AH431

2-Wire Current unipolar switch

Alfa Electronics Co.,Ltd

1. Product Introduction

AH431 is a Hall effect sensor switch chip designed and produced based on bipolar semiconductor technology. The device is internally integrated with a Hall effect circuit, voltage regulator, signal amplification and processing circuit, Schmidt trigger, and a switch controlled current source circuit. The internal compensation characteristics of AH431 slightly increase its sensitivity with increasing temperature, making it particularly suitable for matching with commonly used low-cost magnetic steels. Enhanced output drive circuits can drive larger currents and reduce internal power consumption of devices. AH431 can withstand 60V high-voltage impact. The above characteristics greatly improve the reliability of the device and are very suitable for use as solid-state electronic switches in products such as automobiles, industrial appliances, and home appliances. Provide TO92S inline packaging, SMT SOT23-3L packaging, and all packaging meets RoHS standards.

3-pin SOT23　　3-pin TO92S

2. Function

- Power supply range: 3.8~60VDC
- Digital current mode output
- Bop/Brp:85/60Gs
- Magnetic characteristic temperature compensation
- ESD：±6kV
- Operating temperature range：-40℃～125℃

3. Application

- Automobile tachometer and odometer
- Position sensor
- Proximity switch
- Flowmeter
- Distance sensor

4. Product packaging

Part No.	Packages	Temperature range	Packing
AH431UA	TO92S	-40℃～125℃	1000/bag
AH431SU	SOT23-3L	-40℃～125℃	3000/ reel

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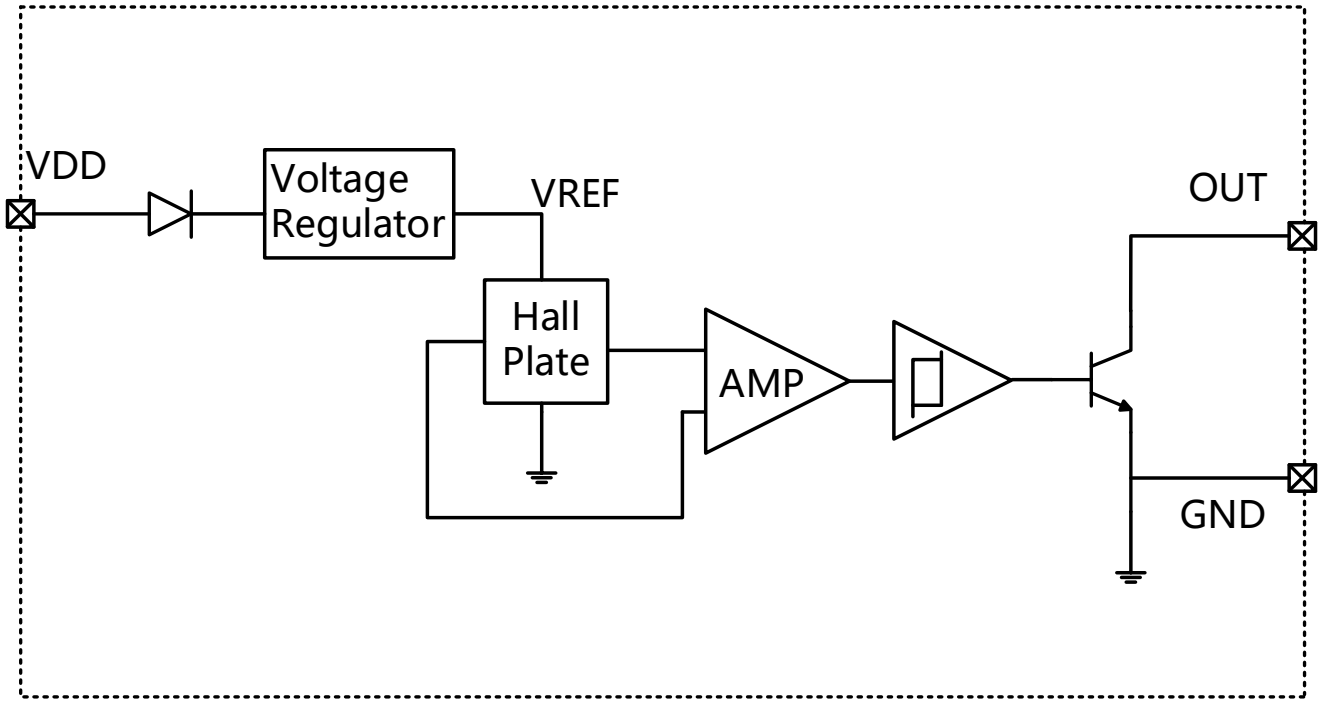
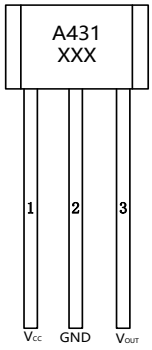
5. Functional Block Diagram

