AH401

Introduction

AH401, designed with Bipolar technology, includes on-chip Hall element voltage generator, a voltage regulator for operation with supply voltages of 3.8 to 60V, reverse voltage protection, temperature compensation circuitry, small-signal amplifier, Schmitt trigger and an open-collector output.

The sensor is designed to respond to North and South poles. While the magnetic flux density(B) is larger than operate point Bop, the output will be turned on with low output level. Then the output is held until the magnetic flux (B) is lower than release point Brp. The output will be turned off with high output level.

AH401 offers a variety of packages, including TO-92, SOT-23. All packages are RoHS compliant.

Features

- Miniature construction

- High sensitivity of +/-55 Gauss (typ.)

- Wide voltage range of 3.8 Vdc to 60 Vdc

- Temperature range of -40 °C to 150 °C

- Highest ESD performance up to ±4 kV

- Open Collector Output

Applications

- BLDC Motor Commutation

- Flow sensor

- Position sensor

- Speed sensor

- Proximity sensor
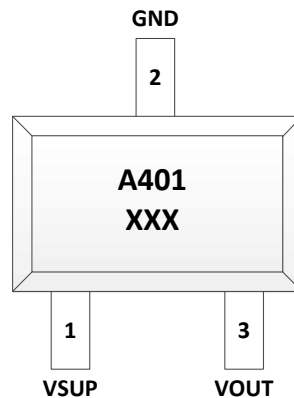
Function diagram

AH401, designed with Bipolar technology, includes on-chip Hall element voltage generator, a voltage regulator for operation with supply voltages of 3.8 to 60V, reverse voltage protection, temperature compensation circuitry, small-signal amplifier, Schmitt trigger and an open-collector output.
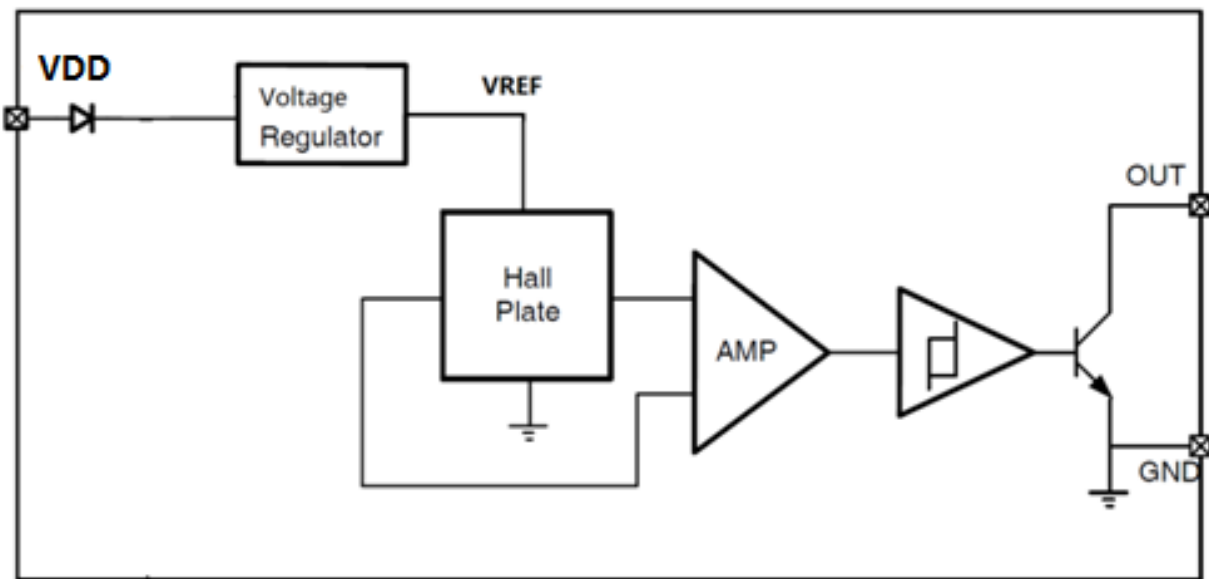
Pin orientation
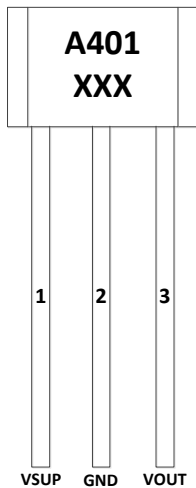
TO92S   Sot23-3L

