Introduction

AH431, designed with Bipolar technology, includes on-chip Hall element voltage generator, a voltage regulator for operation with supply voltages of 3.8 to 40V, temperature compensation circuitry, small-signal amplifier, Schmitt trigger and a switch controlled current source circuit.

The sensor is a 2-wire device designed to respond to South poles , the output driver being a current source. The comparator compares the actual magnetic flux with the fixed reference values (switching points). The current source is switched on (high current consumption) or off (low current consumption) . The active offset compensation leads to constant magnetic characteristics over supply voltage and temperature range.

AH431 offers a variety of packages, including TO-92S, SOT-23. All packages are RoHS compliant.

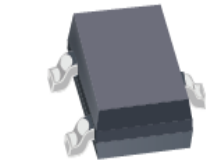
Features

- Digital current output
- Miniature construction
- High sensitivity of 80/60Gauss (typ.)
- Wide voltage range of 3.8 Vdc to 40 Vdc
- Highest ESD performance up to ±6 kV
- Temperature range of -40 °C to 125 °C

Applications

- BLDC Motor Commutation
- Flow sensor
- Position sensor
- Speed sensor
- Proximity sensor

Package



3-pin SOT23

3-pin TO92S

Ordering information

Part number	Package	Packing	Ambient, T_A
AH431UA	TO92S	Bulk, 1000 pieces/bag	-40℃ to 125℃
AH431SU	SOT23	Tape&Reel, 3000 pieces/reel	-40℃ to 125℃

Pin assignment

Pin number	Name	Function
1	VDD	Power supply
2	GND	Ground

Absolute Maximum Ratings

The absolute maximum value is the limiting value when the chip is applied, above which the chip can be damaged. Although the function of the chip is not necessarily damaged when the absolute maximum value is exceeded, the reliability of the chip may be affected if the absolute maximum value is exceeded for a certain time.

Parameter	Symbol	Value	Units
Supply voltage	VDD	60	V
Operating temperature range	Ta	-40~125	℃
Storage temperature range	Ts	-40~165	℃

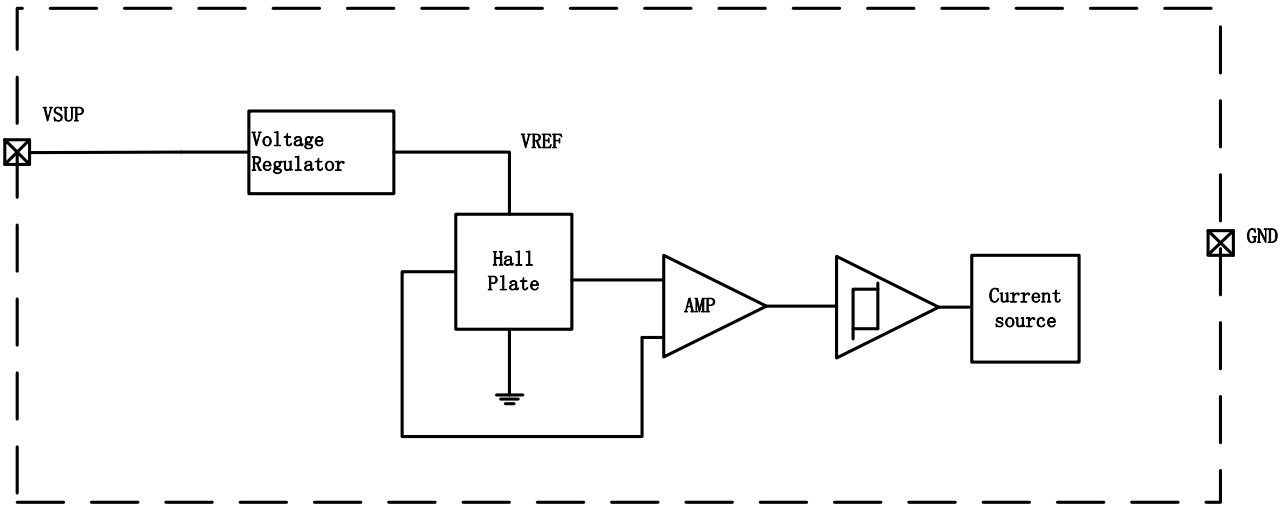
Electrical and magnetic characteristics(Ta=25℃, VDD =5.0V)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Electrical characteristics						
VDD	Operating voltage		3.8		40	V
IDDon	Supply current			18		mA
IDDoff	Supply current			7		mA