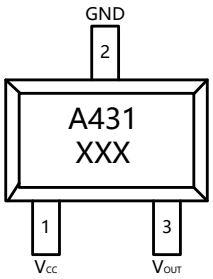


6. Pin information

No.	Name	Functions
1	V_{CC}	Power supply
2	GND	Ground
3	V_{OUT}	Output



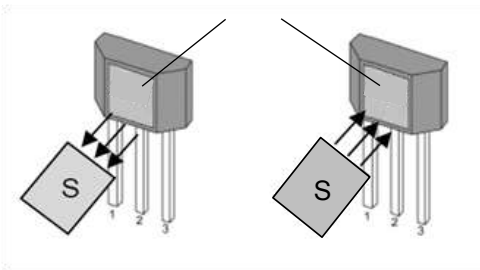
TO92S



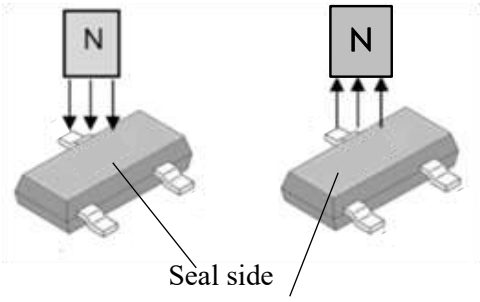
SOT23-3L

7. Magnetoelectric conversion characteristics

Seal side



I_{CC}=Low I_{CC}=High



I_{CC}=High I_{CC}=Low

8. Limit parameter

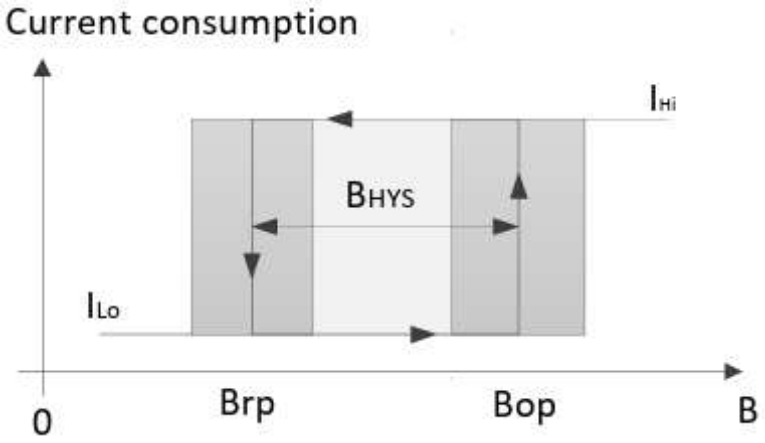
The absolute maximum rating is the limit value that a chip can withstand, and exceeding this value may cause permanent damage to the chip.

