AH451

Introduction

AH451 is an omnipolar Hall-effect switch designed and produced based on a bipolar semiconductor (Bipolar) process and is sensitive to the south and north poles. The device integrates a voltage generator that can work stably under a power supply voltage of 3.8 to 40V, reverse voltage protection circuit, temperature compensation circuit, small signal amplifier, Schmitt trigger and open collector output.

The sensor can work in the South and North Pole. When the magnetic flux density (B) is greater than the operating point Bop, the output will be turned on at a low output level. Then keep the output until the magnetic flux (B) is lower than the release point Brp. The output will be turned off at a high output level.

AH451 provides TO-92S package and SOT-23 package. Both packages meet the RoSH environmental protection standard.
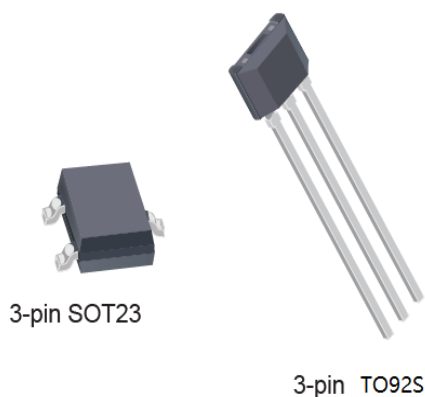
Features

- Micro structure

- Sensitivity +/-80/50Gauss (typical value)

- Operating voltage range from 3.8 Vdc to 40 Vdc

- Operating temperature range -40 ℃ -125℃

- Highest ESD performance up to ±4 kV

- open collector output

Application

- Docking detection

- Door lock opening and closing detection

- Proximity sensing

- Valve positioning Pulse countin

Package

3-pin SOT23

3-pin TO92S

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Ordering information

Part number	Package	Packing	Ambient, T_A
AH451UA	TO92S	Bulk, 1000 pieces/bag	-40℃ to 125℃
AH451SU	SOT23	Tape&Reel, 3000 pieces/reel	-40℃ to 125℃

Pin assignment

Pin number	Name	Function
1	VDD	Power supply
2	GND	Ground
3	Vout	output

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
Reverse voltage	VDD	-60	V
Output Sink Current	I_{sink}	40	mA
Output voltage	Vout	60	V
Operating temperature range	T_a	-40~125	℃
Storage temperature range	T_s	-40~165	℃

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

| Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Electrical characteristics						
VDD	Operating voltage		3.8		40	V
IDD	Supply current			3.5	7	mA
I$_{le}$	Leakage current	Off condition			10	uA
Vsat	Saturation voltage output	Iout=20mA			0.4	V
Tr	Output rising time	Pullup resistor =1kohms, Load cap=20pF			1	us
T$_f$	Output falling time	Pullup resistor =1kohms, Load cap=20pF			1.5	us
Magnetic characteristics						
Operate point	Bop	Pullup resistor =1kohms, Load cap=20pF		+/−80		Gauss
Release point	Brp	Pullup resistor =1kohms, Load cap=20pF		+/−50		Gauss
Hysteresis	Bhys	Pullup resistor =1kohms, Load cap=20pF		30		Gauss

