LINEAR HALL EFFECT IC **AH49H**

General Description

The AH49H is a small, versatile linear Hall-effect device that is operated by the magnetic field from a permanent magnet or an electromagnet. The output voltage is set by the supply voltage and varies in proportion to the strength of the magnetic field.

The integrated circuitry features low noise output, which makes it unnecessary to use external filtering components. It also includes precision resistors to provide increased temperature stability and accuracy. The operating temperature range of these linear Hall sensors is -40°C to 105°C, appropriate for commercial, consumer, and industrial environments.

The AH49H is available in standard TO-92S-3 and SOT-23-3 packages.

Features

- Miniature Construction
- Power Consumption of 2mA at V_{CC}=3.3V for Energy Efficiency
- Single Current Sourcing Output
- Linear Output for Circuit Design Flexibility
- Low Noise Output Virtually Eliminates the Need for Filtering
- A Stable and Accurate Output
- Temperature Range: -40°C to 105°C
- Responds to Either Positive or Negative Gauss
- The Maximum Instantaneous Supply Voltage Up to 50V
- High ESD Rating: 6000V (Human Body Model)
  400V (Machine Model)

Application

- Current Sensing
- Motor Control
- Position Sensing
- Magnetic Code Reading
- Rotary Encoder
- Ferrous Metal Detector
- Vibration Sensing
- Liquid Level Sensing
- Weight Sensing

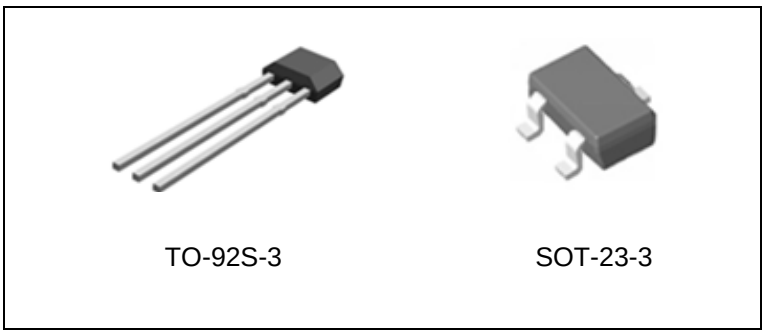
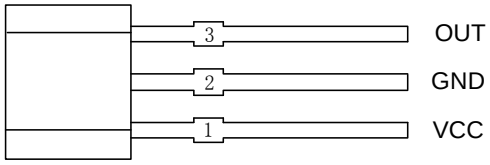


Figure 1. Package Types of AH49H

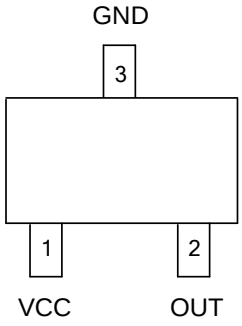
Pin Configuration

Z3 Package
(TO-92S-3)



(Front View)

N Package
(SOT-23-3)



(Top View)

Figure 2. Pin Configuration of AH49H

Pin Description

Pin Number		Pin Name	Function
TO-92S-3	SOT-23-3		
1	1	VCC	Power supply pin
2	3	GND	Ground pin
3	2	OUT	Output pin