Parameters	Symbols	Min	Max	Units
Power supply voltage	V_{CC}	−0. 3	60	V
Operating temperature	T_J	−40	125	℃
storage temperature	T_{STG}	−40	165	℃

9. Electromagnetic characteristics

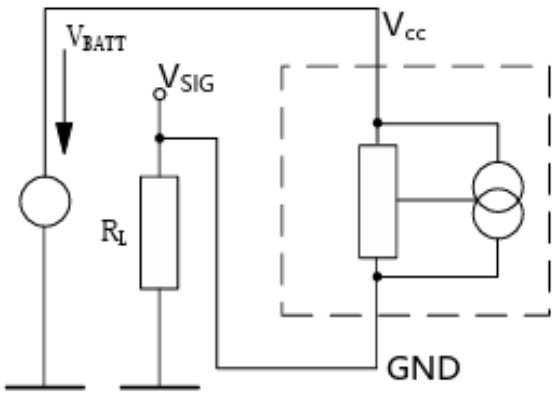
Parameters	Symbols	Test conditions	Min	Typ	Max	Units
Electrical performance						
Power supply voltage	V_{CC}		3.8		40	V
Power supply current	I_{CC}	V_{CC}=5V		3.5	7	mA
Output leakage current	Ile				10	uA
Output voltage	V_{SAT}	I_{OUT}=20mA, on-state			0.4	V
Output Rise Time	T_R	C_L=20pF			1.0	us
Output Fall Time	T_F	C_L=20pF			1.5	us
Magnetic performance						
operating point	Bop	R_L=1kΩ, C_L=20pF		±80		Gs
release point	Brp	R_L=1kΩ, C_L=20pF		±50		Gs
return difference	B_{HYS}	R_L=1kΩ, C_L=20pF		30		Gs

10. Output State

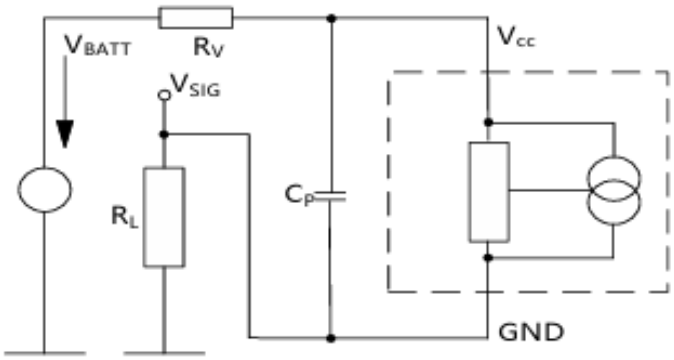


11.Application Circuit

The following figure shows a simple application of a 2-wire sensor. Current consumption can be detected by measuring the voltage on the RL. In order for the sensor to function properly, the voltage between VDD and GND must be at least VDDmin. When the maximum current consumption is IDDON, the maximum RL can be calculated as: $RLmax = \frac{VBATTmin-VDDmin}{IDDon}$