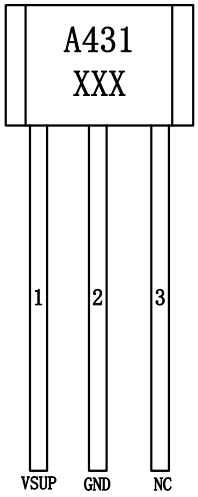
Tr	Output rising time				1	us
Tf	Output falling time				1.5	us
Magnetic characteristics						
Bop	Operate point			85		Gauss
Brp	Release point			60		Gauss
Bhys	Hysteresys			25		Gauss

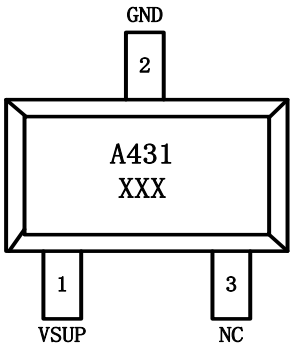
Function diagram

AH431, designed with Bipolar technology, includes on-chip Hall element voltage generator, a voltage regulator for operation with supply voltages of 3.8 to 40V, temperature compensation circuitry, small-signal amplifier, Schmitt trigger and a switch controlled current source circuit.



Pin orientation





TO92S **SOT23**

Pin description

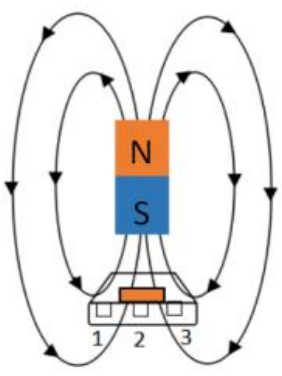
Name	Pin number	Description
VDD	1	Power supply
GND	2	Ground
NC	3	NC

Application example: VDD =5V

TO92S package, when the South pole is close to the marked side, the power supply output current is high current, and when away, the power supply output current is low current;

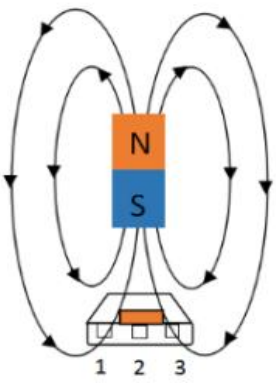
SOT23 package, when the North pole is close to the marked side, the output current of the power supply is high current, and when away, the output current of the power supply is low current.