Functional Block Diagram

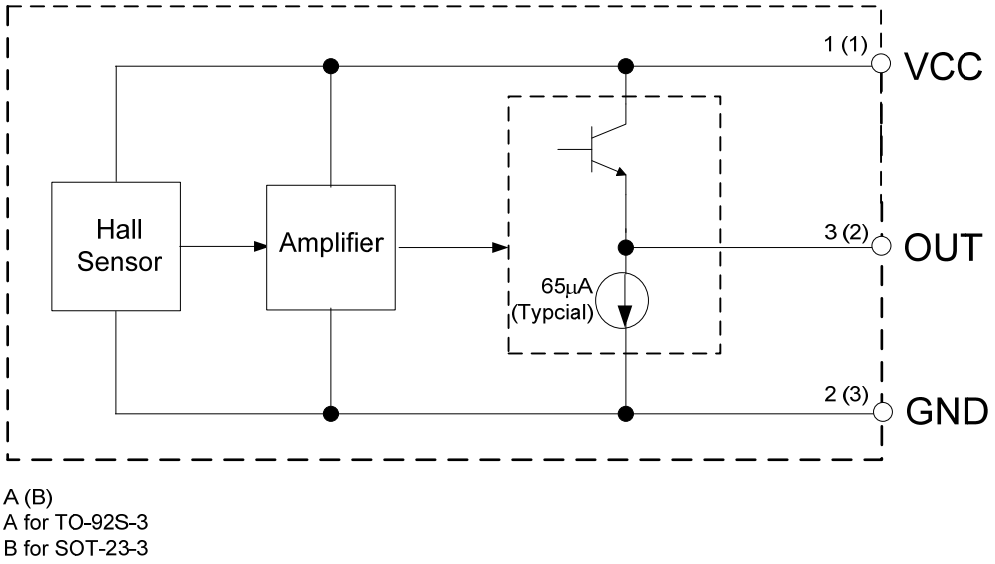
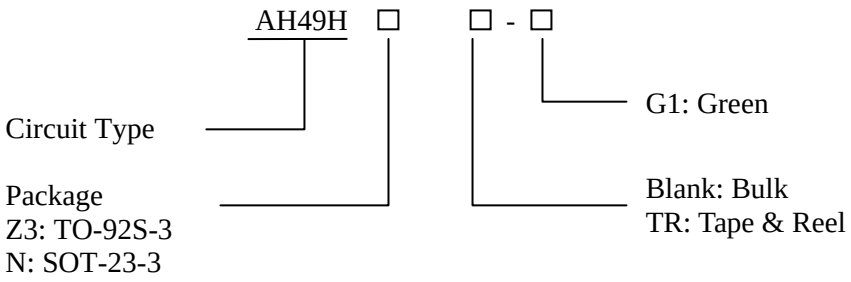


Figure 3. Functional Block Diagram of AH49H

Ordering Information



Package	Temperature Range	Part Number	Marking ID	Packing Type
TO-92S-3	-40 to 105°C	AH49HZ3-G1	49HG	Bulk
SOT-23-3		AH49HNTR-G1	GT7	Tape & Reel

BCD Semiconductor's Pb-free products, as designated with "G1" in the part number, are RoHS compliant and green.

Absolute Maximum Ratings (Note 1)

Parameter		Symbol	Value	Unit
Supply Voltage		V_{CC}	10	V
Instantaneous Supply Voltage		V_{CC_INST}	50	V
Power Dissipation	TO-92S-3	P_D	400	mW
	SOT-23-3		230	
Ambient Temperature		T_A	-40 to 125	°C
Storage Temperature		T_{STG}	-50 to 150	°C
ESD (Human Body Model)			6000	V
ESD (Machine Mode)			400	V

Note 1: Stresses greater than those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “Recommended Operating Conditions” is not implied. Exposure to “Absolute Maximum Ratings” for extended periods may affect device reliability.

Recommended Operating Conditions (T_A=25°C)

Parameter	Symbol	Min	Max	Unit
Supply Voltage	V_{CC}	3	8	V
Operating Temperature	T_{OP}	-40	105	°C

Electrical Characteristics

V_{CC}=3.3V, T_A=25°C, unless otherwise specified.

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Supply Current	I_{CC}		1.2	2	3.2	mA
Quiescent Output Voltage	V_{NULL}	B=0 (Gauss)	1.45	1.7	1.85	V
Output Voltage Sensitivity	V_{SEN}	B=±600 (Gauss)		0.33		mV/Gauss
Output Voltage Span	V_{OUT_S}			0.85 to 2.6		V
Output Resistor	R_{OUT}		30	50	70	Ω
Linear Magnetic Range	B			±3000		Gauss
Output Noise		Bandwidth=10Hz to 10kHz		90		μV

Transferring Characteristics (V_{CC}=3.3V)

When there is no outside magnetic field (B=0Gauss), the quiescent output voltage is one-half the supply voltage in general.

For TO-92S-3 package, if a south magnetic pole approaches the front face (the side with marking ID) of the Hall effect sensor, the circuit will drive the output voltage higher. In contrary, a north magnetic pole will drive the output voltage lower. The variations of voltage level up or down are symmetrical. Because the SOT-23-3 is reversed packaging with TO-92S-3, so the magnetic performance is also reversed. Therefore, if the reversed magnetic pole approaches the front face, the output is the same as TO-92S-3 package. Greatest magnetic sensitivity is obtained with a supply voltage of 8V, but at the cost of increased supply current and a slight loss of output symmetry. So, it is not recommended to work in such condition unless the output voltage magnitude is a main issue. The output signal can be capacitively coupled to a next-level amplifier for further amplifying if the changing frequency of the magnetic field is high.