AH401

Ordering information

Part number	Package	Packing	Ambient, T$_A$
AH401UA	TO92S	Bulk, 1000 pieces/bag	-40℃ to 150℃
AH401SU	SOT23	Tape&Reel, 3000 pieces/reel	-40℃ to 150℃

Pin assignment

SOT23-3LPin number	TO92SPin number	Name	Function
1	1	VSUP	Power supply
2	2	GND	Ground
3	3	VOUT	Open collector output with a pull-up resistor

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	Min	Max	Units
Supply voltage	VDD	−60	90	V
Reverse voltage	Vout	−0.5	90	V
Output Sink Current	I$_{sink}$	0	40	mA
Operating temperature range	T$_a$	−40	150	℃
Storage temperature range	T$_s$	−50	165	℃

AH401

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

| Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Electrical characteristics						
VDD	Operating voltage		3.8		60	V
IDD	Supply current			3.5	7	mA
I_{le}	Leakage current	Off condition			10	uA
Vsat	Saturation voltage output	Iout=20mA, On condition			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						
Bop	Operate point	Pullup resistor =1kohms, Load cap=20pF	10	55	100	Gauss
Brp	Release point	Pullup resistor =1kohms, Load cap=20pF	−100	−55	−10	Gauss
Bhys	Hysteresys	Pullup resistor =1kohms, Load cap=20pF		110		Gauss

Magnetoelectric conversion characteristics

Apply a magnetic field greater than Bop on the seal side of TO92S package (near the South Pole), and the output becomes low;Apply a magnetic field less than Brp (near the North Pole) and the output becomes high.When the chip is first powered on, if the magnetic field is between the Bop and the Brp, the output state is in an undefined state (high or low).The magnetic field polarity of the operating and releasing points of SOT23-3L package is opposite to that of TO92S.See below.
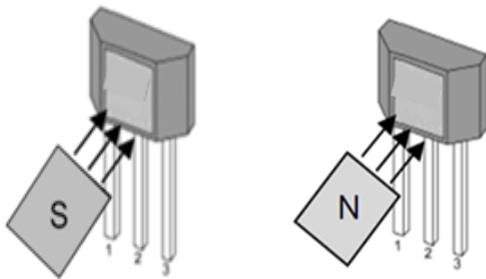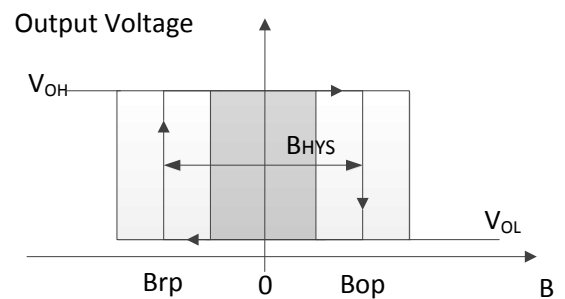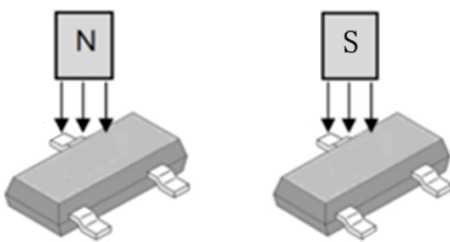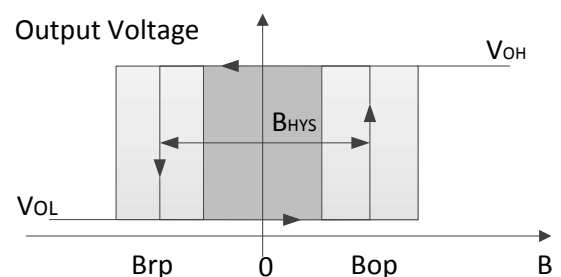
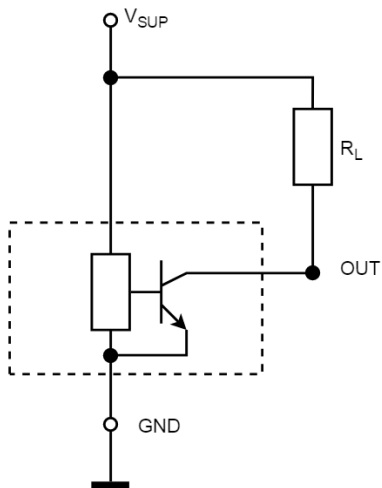V_{OUT}=low V_{OUT}=high   TO92S output state

