

**BIPOLAR HALL-EFFECT POSITION SENSORS**
**AH41**

### General Description

The AH41 is an integrated Hall-effect latched sensor designed for electronic commutation of brushless DC motor applications. The device includes an on-chip Hall voltage generator for magnetic sensing, a comparator that amplifies the Hall voltage, and a Schmitt to provide switching hysteresis for noise rejection and open-collector output. An internal bandgap regulator is used to provide temperature compensated supply voltage for internal circuits and allows a wide operating supply range.

A north pole of sufficient strength will turn the output ON. In the absence of a magnetic field, the output is OFF.

This IC is available in TO-92S-3 package.

### Features

- On-chip Hall Sensor
- Wide Operating Voltage Range: 4V to 24V
- Internal Bandgap Regulator for Temperature Compensation
- Maximum Output Sink Current: 50mA
- Low Profile TO-92S-3
- Operating Temperature: -40°C to 150°C
- ESD Rating: 2000V (Human Body Model)  
300V (Machine Model)

### Application

- Brushless DC Motor

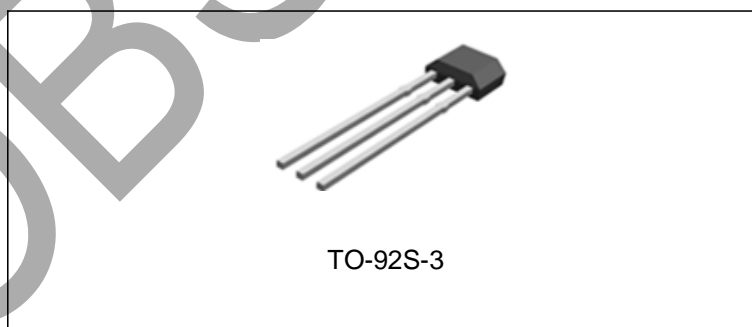


Figure 1. Package Type of AH41

### Pin Configuration

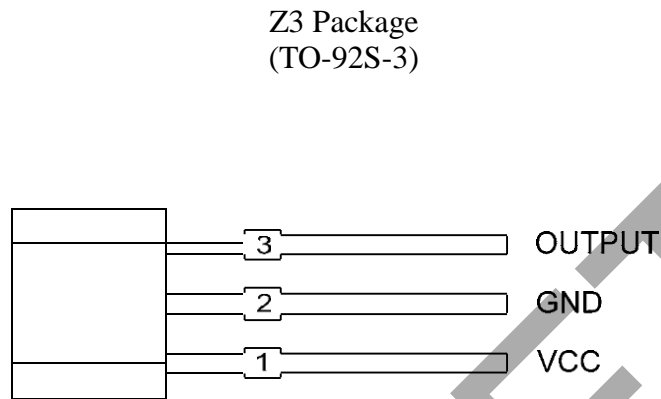


Figure 2. Pin Configuration of AH41 (Front View)

### Pin Description

Pin Number	Pin Name	Function
1	VCC	Power supply pin
2	GND	Ground pin
3	OUTPUT	Output pin. It is low during the N magnetic field

