Description

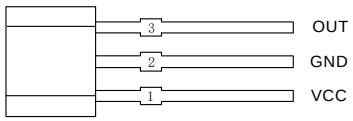
The AH49E is a small, versatile linear Hall-effect device that is operated by the magnetic field from a permanent magnet or an electromagnet. The output voltage is set by the supply voltage and varies in proportion to the strength of the magnetic field.

The integrated circuitry features low noise output, which makes it unnecessary to use external filtering. 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 +85°C, appropriate for commercial, consumer and industrial applications.

The AH49E is available in standard TO92S (TYPE CJ), TO-92S and SOT-23-3 packages.

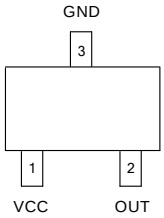
Pin Assignments

Z3 Package
(TO92S (TYPE CJ))
(TO-92S NRND)



(Front View)

N Package
(SOT-23-3)



(Top View)

Features

- Miniature Construction
- Power Consumption of 3.5mA at V_{CC} = 5V 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 +85°C
- Responds to Either Positive or Negative Gauss
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/104/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please contact us or your local Diodes representative. https://www.diodes.com/quality/product-definitions/**

Applications

- Current sensing
- Motor controls
- Position sensing
- Magnetic code reading
- Ferrous metal detectors
- Vibration sensing
- Liquid level sensing
- Weight sensing

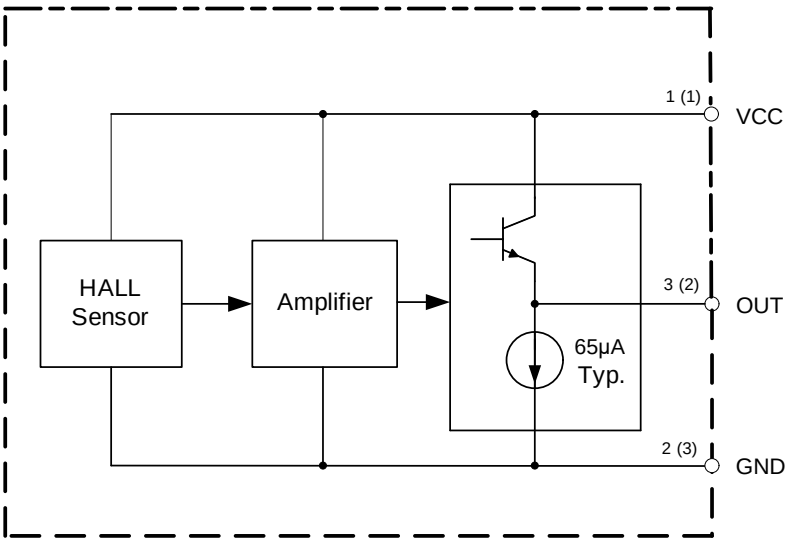
Notes:
1. EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant. All applicable RoHS exemptions applied.
2. See https://www.diodes.com/quality/lead-free/ for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.

Pin Descriptions

Pin Number		Pin Name	Function
TO92S (TYPE CJ) TO-92S*	SOT-23-3		
1	1	VCC	Supply voltage
2	3	GND	Ground pin
3	2	OUT	Output

*Not recommended for new design

Functional Block Diagram



A/B
A for TO-92S / TO92S (TYPE CJ)
B for SOT-23-3

Absolute Maximum Ratings (Note 4)

Symbol	Parameter	Rating	Unit
V_{CC}	Supply Voltage	8	V
I_O	Output Current	10	mA
T_A	Operating Temperature	-40 to +100	°C
T_{STG}	Storage Temperature Range	-50 to +150	°C
—	ESD (Human Body Model)	3000	V

Note: 4. Stresses greater than those listed under *"Absolute Maximum Ratings"* can 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 can affect device reliability.

Recommended Operating Conditions

Symbol	Parameter	Min	Max	Unit
V_{CC}	Supply Voltage	3.0	6.5	V
T_{OP}	Operating Temperature	-40	+85	°C

Electrical Characteristics (@V_{CC} = 5V, T_A = +25°C, unless otherwise specified.)

