

KTH1605P Series

High Performance, Omni-Polar
High-Frequency Hall Switch Sensor

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1 Product Features

- High-speed @5 kHz, low-power: 700 μA @1.8V
- Wide operating voltage range: 1.6 ~ 5.5V
- Selectable magnetic field threshold (B_{OP}):
 - Ultra-low threshold: 22 Gs
 - Low threshold: 33 Gs
 - High threshold: 46 Gs
- Omnipolar magnetic field detection
- CMOS push-pull output
- Package: SOT-23-3L, TO-92S
- Operating temperature range: $-40 \sim 85^{\circ}\text{C}$
- Excellent ESD performance: HBM 8kV
- RoHS compliant

2 Typical Applications

- Speed detection
- Displacement detection
- Flow detection
- Non-contact detection

3 Application Circuit Diagram

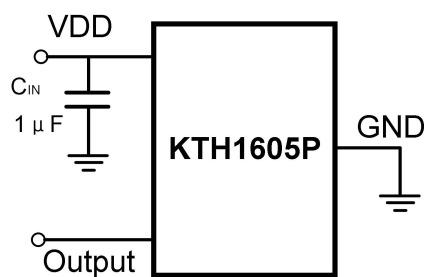


Figure 1: KTH1605P Application Circuit

Note: To filter noise at the chip's power supply terminal, a $1\mu\text{F}$ capacitor should be connected between VDD and ground, as close as possible to the VDD pin.

4 Overview

The KTH1605P is a high-speed, omnipolar magnetic field detection Hall switch sensor designed for compact systems, high-frequency operations, and power-sensitive systems. It offers multiple magnetic field thresholds and packaging options to fit a variety of applications.

When the applied magnetic flux density, either from the S or N pole, exceeds the operating point B_{OP} , the chip outputs a low level and maintains this state. The output returns to a high level when the flux density falls below the release point B_{RP} . The chip includes built-in temperature compensation and offset voltage elimination circuits to ensure stable switching points. With high response speed, it provides reliable omnipolar magnetic field detection.

The KTH1605P operates within a supply voltage range of 1.6 ~ 5.5V and is available in standard SOT-23-3L and TO-92S packages.

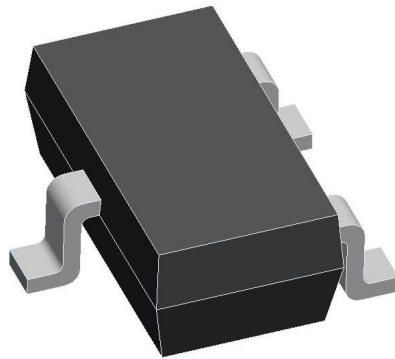


Figure 2: SOT-23-3L Package



Figure 3: TO-92S Package

5 Pin Definitions and Marking Information

5.1 SOT-23-3L Package

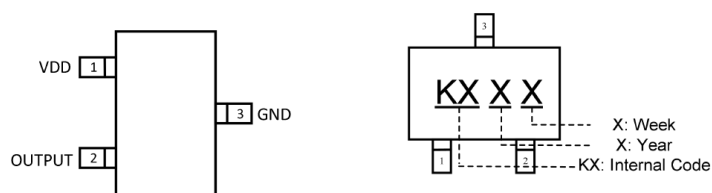


Figure 4: SOT-23-3L Package Top View

Pin Number	Pin Name	Description
1	VDD	Power supply input
2	OUTPUT	Output terminal
3	GND	Ground

5.2 TO-92S Package

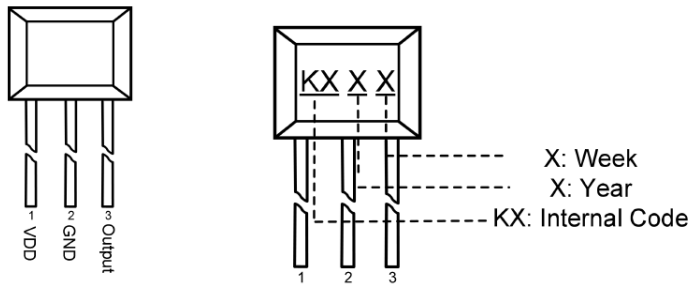


Figure 5: TO-92S Package Top View

Pin Number	Pin Name	Description
1	VDD	Power supply input
2	GND	Ground
3	OUTPUT	Output terminal