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Function diagram

AH451 is an omnipolar Hall effect switch designed with bipolar technology. It includes an on-chip Hall element voltage generator, a voltage stabilizer that can work at a power supply voltage of 4.5 to 60V, reverse voltage protection, temperature compensation circuits, and small signal Amplifier, Schmitt trigger and open collector output.
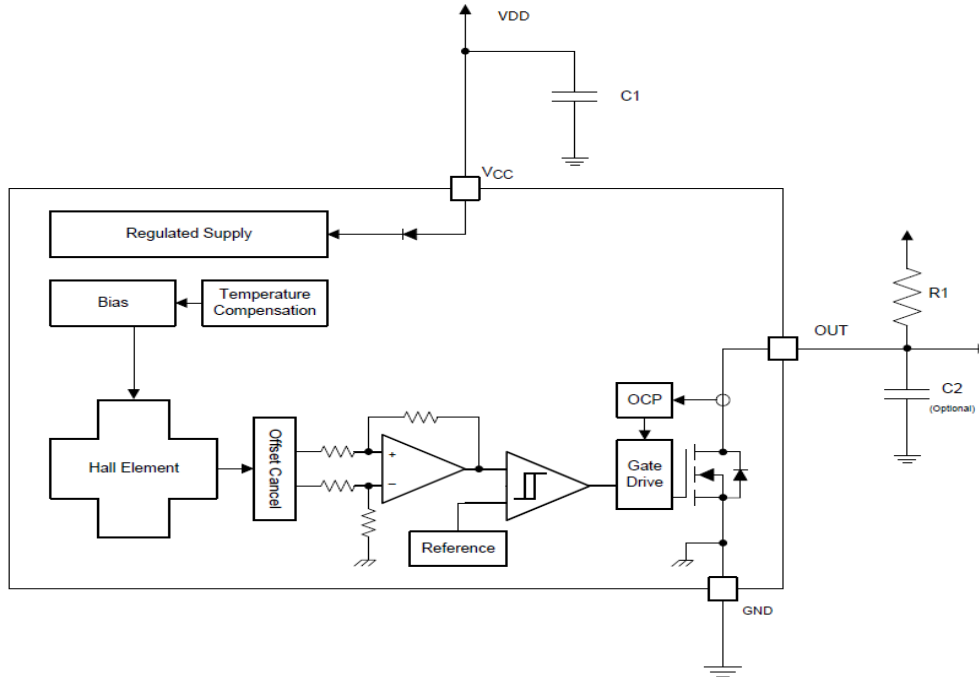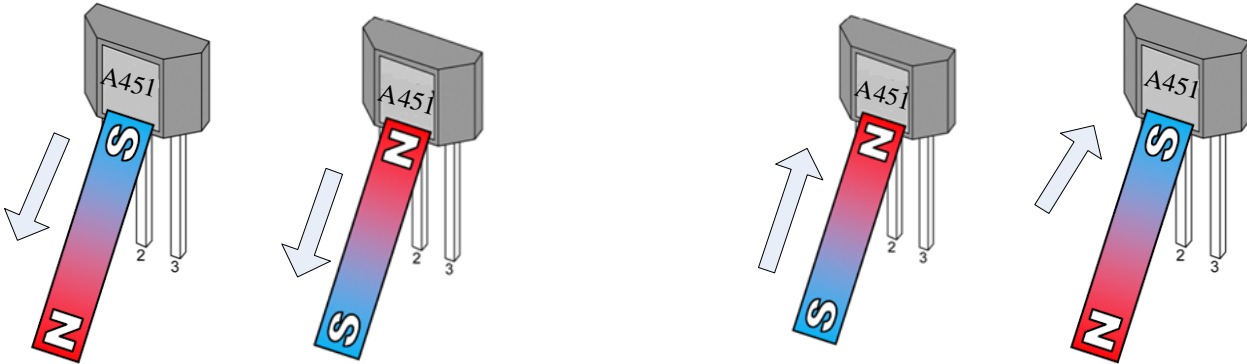

Pin orientation
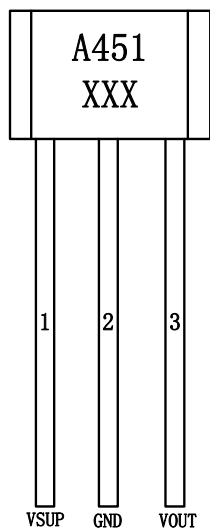
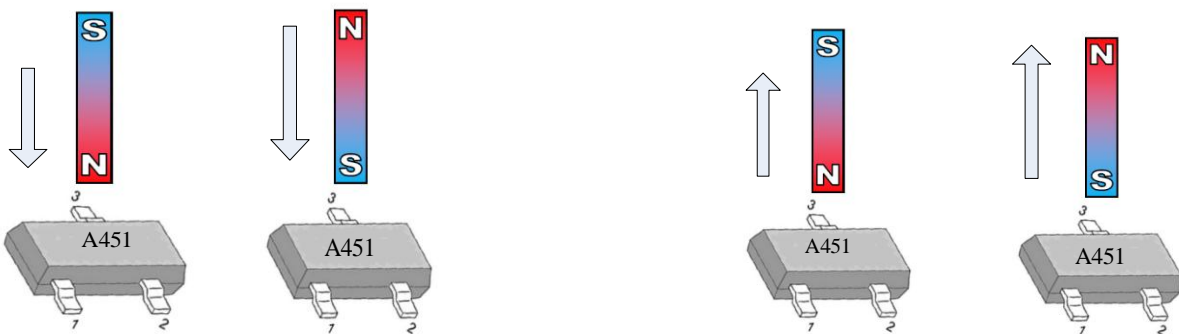**TO92S**   **SOT23**
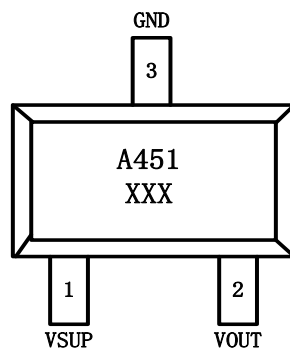
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Applications：VDD =5V