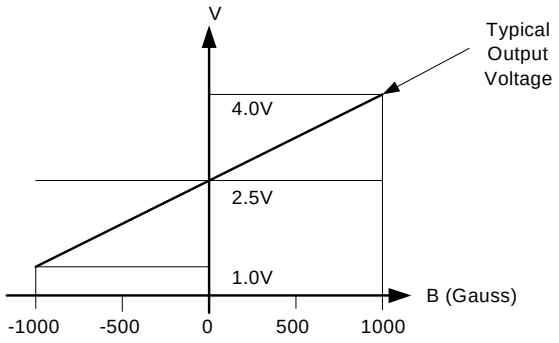
Symbol	Parameters	Conditions	Min	Typ	Max	Unit
I_{CC}	Supply Current	—	—	3.5	4.5	mA
V_{NULL}	Quiescent Output Voltage	B = 0 (Gauss)	2.25	2.5	2.75	V
—	Output Voltage Sensitivity	B = 0 to ±1000 (Gauss)	1.1	1.6	2.1	mV/Gauss
V_{OS}	Output Voltage Span	—	1.0 to (V_{CC} -1.0)	0.8 to (V_{CC} -0.8)	—	V
R_O	Output Resistor	—	—	60	120	Ω
B	Magnetic Field Range	—	±650	±1000	—	Gauss
—	Linearity of Span	—	—	0.7	—	%
—	Output Noise	Bandwidth = 10Hz to 10kHz	—	90	—	μV

Transferring Characteristics (@V_{CC} = 5V)

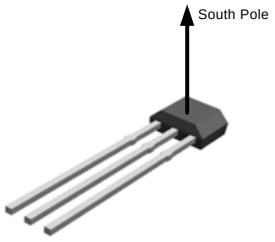
When there is no outside magnetic field (B = 0GS), the quiescent output voltage is one-half the supply voltage in general.

For TO92S package, if a south magnetic pole approches to the front face (the side with marking ID) of the Hall effect sensor, the circuit will drive the output voltage higher. Contrary, a north magnetic pole will drive the output voltage lower. The variations of voltage level up or down are symmetrical. Due to SOT-23-3 is reversed packaging with TO92S (TYPE CJ), so the magnetic performance is also reversed. Therefor, if the reversed magnetic pole approches to the front face (the side with marking ID), the output is the same as TO-92S package.

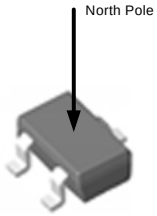
Greatest magnetic sensitivity is obtained with a supply voltage of 6V, but at the cost of increased supply current and a slight loss of output symmetry. So, it is not recommended to work in such condition unless the output voltage magnitude is a main issue. The output signal can be capacitively coupled to an amplifier for boosting further if the changing frequency of the magnetic field is high.



Transferring Characteristic



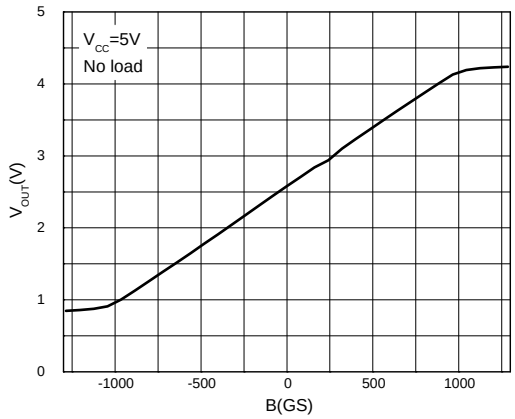
Magnetic Characteristic (For TO92S (Type CJ) & TO-92S)



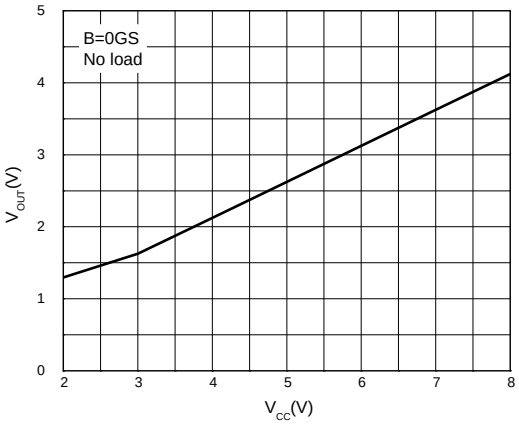
Magnetic Characteristic (For SOT-23-3)