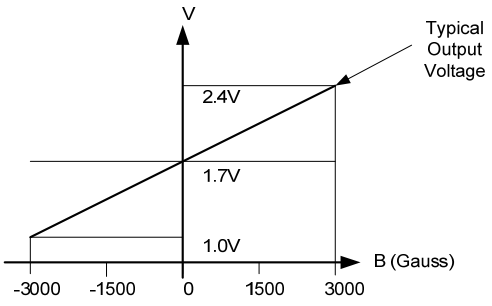
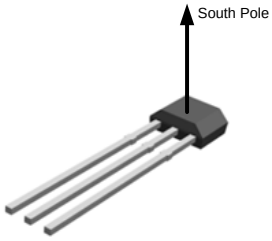
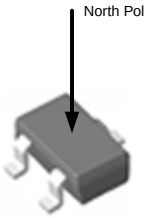


Figure 4. Transferring Characteristic of AH49H



For TO-92S-3



For SOT-23-3

Figure 5. Magnetic Characteristic of AH49H

Typical Performance Characteristics

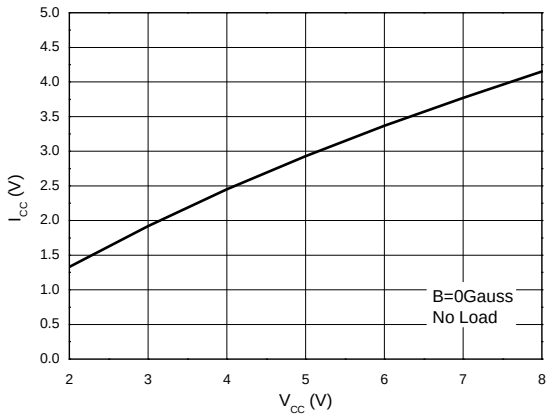


Figure 6. Supply Current vs. Supply Voltage

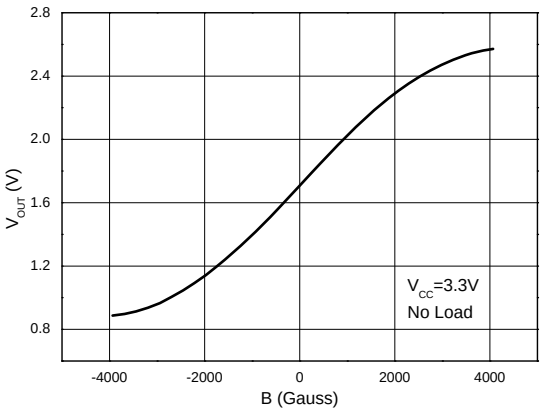


Figure 7. Output Voltage vs. Magnetic Field

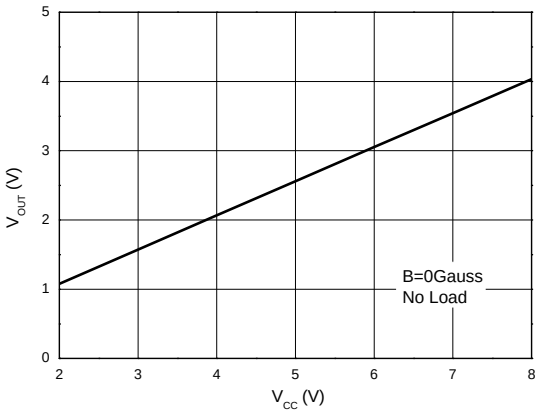


Figure 8. Output Voltage vs. Supply Voltage

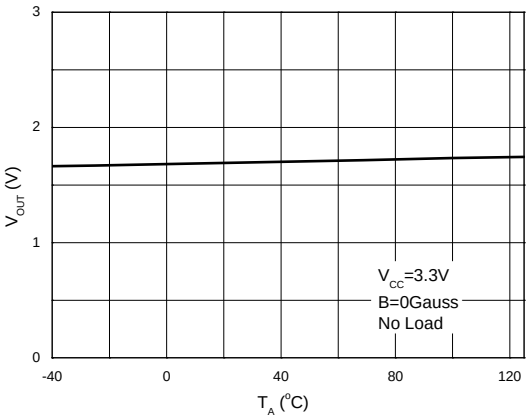


Figure 9. Output Voltage vs. Ambient Temperature

Typical Performance Characteristics (Continued)

