

1. Introduction

HK451 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 3.5 to 60V, 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 B_{op} , 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 B_{rp} . The output will be turned off at a high output level.

HK451 provides TO-92S package and SOT-23 package. Both packages meet the RoHS environmental protection standard.

2. Features

- Micro structure
- Sensitivity +/-80/50Gauss (typical value)
- Operating voltage range from 3.5 Vdc to 40Vdc
- Operating temperature range -40 °C - 125°C
- Highest ESD performance up to ± 5 kV
- open collector output

3. Application

- Docking detection
- Door lock opening and closing detection
- Proximity sensing
- Valve positioning Pulse countin

4. Package



5. Ordering information

Part number	Package	Packing	Ambient, T _A
HK451UA	TO92S	Bulk, 1000 pieces/bag	-40°C to 125°C
HK451SU	SOT23	Tape&Reel, 3000 pieces/reel	-40°C to 125°C

6. Pin assignment

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

7. 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	-0.3	V
Output Sink Current	I _{sink}	40	mA
Output voltage	Vout	60	V
Operating temperature range	T _a	-40~ 125	°C
Storage temperature range	T _s	-40~ 165	°C

High sensitivity omnipolar Hall sensor

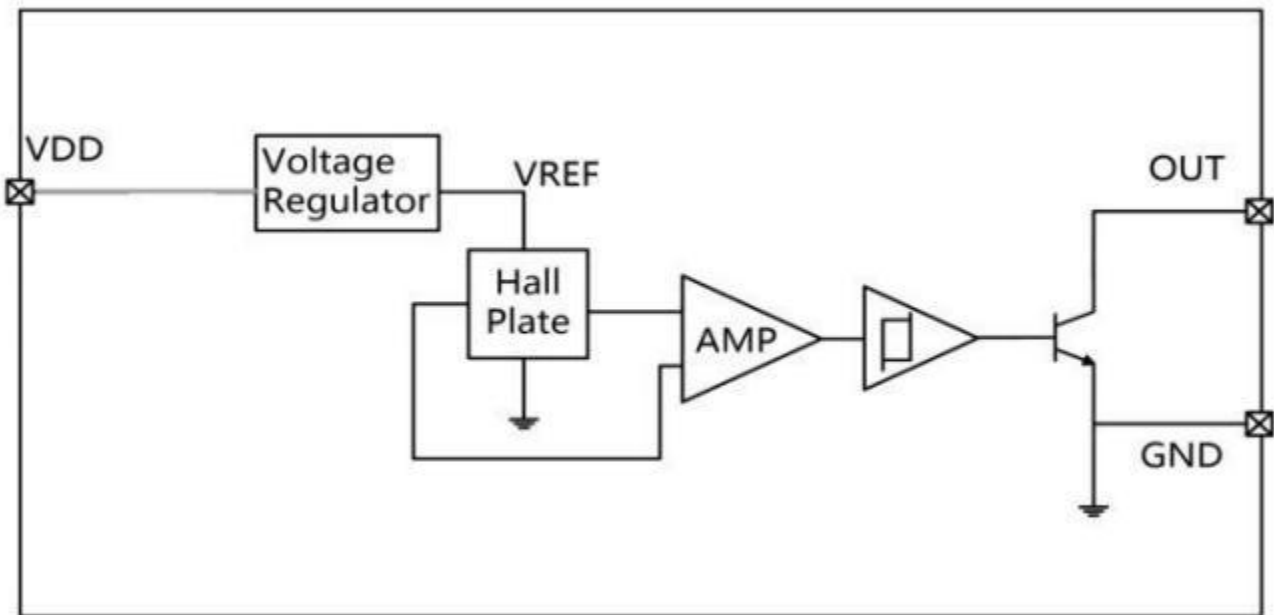
8. Electrical and magnetic characteristics (Ta=25°C, VDD =5.0V)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Electrical characteristics						
VDD	Operating voltage		3.5		60	V
IDD	Supply current			3.5	7	mA
Ile	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
Tf	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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9. Function diagram

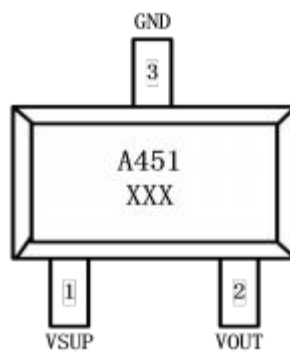
HK451 is an omnipolar Hall effect switch designed with bipolar technology. It includes an on-chip Hall element voltage generator, a voltage stabilizer that can work at a power supply voltage of 3.5 to 60V, temperature compensation circuits, and small signal Amplifier, Schmitt trigger and open collector output.