V_{OUT}= High   V_{OUT}= Low

TO92S （AH451UA）

TO92S   Pin description

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

V_{OUT}= Low   V_{OUT}= High

SOT23 （AH451SU）

SOT23 Pin description

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

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Output Behavior
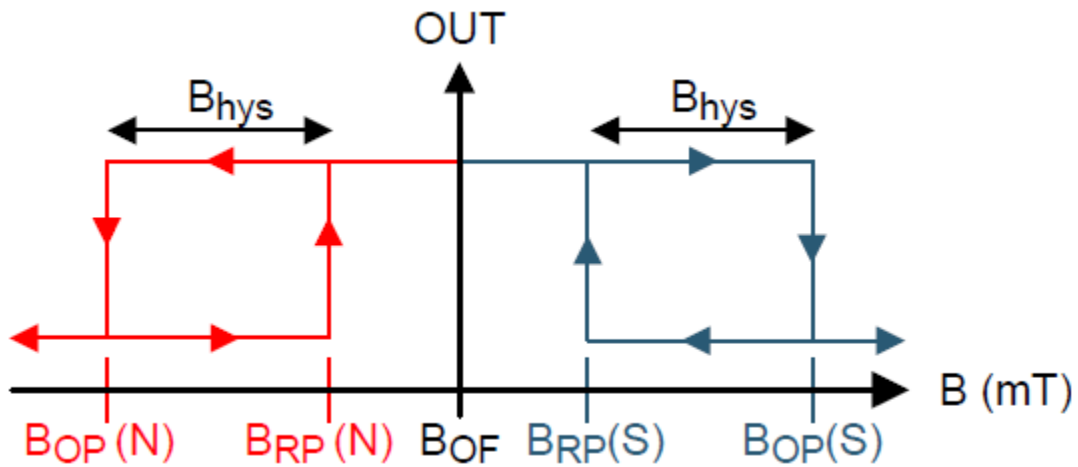
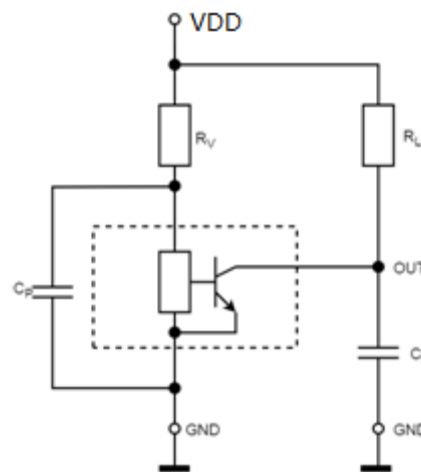
Application Circuits

Typical application circuit，RL= 4700ohms
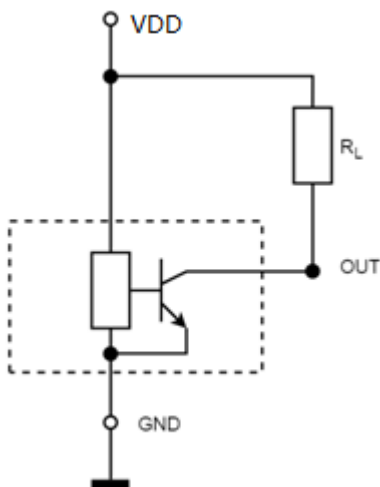
Case 1 of typical application circuit   Case 2 of typical application circuit

For applications with interference or radiation interference on the power supply line, it is recommended to place the series resistor RV and the two capacitors CP and CL as close to the sensor as possible (see the figure below). For example:RV=100ohms, CP= 4.7nF, and CL = 1 nF