6 Functional Block Diagram

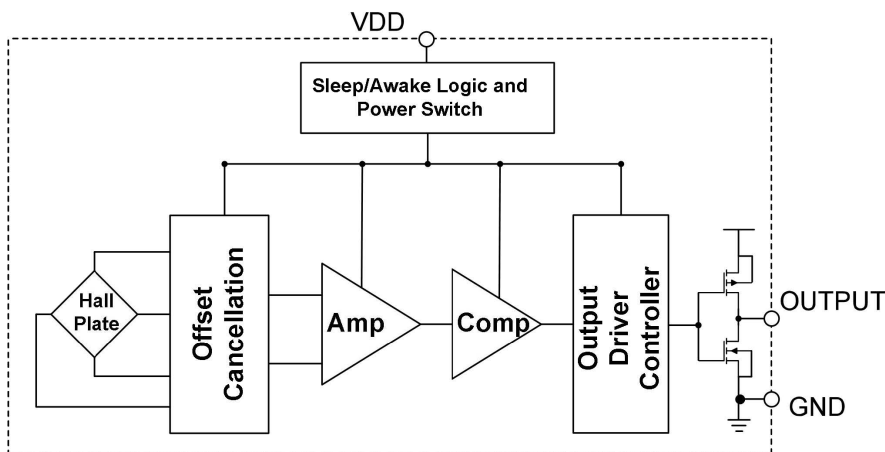


Figure 6: Functional Block Diagram of KTH1605P Series

7 Switching Output Characteristics

As shown in the figure below, when the south pole of a magnet approaches the top of the chip, magnetic lines pass from the bottom to the top of

the chip, and the magnetic flux density B is considered positive. Conversely, when the north pole approaches the top, the magnetic lines pass from the top to the bottom, and B is considered negative.

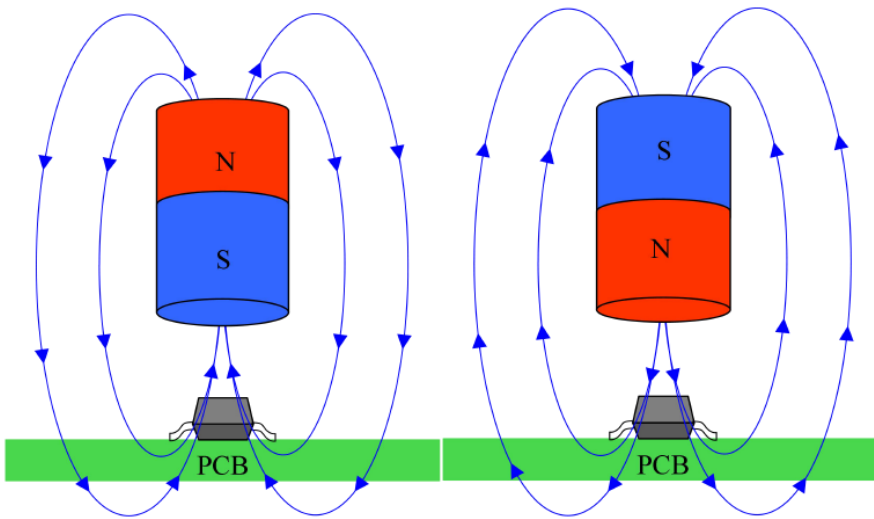
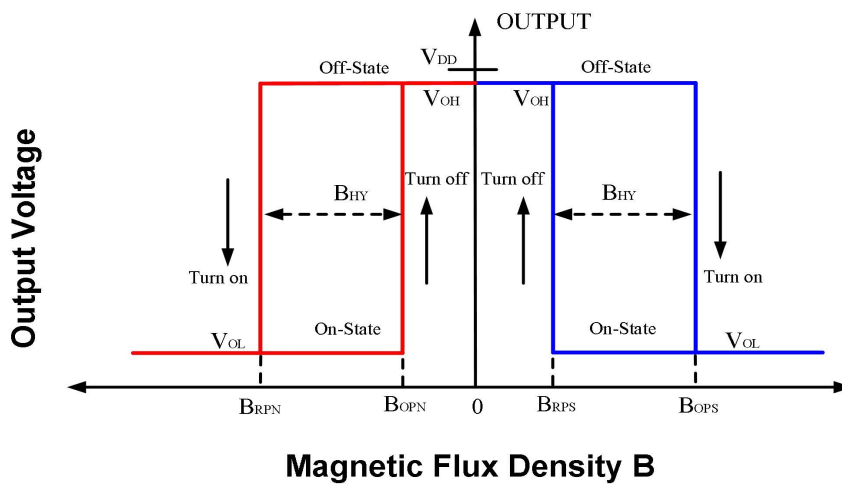
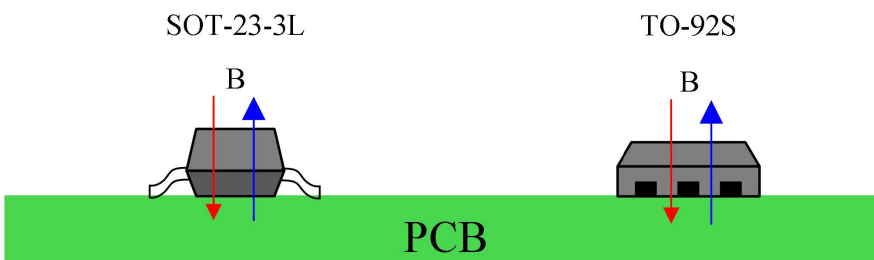
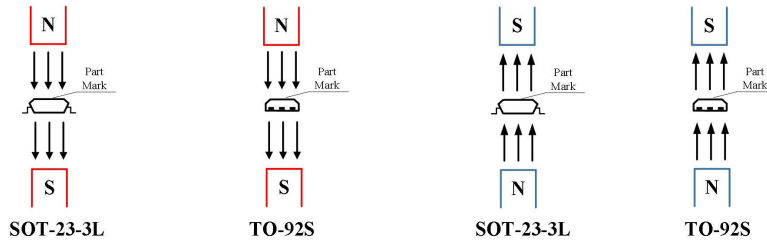