10. Pin orientation



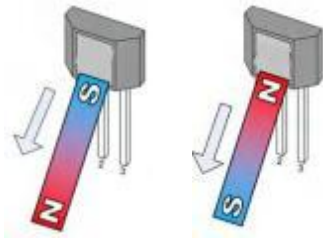
TO92S



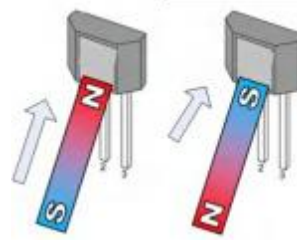
SOT23

High sensitivity omnipolar Hall sensor

Applications: VDD = 5V

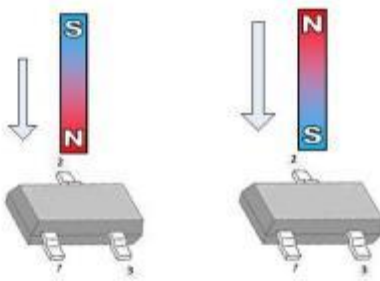


VOUT = 高电平

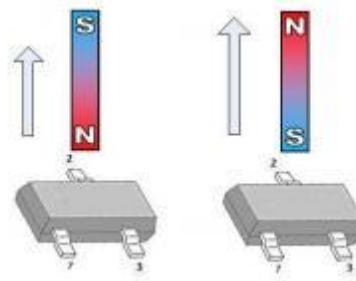


VOUT = 低电平

TO92S (HK451UA)



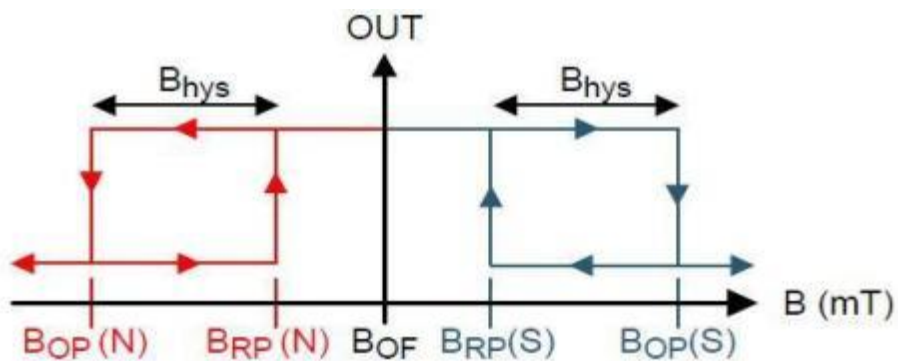
VOUT = 低电平



VOUT = 高电平

SOT23 (HK451SU)

