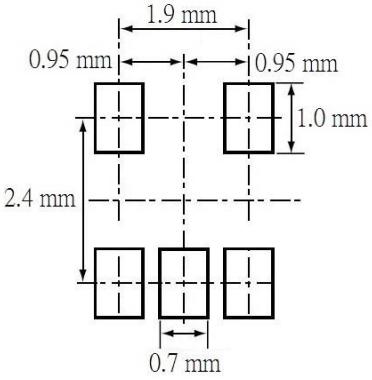
《SOT-25》

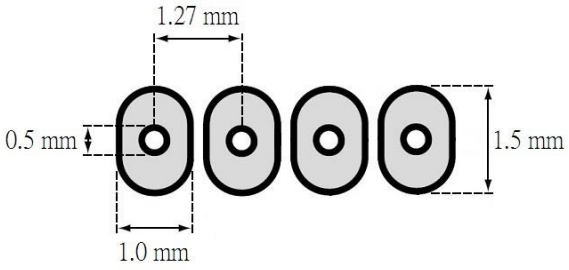


PCB Layout Reference View

SOT-25



TO-94



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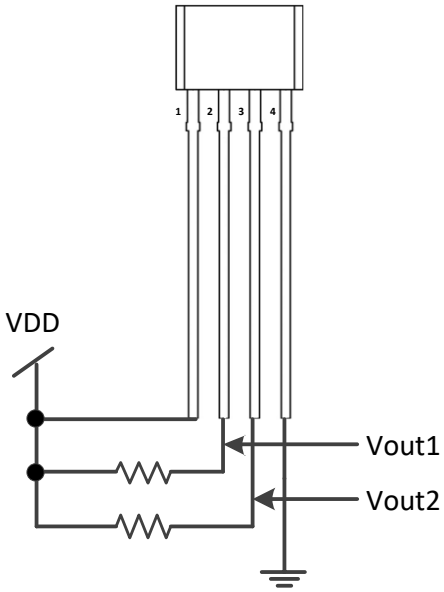
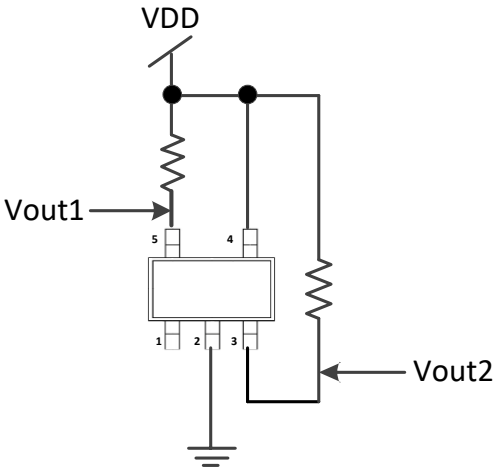
Application Circuit: Magnetic field detector

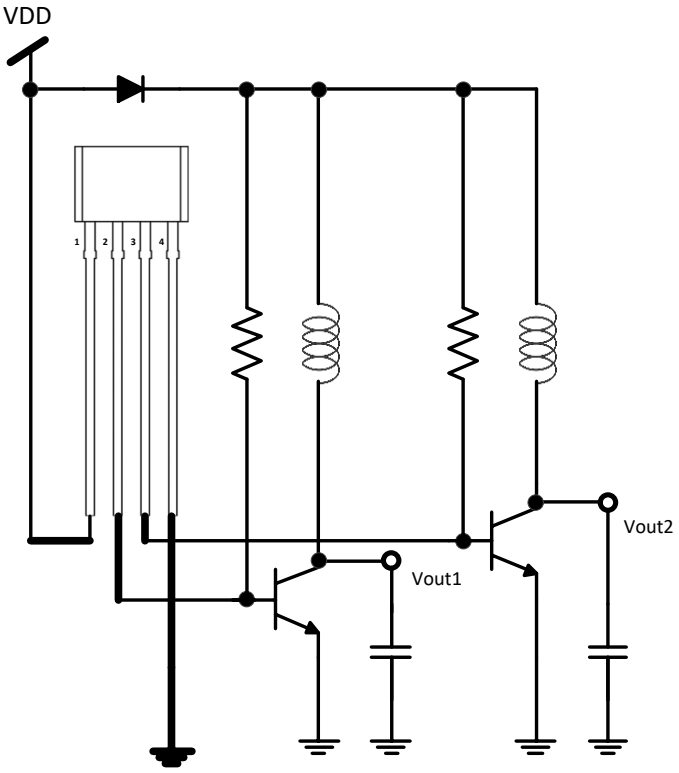
《TO-94》



《SOT-25》



Application Circuit: Fan Motor Applications



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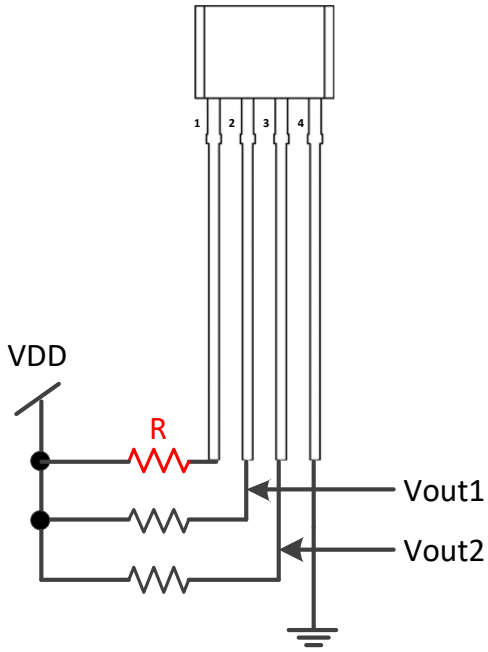
Application Circuit: Protection circuit



Precautions for the use of Hall Sensor IC: please refer to Winson Website-> Products->Application Note ->Hall Sensor IC Application Note: http://www.winson.com.tw/Product/83