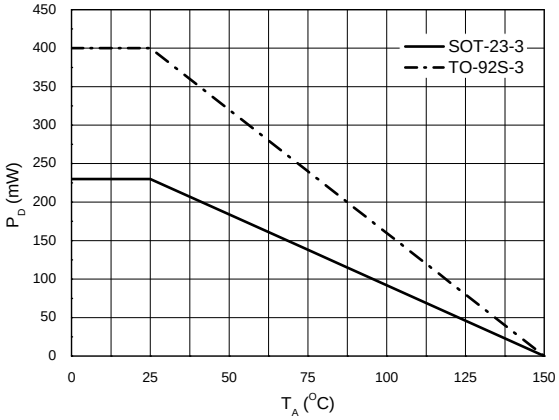
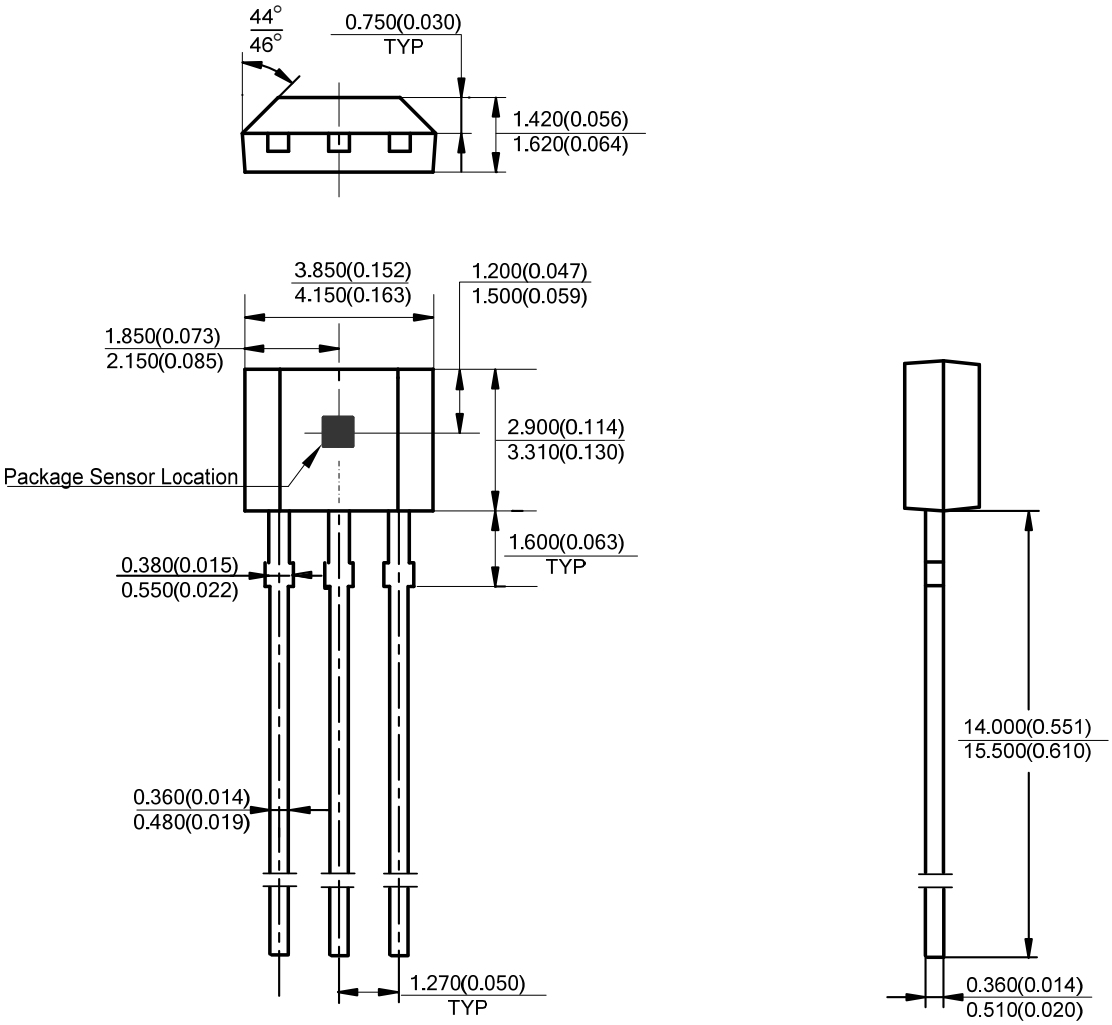