**Functional Block Diagram**

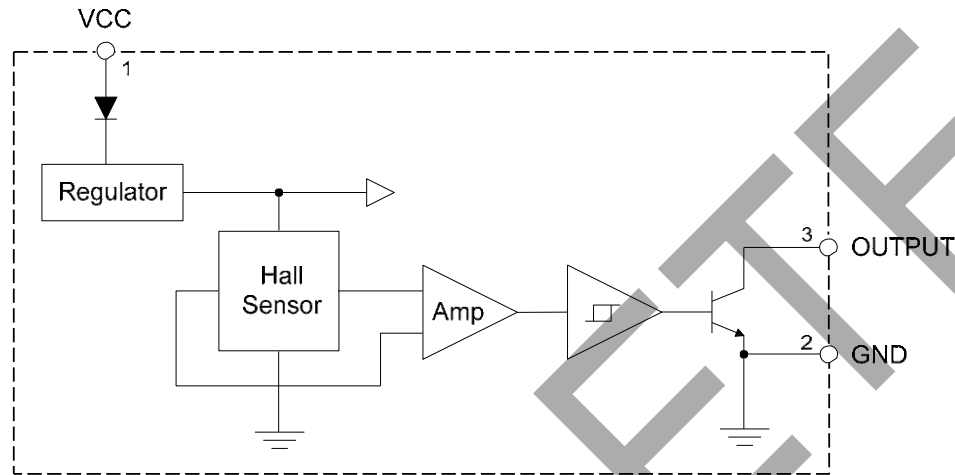
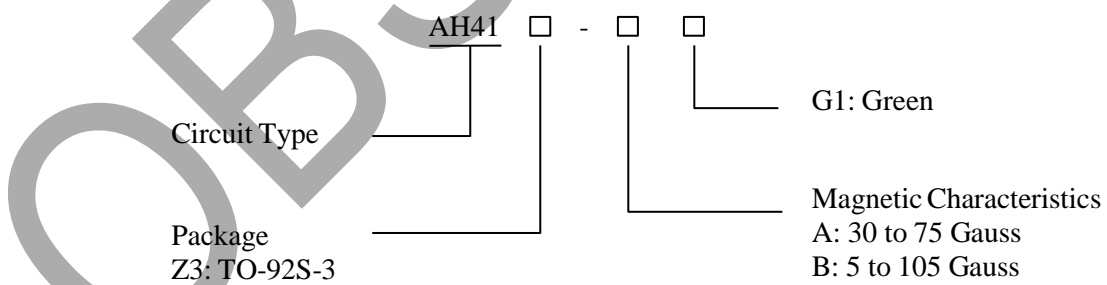


Figure 3. Functional Block Diagram of AH41

**Ordering Information**



Package	Temperature Range	Part Number	Marking ID	Packing Type
TO-92S-3	-40 to 150°C	AH41Z3-AG1	AH41	Bulk
		AH41Z3-BG1	AH41	Bulk

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

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**Absolute Maximum Ratings (Note 1)**

Parameter	Symbol	Value	Unit
Supply Voltage	$V_{CC}$	-24 to 28	V
Output OFF Voltage	$V_{CE}$	30	V
Output Sink Current (Continuous Current)	$I_{OUT}$	50	mA
Power Dissipation ( $T_A=25^\circ\text{C}$ )	$P_D$	400	mW
Storage Temperature	$T_{STG}$	-65 to 150	$^\circ\text{C}$
Junction Temperature	$T_J$	150	$^\circ\text{C}$
ESD (Machine Model)		300	V
ESD (Human Body Model)		2000	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 ( $T_A=25^\circ\text{C}$ )**

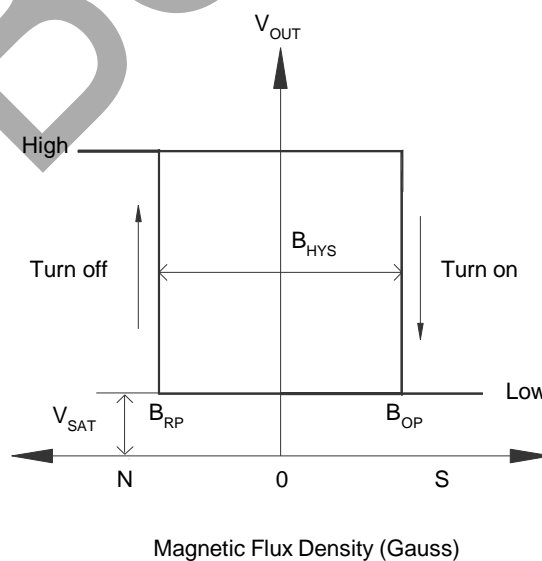
Parameter	Symbol	Min	Max	Unit
Supply Voltage	$V_{CC}$	4	24	V
Operating Temperature	$T_{OP}$	-40	150	$^\circ\text{C}$

**BIPOLAR HALL-EFFECT POSITION SENSORS**
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**Electrical Characteristics**
 $V_{CC}=12V$ ,  $T_A=25^\circ C$ , unless otherwise specified.