Typical Application Circuit 1

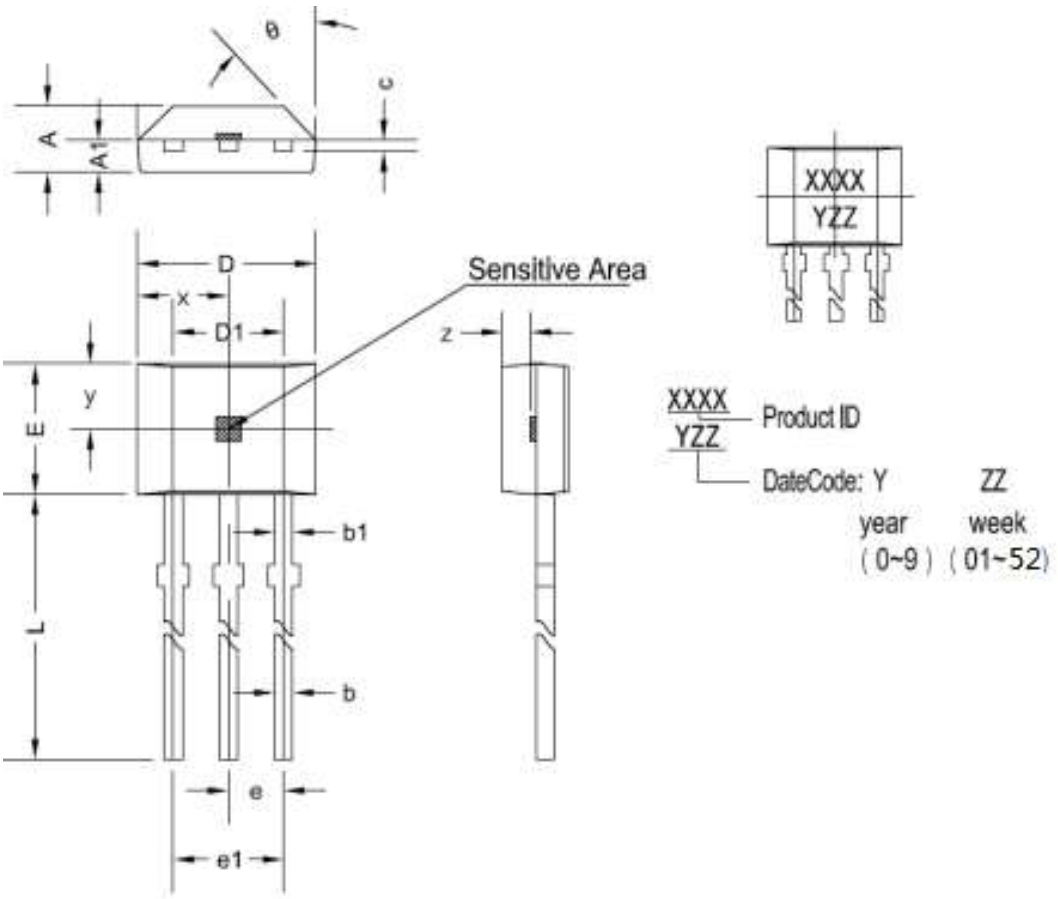


Typical Application Circuit 2

For applications with interference or radiation interference on the power line, it is recommended to place a series resistor RV and a capacitor CP near the sensor. In this case, the maximum RL can be calculated as: $RLmax = \frac{VBATTmin-VDDmin}{IDDon} - Rv$,where R_V=100Ω and C_P=4.7nF.