Performance Characteristics

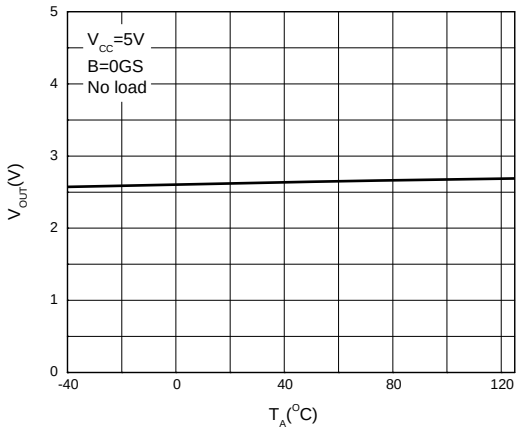
Output Voltage vs. Magnetic Field



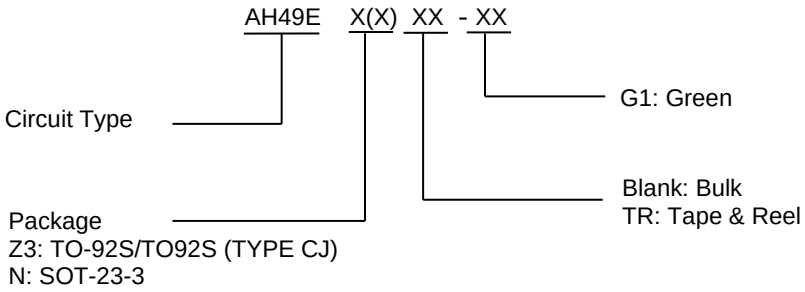
Output Voltage vs. Supply Voltage



Output Voltage vs. Ambient Temperature



Ordering Information



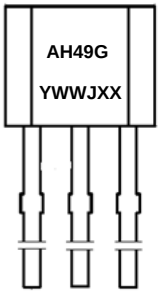
Orderable Part Number	Package	Status (Note 5)	Temperature Range	Marking ID	Packing	
					Qty.	Carrier
AH49EZ3-G1	TO-92S	NRND (CONTACT US)	-40°C to +85°C	AH49G	1000	Bulk
AH49EZ3-G1	TO92S (TYPE CJ)	Active		AH49G	1000	Bulk
AH49ENTR-G1	SOT-23-3	Active		GJ1	3000	Tape & Reel

Note: 5. NRND = Not recommended for new design

Marking Information

(1) Package Type: TO92S (TYPE CJ) / TO-92S

(Front View)



First Line: Identification Code
Second Line: Date Code
Y: Year 0 to 9
WW: Week 00 to 52 (Work Week of Molding)
J: Assembly House Code
XX: 7th and 8th Digits: Batch No.

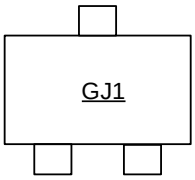
Orderable Part Number	Package (Note 5)	Identification Code
AH49EZ3-G1	TO-92S (NRND)	AH49G
	TO92S (TYPE CJ)	

Note: 5. NRND = Not recommended for new design

Marking Information (continued)

(2) Package Type: SOT23-3

(Top View)