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Supply Voltage	$V_{CC}$		4		24	V
Supply Current	$I_{CC}$	$V_{CC}=4V$ to $24V$		6	9	mA
Output Leakage Current	$I_{OL}$	$V_{CE}=14V$		0.1	10	$\mu A$
Output Saturation Voltage	$V_{SAT}$	$I_{OUT}=20mA$		110	300	mV
Rise Time	$t_r$	$R_L=820\Omega$ $C_L=20pF$		200		ns
Fall Time	$t_f$	$R_L=820\Omega$ $C_L=20pF$		100		ns

**Magnetic Characteristics ( $T_A=25^\circ C$ )**

Parameter	Symbol	Grade	Min	Typ	Max	Unit
Operating Point	$B_{OP}$	A	30		75	Gauss
		B	5		105	
Releasing Point	$B_{RP}$	A	-75		-30	Gauss
		B	-105		-5	
Hysteresis	$B_{HYS}$		80	110	140	Gauss



**Test Circuit**

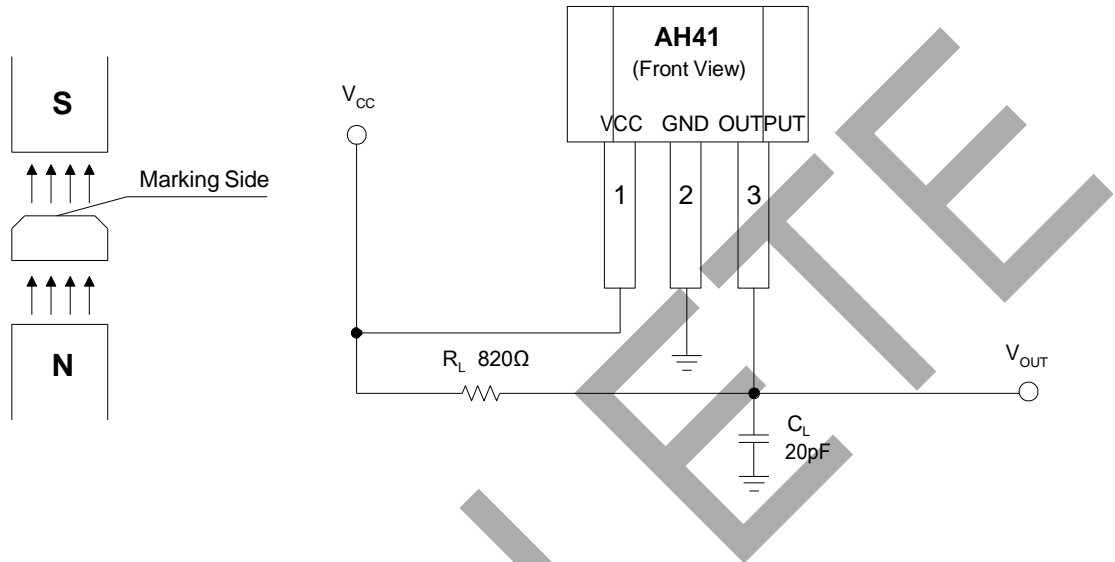


Figure 4. Basic Test Circuit of AH41

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**Typical Performance Characteristics**