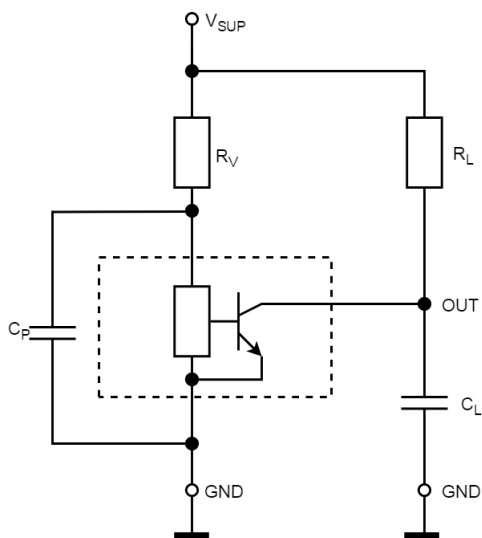V_{OUT}=low V_{OUT}=high   SOT23-3L output state

Application Circuits

Typical application circuit（see the following circuit）RL =4700 ohms

Case 1 of typical application circuit
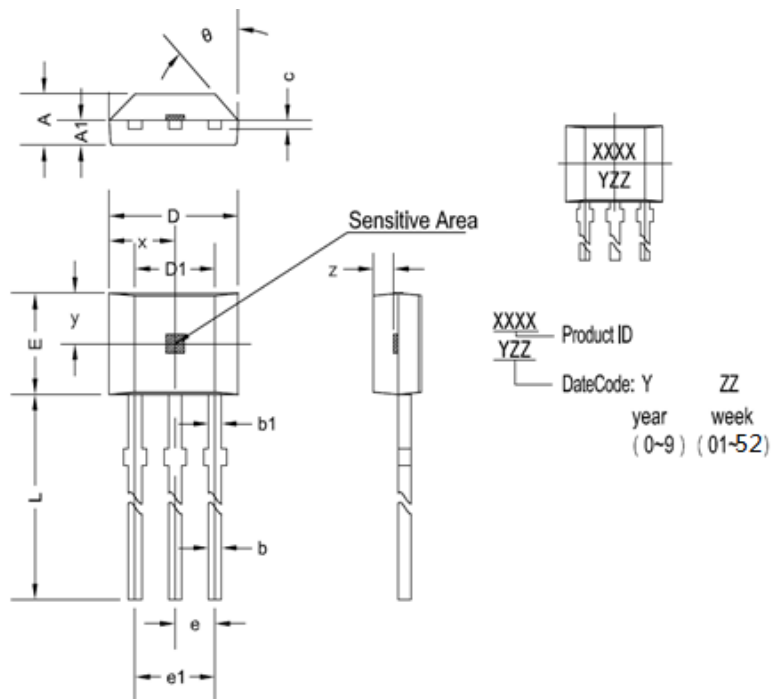
Automotive and Harsh, Noisy Environments Three-Wire Circuit is show below. Here, RV =100 ohms, CP = 4.7 nF, and CL = 1 nF.

Case 2 of typical application circuit

AH401

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	
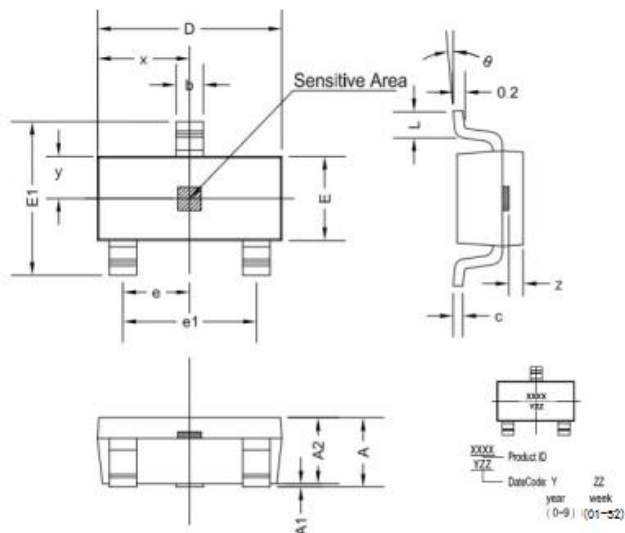
SOT23

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°

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