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Package dimensions

TO92S
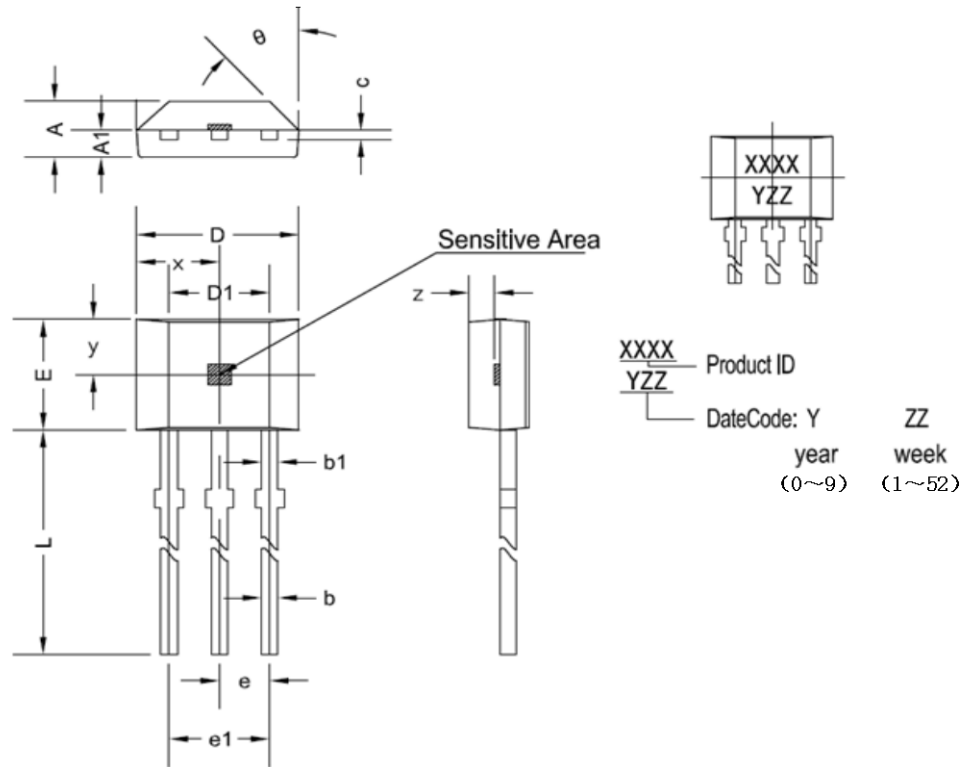
TO92S dimensions

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	

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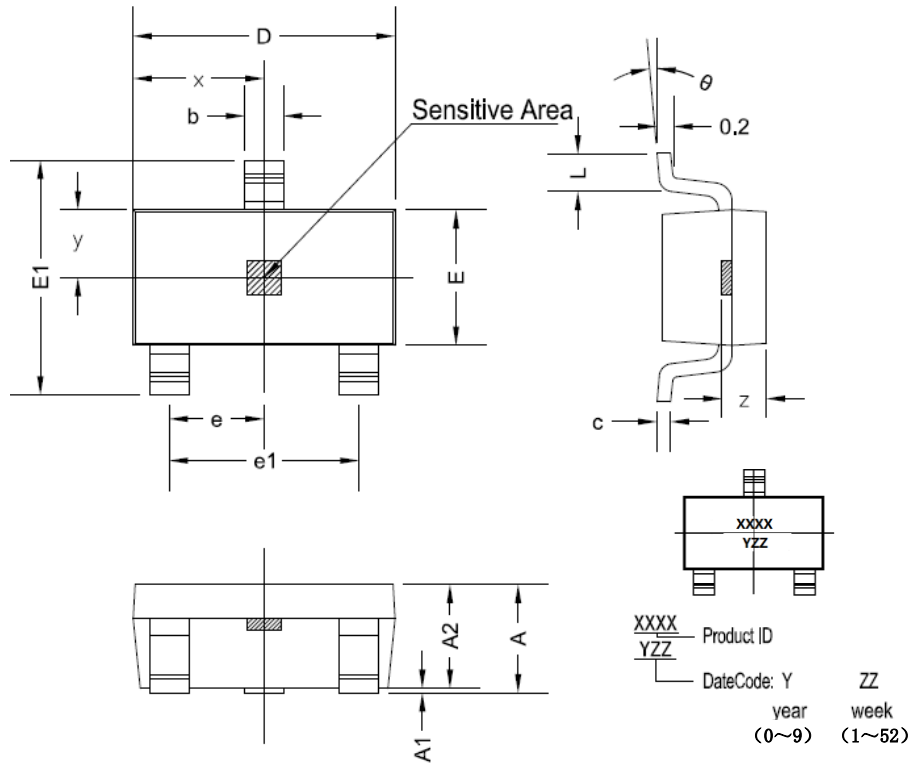
SOT23

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˚