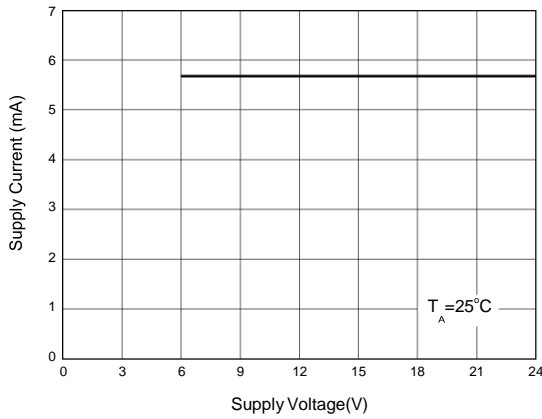


Figure 5. Supply Current vs. Supply Voltage

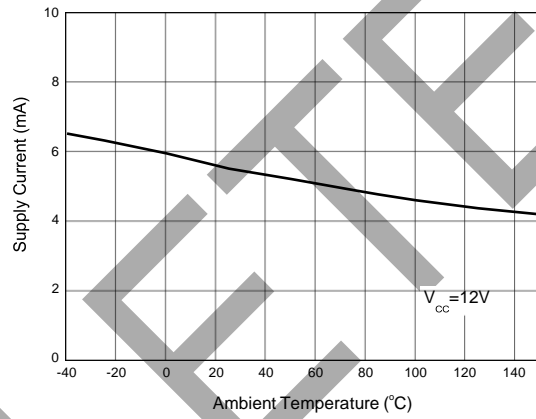


Figure 6. Supply Current vs. Ambient Temperature

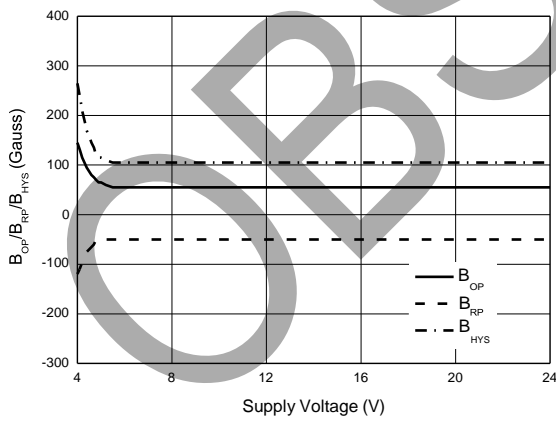


Figure 7. B<sub>OP</sub>/B<sub>RP</sub>/B<sub>HYS</sub> vs. Supply Voltage

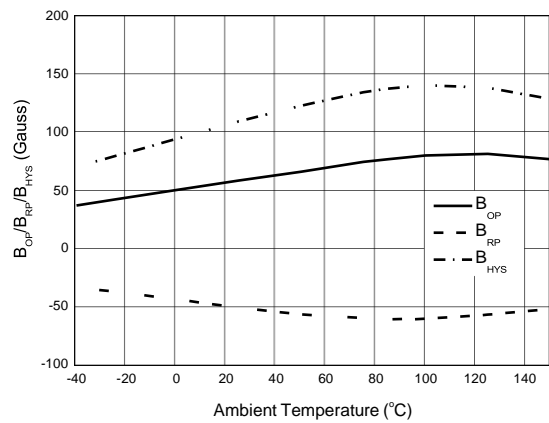


Figure 8. B<sub>OP</sub>/B<sub>RP</sub>/B<sub>HYS</sub> vs. Ambient Temperature

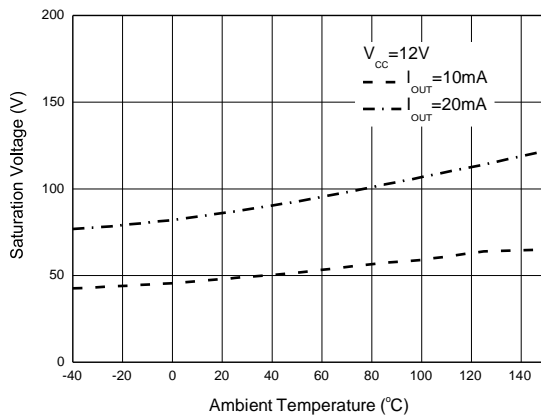
**Typical Performance Characteristics (Continued)**