Figure 10. Power Dissipation vs. Ambient Temperature

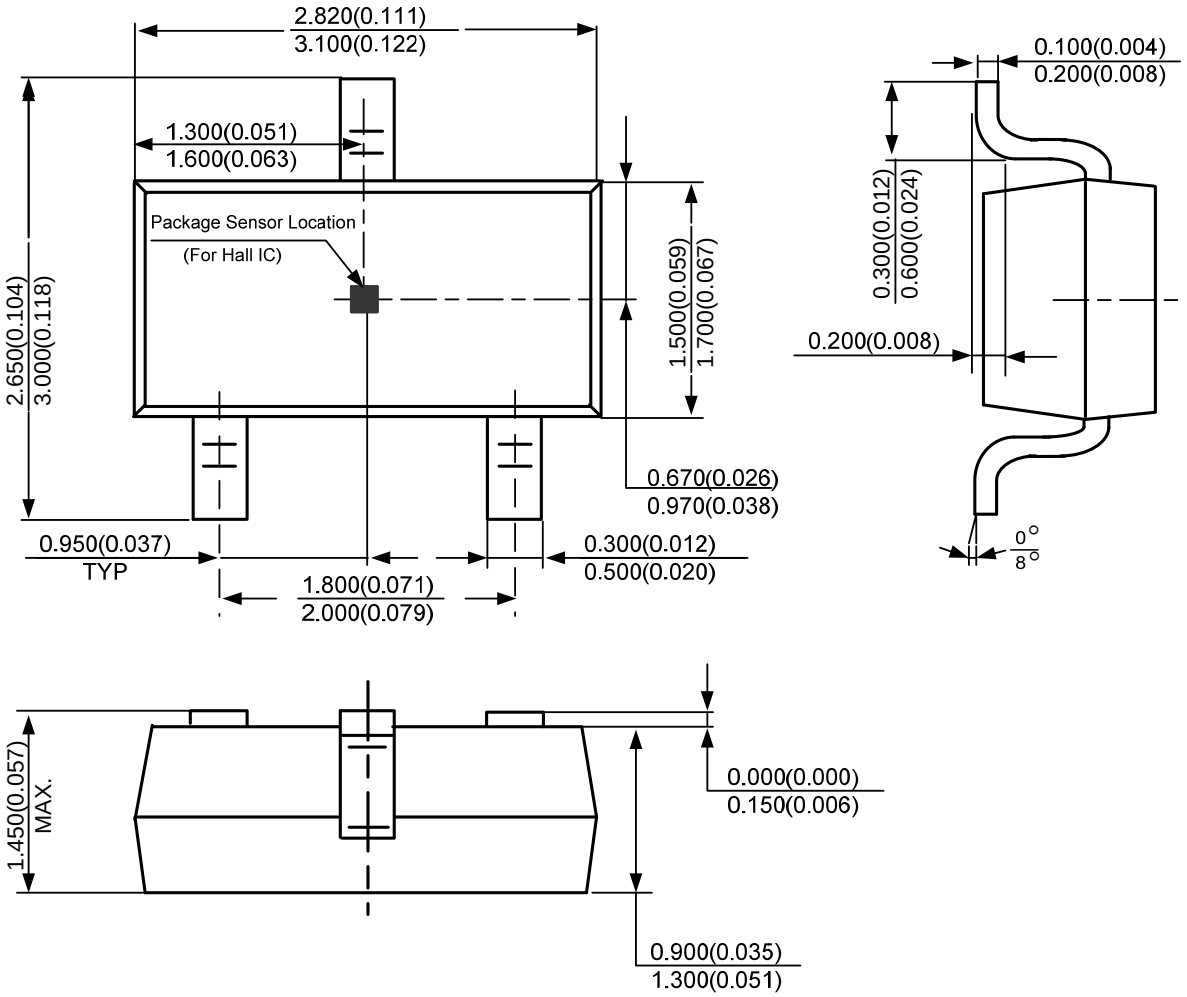
Mechanical Dimensions

TO-92S-3 **Unit: mm(inch)**



Mechanical Dimensions (Continued)

SOT-23-3 **Unit: mm(inch)**





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