I_{DDhigh}



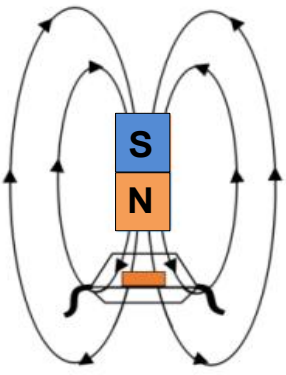
TO92S （AH431UA）

I_{DDlow}



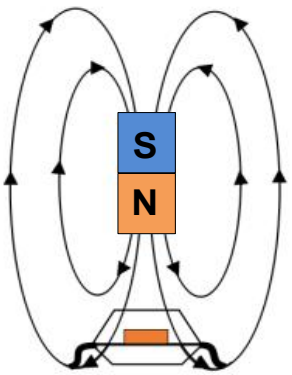
TO92S （AH431UA）

I_{DDhigh}



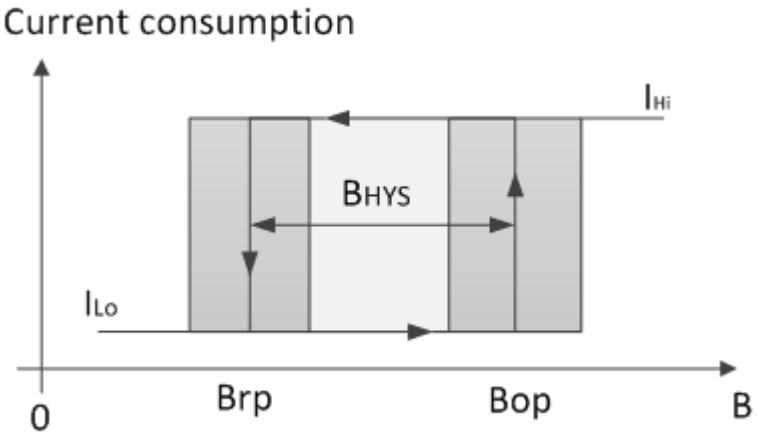
SOT23（AH431SU）

I_{DDlow}



SOT23（AH431SU）

Output Behavior

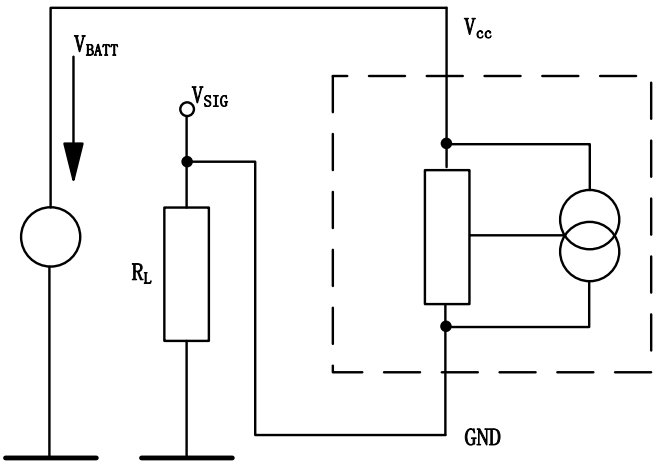


AH431UA/SU output behavior

Application Circuits

The following figure shows a simple application with a 2-wire sensor. The current consumption can be detected by measuring the voltage over RL. For correct functioning of the sensor, the voltage between Vcc and GND must be a minimum of Vccmin. With the maximum current consumption of Icchimax, the maximum RL can be calculated as:

$$RLmaxx = \frac{V_{BATTmin} - V_{ccmin}}{Icchimax}$$



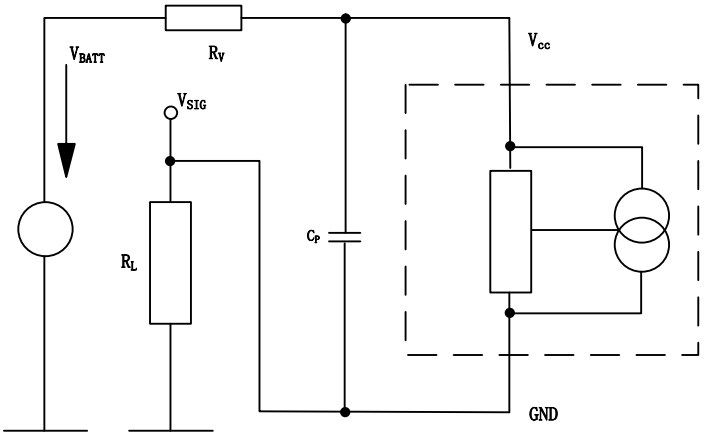
Case 1 of typical application circuit

Example 2-wire application circuit 2

For applications with disturbances on the supply line or radiated disturbances, a series resistor RV and a capacitor CP both placed close to the sensor are recommended. In this case, the maximum RL can be calculated as:

$$RLmaxx = \frac{VBATTmin - Vccmin}{Icchimax} - Rv$$

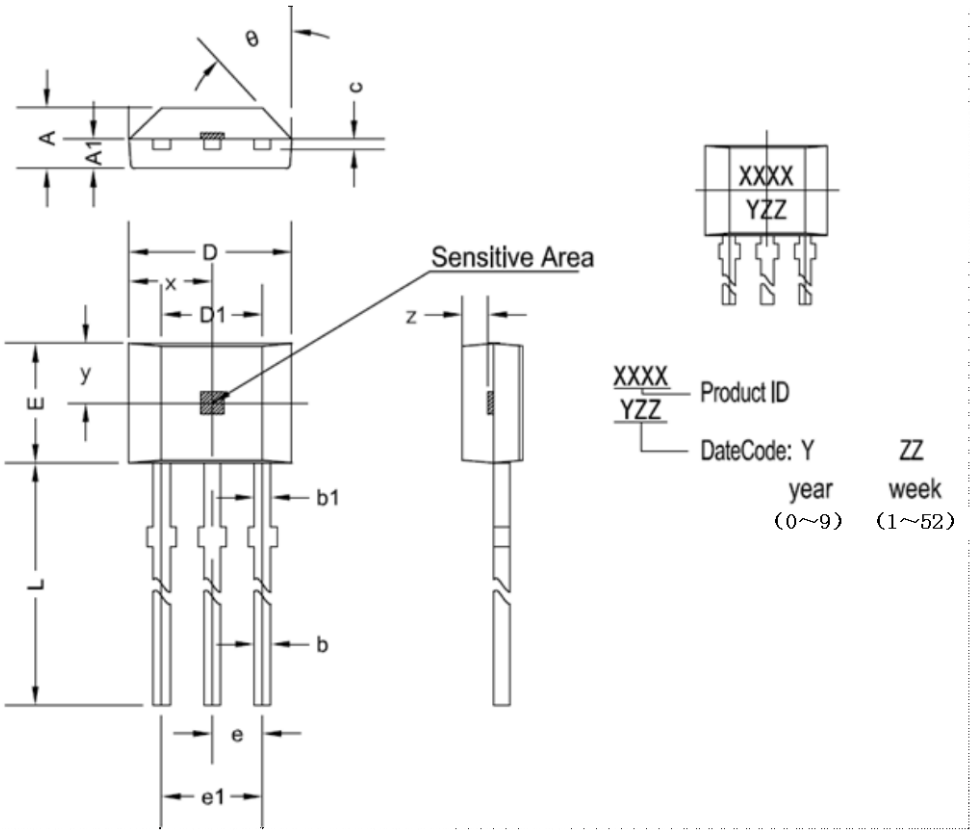
For example: RV =100 Ωand CP = 4.7 nF



Case 2 of typical application circui

Package dimensions

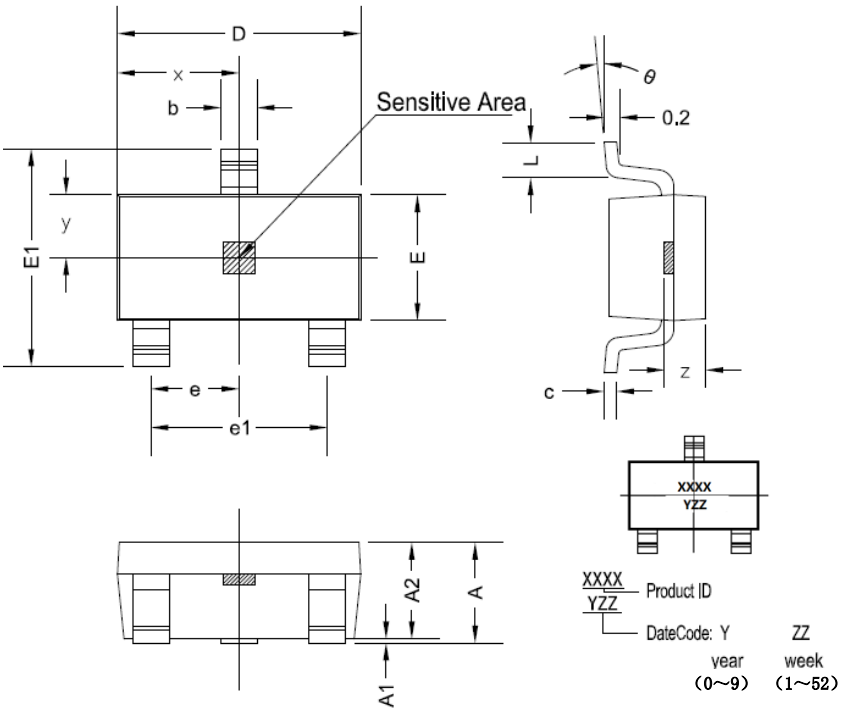
TO92S



T092S dimensions

symbol	Size (mm)		Size (in inches)	
	minimum	maximum	minimum	maximum
A	1.42	1.67	0.056	0.066
A1	0.66	0.86	0.026	0.034
b	0.35	0.56	0.014	0.022
b1	0.4	0.55	0.016	0.022
C	0.36	0.51	0.014	0.02
D	3.9	4.2	0.154	0.165
D1	2.97	3.27	0.117	0.129
E	2.9	3.28	0.114	0.129
e	1.270 TYP		0.050 TYP	
e1	2.44	2.64	0.096	0.104
L	13.5	15.5	0.531	0.61
x	2.025TYP		0.080TYP	
y	1.545TYP		0.061TYP	
z	0.500TYP		0.020TYP	
θ	45°TYP		45°TYP	

SOT23



SOT23 **dimensions**

symbol	Size (mm)		Size (in inches)	
	minimum	maximum	minimum	maximum
A	1.05	1.25	0.041	0.049
A1	0	0.1	0	0.004
A2	1.05	1.15	0.041	0.045
b	0.3	0.5	0.012	0.02
c	0. 100	0.2	0.004	0.008
D	2.82	3.02	0.111	0.119
E	1.5	1.7	0.059	0.067
E1	2.65	2.95	0.104	0.116
e	0.950 TYP		0.037 TYP	
e1	1.8	2	0.071	0.079
L	0.3	0.6	0.012	0.024
x	1.460TYP		0.057TYP	
y	0.800TYP		0.032TYP	
z	0.600TYP		0.024TYP	
θ	0°	8°	0°	8°