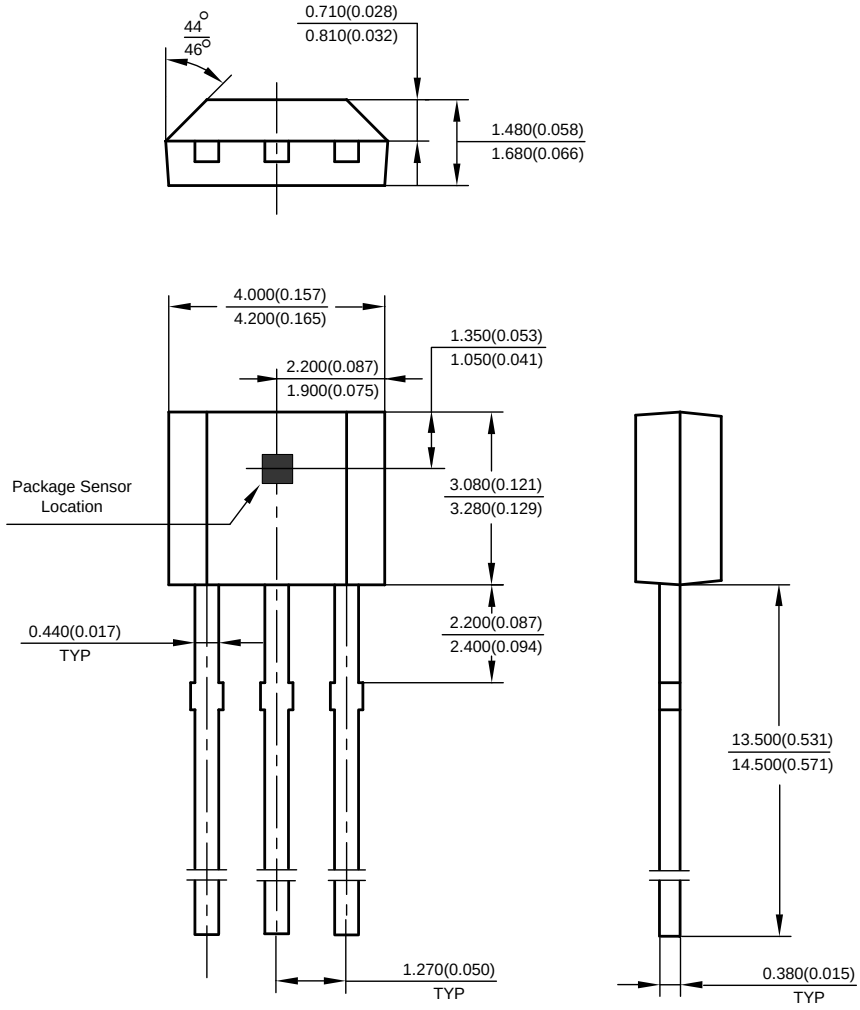
GJ1 : Identification Code

Orderable Part Number	Package	Identification Code
AH49ENTR-G1	SOT23-3	GJ1

Package Outline Dimensions (All dimensions in mm(inch).)

Please see http://www.diodes.com/package-outlines.html for the latest version.

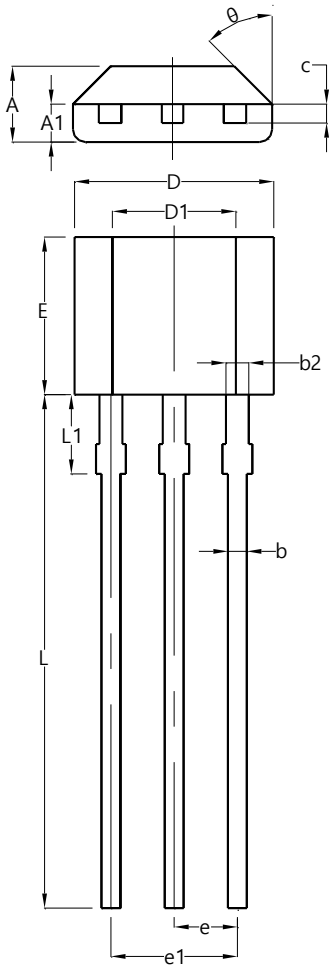
TO-92S



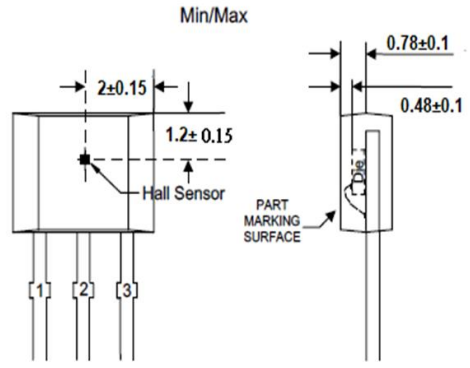
Package Outline Dimensions (All dimensions in mm(inch).) (continued)

Please see http://www.diodes.com/package-outlines.html for the latest version.

TO92S (TYPE CJ)



TO92S (TYPE CJ)			
Dim	**Min**	**Max**	**Typ**
A	1.420	1.620	--
A1	0.660	0.860	--
b	0.330	0.480	--
b2	0.400	0.510	--
c	0.330	0.510	--
D	3.900	4.100	--
D1	2.280	2.680	--
E	3.050	3.250	--
e	--	--	1.270
e1	2.440	2.640	--
L	15.100	15.500	--
L1	1.6 REF		
θ	--	--	45°
All Dimensions in mm			