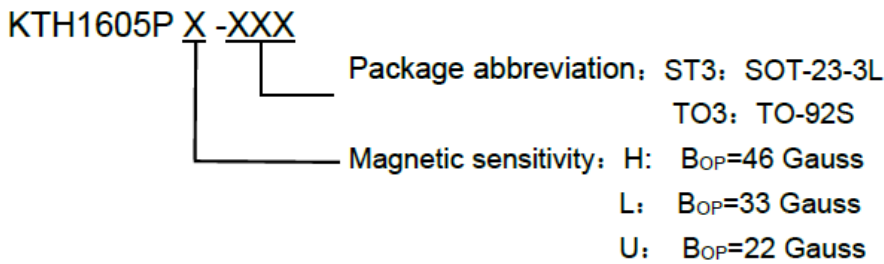
Figure 7: Magnetic Field Sensitivity of KTH1605P

KTH1605P is sensitive to both magnetic fields passing from the bottom to the top of the chip and those passing from the top to the bottom.





8 Product Model Composition



9 Absolute Maximum Ratings

@ $T_A = +25^\circ C$, unless otherwise specified

Parameter	Description	Value
V_{DD}	Supply Voltage	6 V
V_{DD_REV}	Reverse Power Supply Voltage	-0.3 V
I_{OUTPUT}	Output Drive Current	5 mA
B	Magnetic Flux Density	No limit
P_D	Package Power Dissipation	400 mW
T_{STG}	Storage Temperature Range	-50 to +150 °C
T_J	Maximum Junction Temperature	+150 °C
ESD HBM	Human Body Model ESD Capability	8000 V

Table 1: Absolute Maximum Ratings of KTH1605P Series

Note: Exceeding the absolute maximum ratings may cause permanent damage. Prolonged operation at absolute maximum rating conditions may affect the reliability of the chip.

10 Reference Operating Conditions

@ $T_A = +25^\circ C$, unless otherwise specified

Item	Parameter Description	Operating Conditions	Value	Unit
V_{DD}	Supply Voltage Range	Chip Operating	1.6 ~ 5.5	V
T_A	Operating Temperature Range	Chip Operating	-40 ~ +85	°C