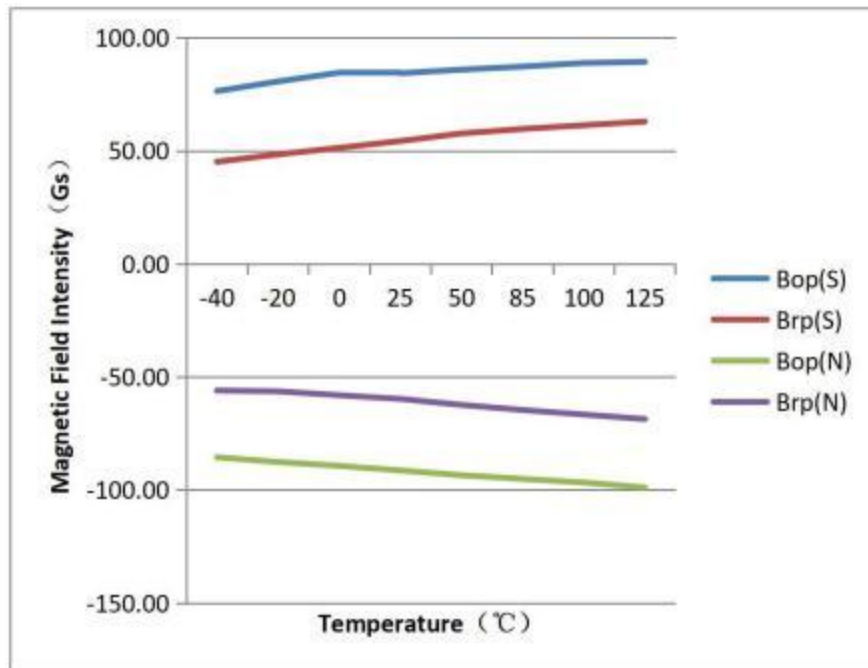
Output Behavior



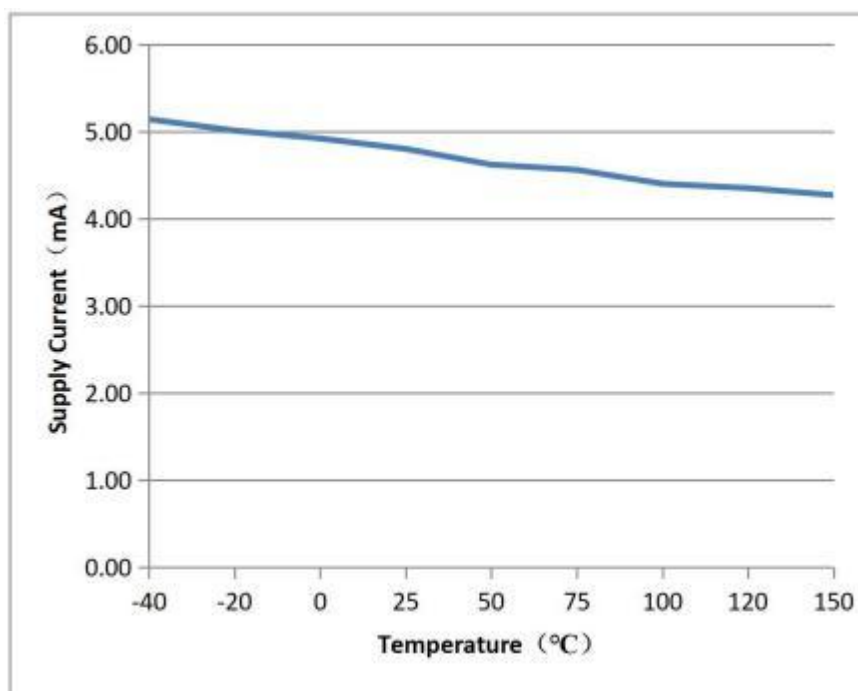
High sensitivity omnipolar Hall sensor

11. Temperature characteristic

HK451 At Vcc=5V, Magnetic characteristics vs. Temperature.



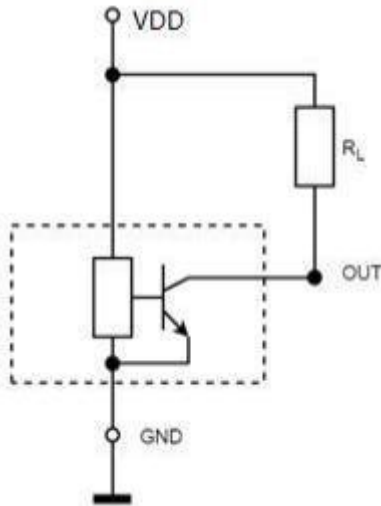
HK451 At Vcc=5V, Supply Current vs. Temperature.



High sensitivity omnipolar Hall sensor

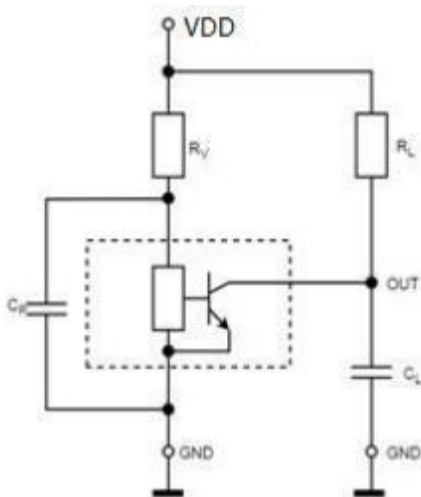
12.Application Circuits

Typical application circuit , $R_L = 4700\text{ohms}$



Case 1 of typical application circuit

For applications with interference or radiation interference on the power supply line, it is recommended to place the series resistor R_V and the two capacitors C_P and C_L as close to the sensor as possible (see the figure below). For example: $R_V = 100\text{ohms}$, $C_P = 4.7\text{nF}$, and $C_L = 1\text{ nF}$