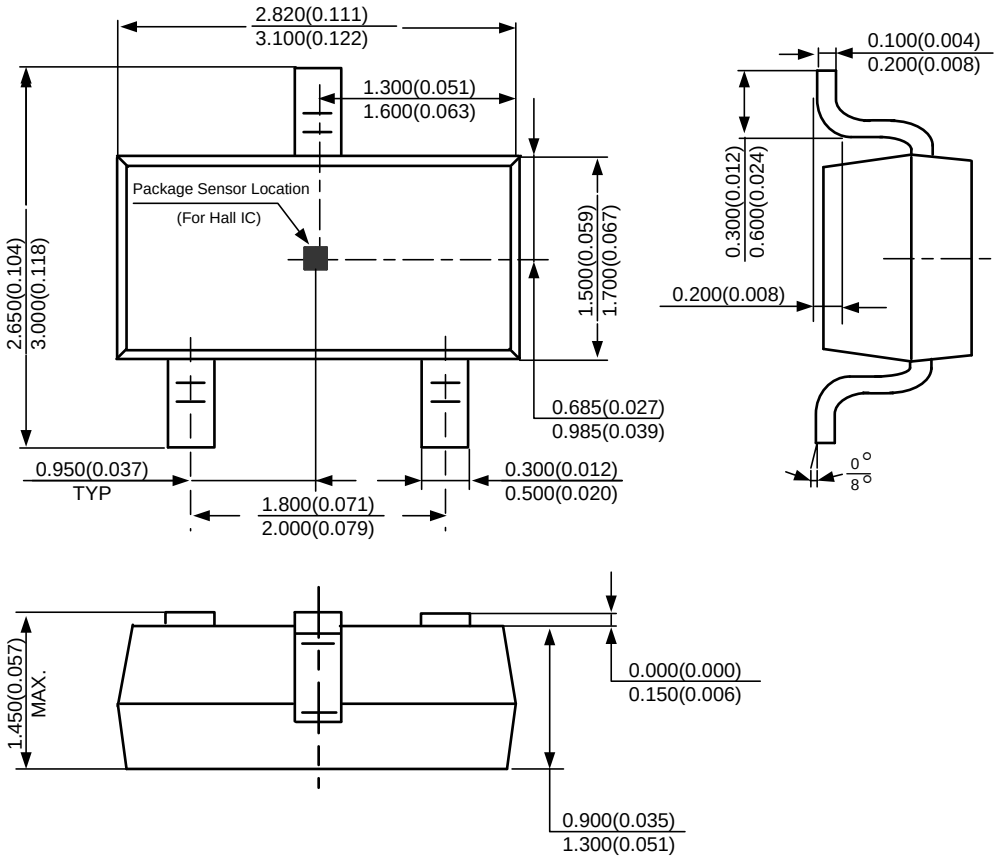


Sensor Location

Package Outline Dimensions (All dimensions in mm(inch).) (continued)

Please see http://www.diodes.com/package-outlines.html for the latest version.

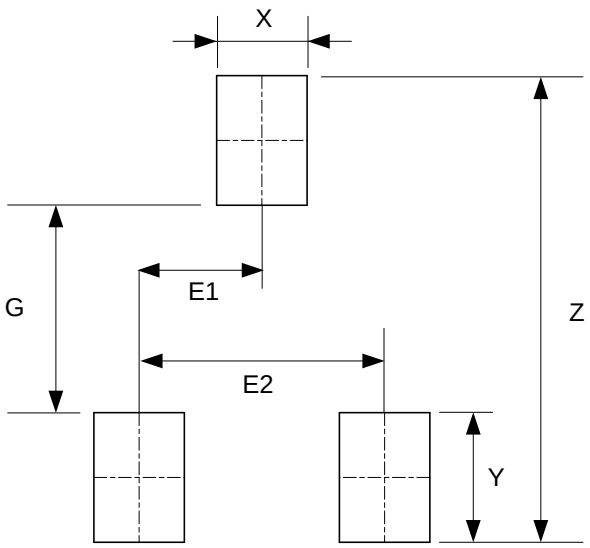
SOT-23-3



Suggested Pad Layout

Please see http://www.diodes.com/package-outlines.html for the latest version.

SOT-23-3



Dimensions	Z (mm)/(inch)	G (mm)/(inch)	X (mm)/(inch)	Y (mm)/(inch)	E1 (mm)/(inch)	E2 (mm)/(inch)
Value	3.600/0.142	1.600/0.063	0.700/0.028	1.000/0.039	0.950/0.037	1.900/0.075

Mechanical Data

- Moisture Sensitivity: SOT23-3 – Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 e3
- Weight: TO92S (TYPE CJ)/TO-92S – 0.077 grams (Approximate)
  SOT23 – 0.009 grams (Approximate)

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