12.Package Material Information

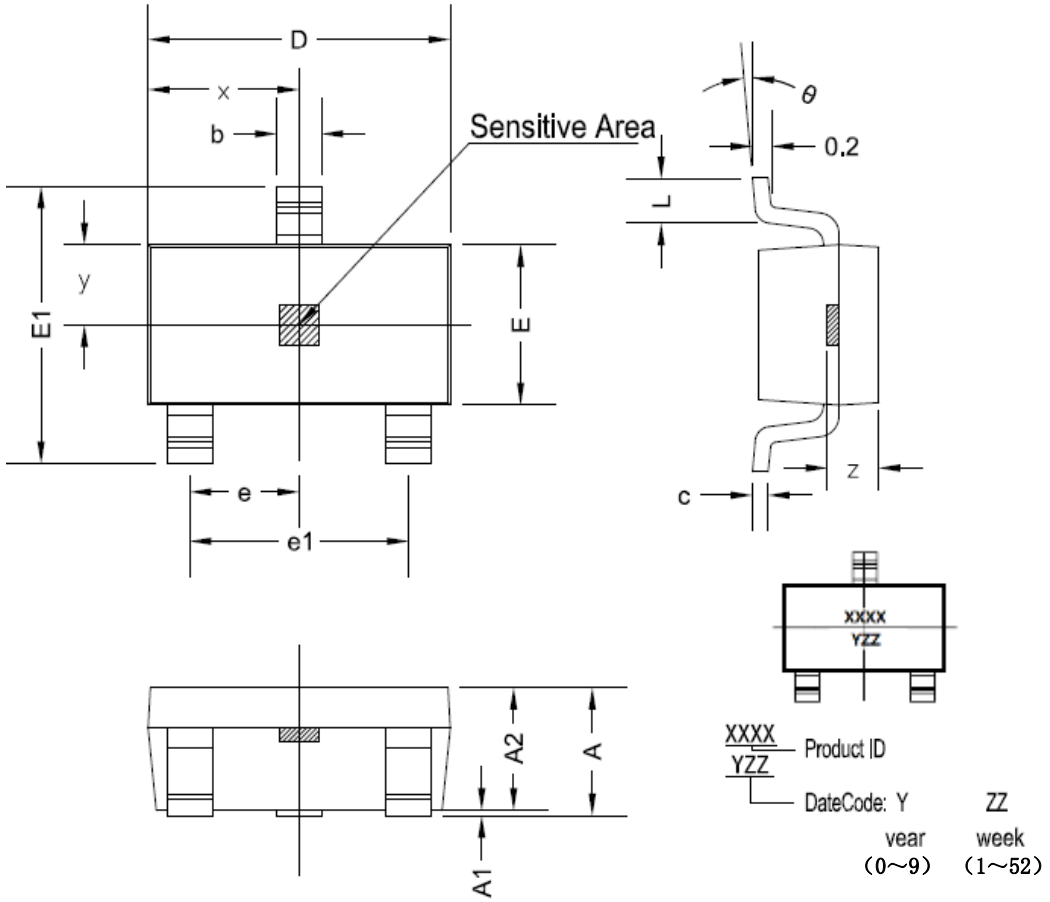
TO92S Package Size



Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min	Max	Min	Max
A	1. 420	1. 670	0. 056	0. 066
A1	0. 660	0. 860	0. 026	0. 034
b	0. 350	0. 560	0. 014	0. 022
b1	0. 400	0. 550	0. 016	0. 022
C	0. 360	0. 510	0. 014	0. 020
D	3. 900	4. 200	0. 154	0. 165
D1	2. 970	3. 270	0. 117	0. 129
E	2. 900	3. 280	0. 114	0. 129
e	1. 270TYP		0. 050TYP	
e1	2. 440	2. 640	0. 096	0. 104
L	13. 500	15. 500	0. 531	0. 610
x	2. 025TYP		0. 080TYP	

y	1. 545TYP	0. 061TYP
z	0. 500TYP	0. 020TYP
θ	45°TYP	45°TYP

SOT23-3L Package Size



Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min	Max	Min	Max
A	1. 050	1. 250	0. 041	0. 049
A1	0. 000	0. 100	0. 000	0. 004
A2	1. 050	1. 150	0. 041	0. 045
b	0. 300	0. 500	0. 012	0. 020
c	0. 100	0. 200	0. 004	0. 008
D	2. 820	3. 020	0. 111	0. 119
E	1. 500	1. 700	0. 059	0. 067
E1	2. 650	2. 950	0. 104	0. 116
e	0. 950TYP		0. 037TYP	
e1	1. 800	2. 000	0. 071	0. 079

L	0. 300	0. 600	0. 012	0. 024
x	1. 460TYP		0. 057TYP	
y	0. 800TYP		0. 032TYP	
z	0. 600TYP		0. 024TYP	
θ	0°	8°	0°	8°

13.Historic version

Versions	Update date	modify
REV1.0	2020.07	
REV1.1	2022.07	Optimize the minimum working voltage to 3.0V and increase the temperature characteristic curve
REV1.2	2023.04	Layout and formatting

14.Notes

- Hall chips are sensitive devices, and electrostatic protection measures should be taken during use, installation, and storage.
- During installation and use, mechanical stress applied to the device casing and leads should be minimized as much as possible.
- It is recommended that the welding temperature should not exceed 350 ℃ and the duration should not exceed 5 seconds.
- To ensure the safety and stability of Hall chips, it is not recommended to use them beyond the parameter range for a long time.