Table 2: Reference Operating Conditions

11 Electrical Characteristics

@ $T_A = +25^\circ\text{C}$, $V_{DD} = 1.8\text{V}$, unless otherwise specified

Item	Parameter Description	Operating Conditions	Min.	Typ.	Max.	Unit
V_{DD}	Supply Voltage	Operating State	1.6	—	5.5	V
V_{OL}	Output Low Level	$I_{OUT} = 1\text{mA}$	—	0.10	0.15	V
V_{OH}	Output High Level	$I_{OUT} = 1\text{mA}$	$V_{DD} - 0.15$	$V_{DD} - 0.10$	—	V
$I_{DD(AVG)}$	Average Current	$T_A = +25^\circ\text{C}$, $V_{DD} = 1.8\text{V}$	—	700	—	μA
f	Switching Frequency	Operating State	—	5	—	kHz

Table 3: Electrical Characteristics of KTH1605P Series

12 Magnetic Characteristics

@ $T_A = +25^\circ\text{C}$, $V_{DD} = 1.8\text{V}$, unless otherwise specified

12.1 KTH1605P H Series

Parameter	Description	Conditions	Min.	Typ.	Max.	Unit
B_{OPS}	Magnetic Operating Point	$T_A = +25^\circ\text{C}$, $V_{DD} = 1.8\text{V}$	40	46	52	Gauss
B_{RPS}	Magnetic Release Point	$T_A = +25^\circ\text{C}$, $V_{DD} = 1.8\text{V}$	26	34	38	Gauss
B_{OPN}	Magnetic Operating Point	$T_A = +25^\circ\text{C}$, $V_{DD} = 1.8\text{V}$	-52	-46	-40	Gauss
B_{RPN}	Magnetic Release Point	$T_A = +25^\circ\text{C}$, $V_{DD} = 1.8\text{V}$	-38	-34	-26	Gauss
B_{HY}	Magnetic Hysteresis	$(B_{OPX} - B_{RPX})$	—	12	—	Gauss

Table 4: Magnetic Characteristics of KTH1605P H Series

12.2 KTH1605P L Series

Parameter	Description	Conditions	Min.	Typ.	Max.	Unit
B_{OPS}	Magnetic Operating Point	$T_A = +25^\circ\text{C}$, $V_{DD} = 1.8\text{V}$	26	33	38	Gauss
B_{RPS}	Magnetic Release Point	$T_A = +25^\circ\text{C}$, $V_{DD} = 1.8\text{V}$	16	23	28	Gauss
B_{OPN}	Magnetic Operating Point	$T_A = +25^\circ\text{C}$, $V_{DD} = 1.8\text{V}$	-38	-33	-26	Gauss
B_{RPN}	Magnetic Release Point	$T_A = +25^\circ\text{C}$, $V_{DD} = 1.8\text{V}$	-28	-23	-16	Gauss
B_{HY}	Magnetic Hysteresis	$(B_{OPX} - B_{RPX})$	—	10	—	Gauss

Table 5: Magnetic Characteristics of KTH1605P L Series

12.3 KTH1605P U Series

Parameter	Description	Conditions	Min.	Typ.	Max.	Unit
B_{OPS}	Magnetic Operating Point	$T_A = +22^\circ C, V_{DD} = 1.8V$	14	22	30	Gauss
B_{RPS}	Magnetic Release Point	$T_A = +22^\circ C, V_{DD} = 1.8V$	8	16	24	Gauss
B_{OPN}	Magnetic Operating Point	$T_A = +22^\circ C, V_{DD} = 1.8V$	-30	-22	-14	Gauss
B_{RPN}	Magnetic Release Point	$T_A = +22^\circ C, V_{DD} = 1.8V$	-24	-16	-8	Gauss
B_{HY}	Magnetic Hysteresis	$(B_{OPX} - B_{RFX})$	—	6	—	Gauss

Table 6: Magnetic Characteristics of KTH1605P U Series

13 Ordering Information

Model	Package Type	Pin Count	Magnetic Field Threshold (B_{OP})	Temperature
KTH1605PU-ST3	SOT-23-3L	3	22 Gauss	$-40 \sim +85^\circ C$
KTH1605PL-ST3	SOT-23-3L	3	33 Gauss	$-40 \sim +85^\circ C$
KTH1605PH-ST3	SOT-23-3L	3	46 Gauss	$-40 \sim +85^\circ C$
KTH1605PU-TO3	TO-92S	3	22 Gauss	$-40 \sim +85^\circ C$
KTH1605PL-TO3	TO-92S	3	33 Gauss	$-40 \sim +85^\circ C$
KTH1605PH-TO3	TO-92S	3	46 Gauss	$-40 \sim +85^\circ C$