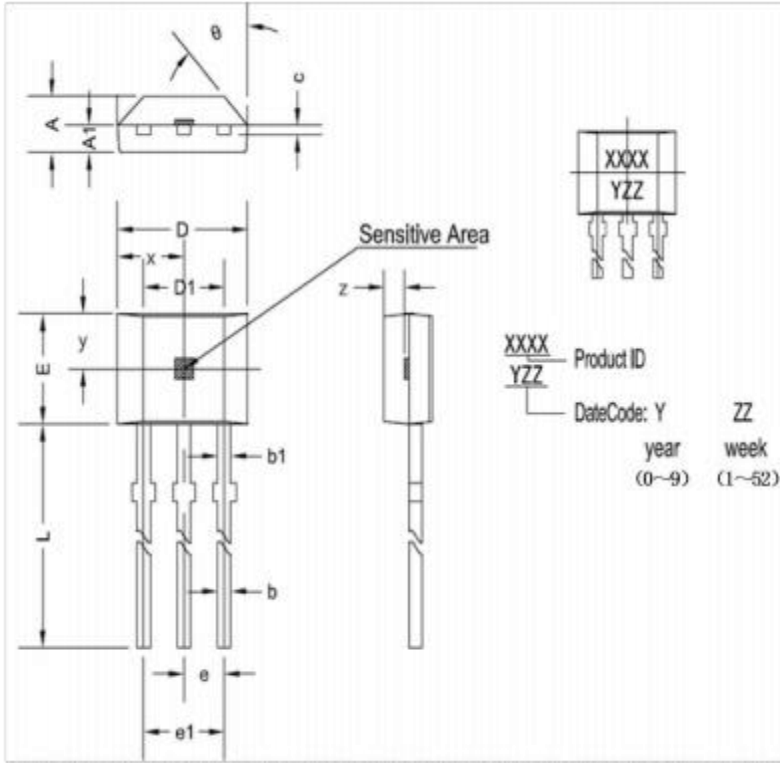


Case 2 of typical application circuit

High sensitivity omnipolar Hall sensor

13.Package dimensions

TO92S

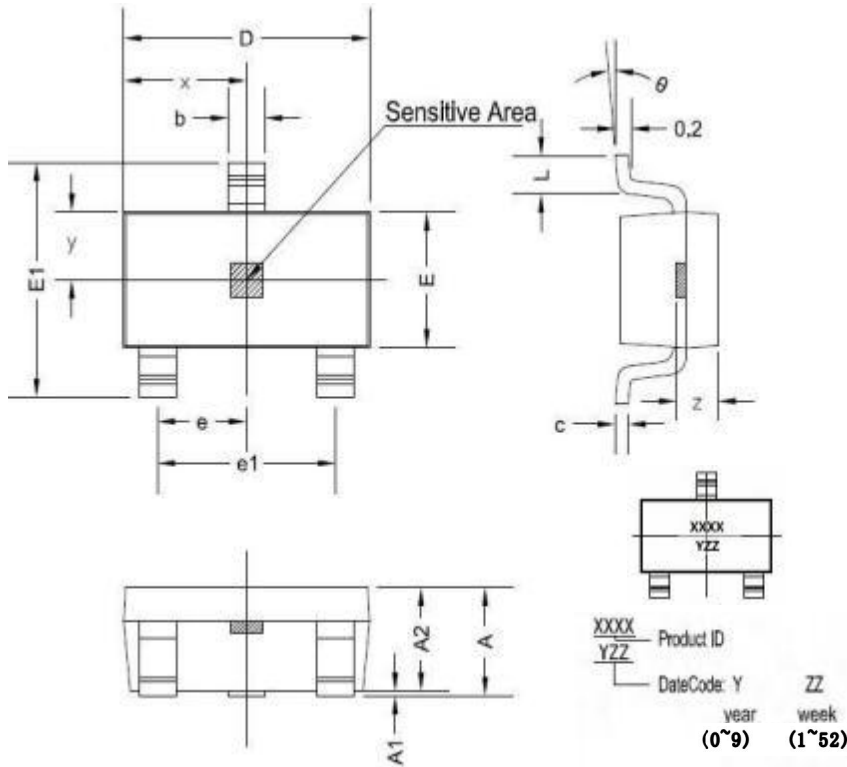


TO92S dimensions

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



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°

Note:

Revision history

Document version	Date of release	Description of changes
REV1.0	2020.06	
REV2.0	2022.07	Lowest supply voltage Vcc=3.5V , Add temperature characteristic curve.

Contact us

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