Figure 9. Saturation Voltage vs. Ambient Temperature

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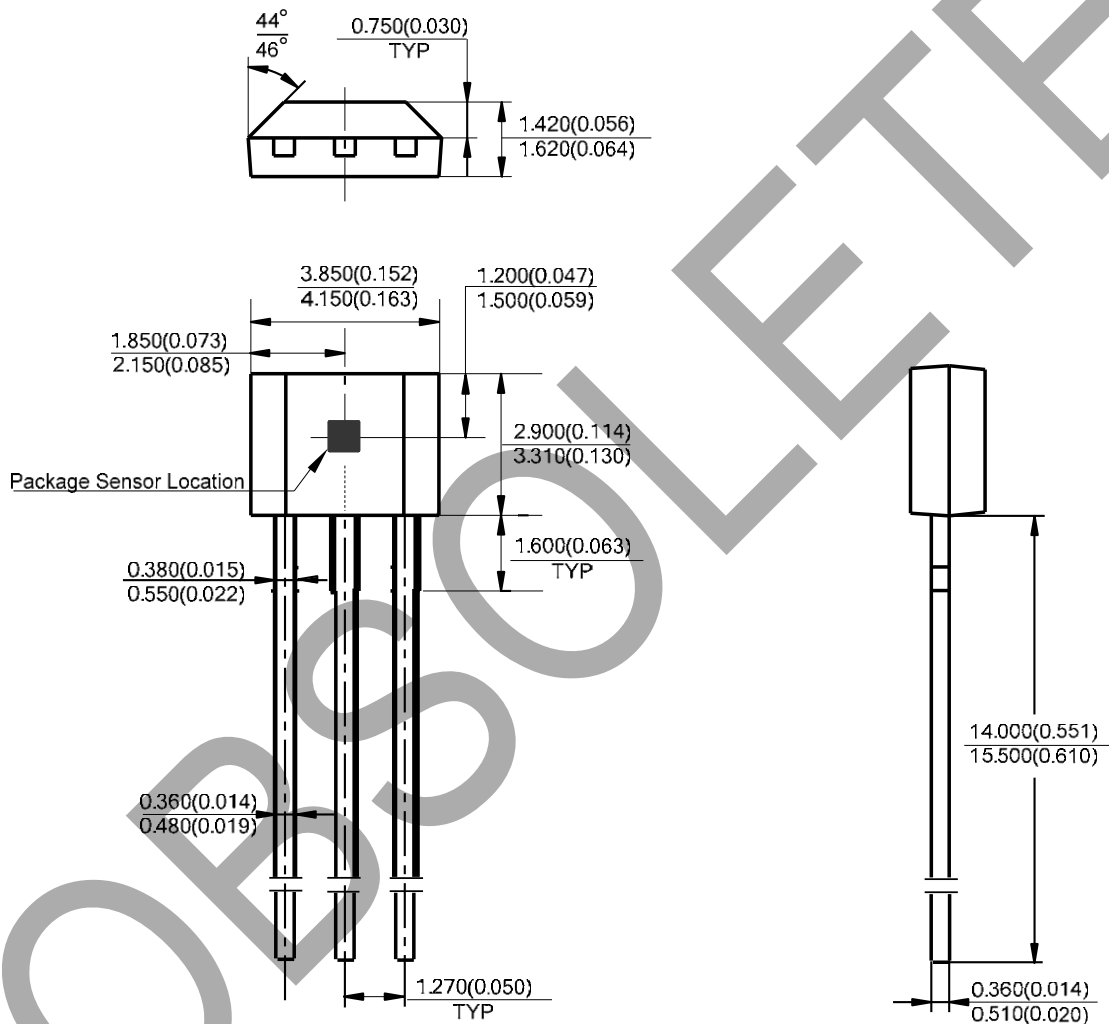
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**Mechanical Dimensions**

**TO-92S-3**

**Unit: mm(inch)**



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