Table 7: Ordering Information for KTH1605P Series

14 Package Dimensions

14.1 SOT-23-3L Package

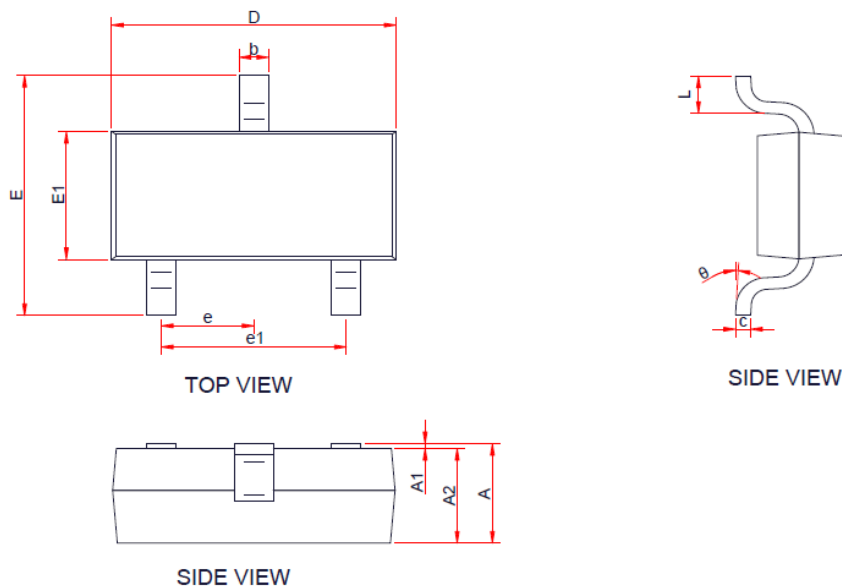


Figure 8: Dimensions of SOT-23-3L Package

Symbol	Dimensions in Millimeters		
	Min.	Typ.	Max.
A	-	-	1.25
A1	0.00	-	0.1
A2	1.00	1.10	1.15
b	0.30	-	0.50
c	0.10	-	0.20
D	2.82	2.95	3.02
E	2.65	2.80	2.95
E1	1.50	1.65	1.70
e	0.85	0.95	1.05
e1	1.80	1.90	2.00
L	0.30	0.45	0.60
θ	0°	-	8°

14.2 TO-92S Package

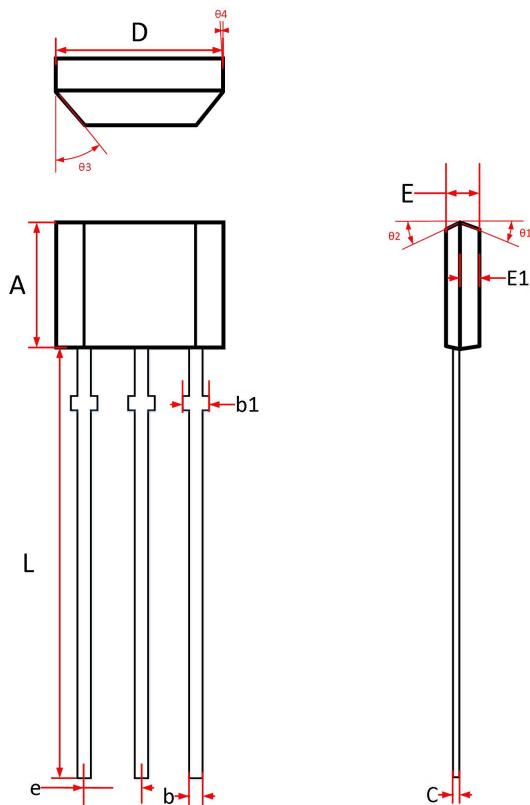


Figure 9: Dimensions of TO-92S Package

Symbol	Dimensions in Millimeters		
	Min.	Typ.	Max.
A	2.90	3.00	3.10
b	0.35	0.39	0.50
b1	0.40	0.44	0.55
C	0.36	0.38	0.45
D	3.90	4.00	4.10
E	1.42	1.52	1.62
E1	-	0.75	-
e	-	1.27 Typ	-
L	13.50	14.50	15.50
$\theta 1$	-	6°	-
$\theta 2$	-	3°	-
$\theta 3$	-	45°	-
$\theta 4$	-	3°	-