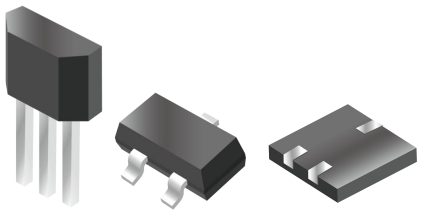
1 Product Features

- Proportional Linear Hall-Effect Magnetic Sensor
- Rail-to-Rail Analog Output
- Low Noise Output Voltage
- Wide Operating Voltage Range: 3.0V~5.5V
- Low Power Consumption:：4.5mA@3.3V V_{DD}
  5.4mA@5.0V V_{DD}
- High-Speed 30KHz Bandwidth
- VDD/2 Quiescent Output,Capable of detecting both N and S pole magnetic fields
- Multiple Sensitivity Options:
  1.00mV/Gs KTH3101Series@V_{DD}=3.3V
  1.65mV/GS KTH3102Series@V_{DD}=3.3V
  2.25mV/Gs KTH3103Series@V_{DD}=3.3V
  3.30mV/Gs KTH3105Series@V_{DD}=3.3V
  6.60mV/Gs KTH3110Series@V_{DD}=3.3V
  8.90mV/Gs KTH3113Series@V_{DD}=3.3V
  1.50mV/Gs KTH3101Series@V_{DD}=5V
  2.50mV/Gs KTH3102Series@V_{DD}=5V
  3.40mV/Gs KTH3103Series@V_{DD}=5V
  5.00mV/Gs KTH3105Series@V_{DD}=5V
  10.00mV/Gs KTH3110Series@V_{DD}=5V
  13.50mV/Gs KTH3113Series@V_{DD}=5V
- Package：SOT-23 TO-92S DFN1616
- Operating Temperature：-40℃~125℃
- RoHS Compliant

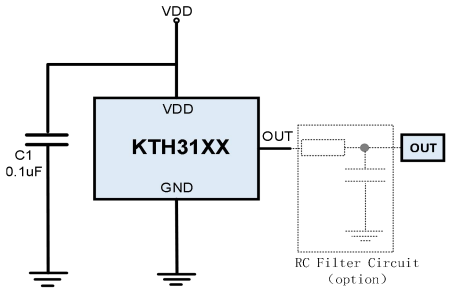
2 Application

- Current Sensor
- Current Sensor
- Position Detection
- Vibration Sensor,Liquid Level Sensor
- Proximity Switch
- Rotary Encoder



Package

3 Typical Application Circuit



4 Descriptions

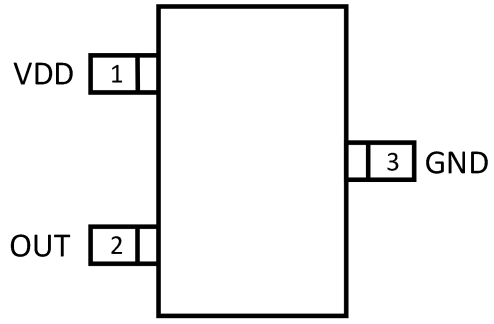
KTH31xx is a linear Hall-effect sensor that provides a proportional response to magnetic flux density. The internal circuitry of KTH31xx integrates a Hall sensor, linear amplifier, and push-pull output stage circuit. It features high-speed, low-noise output characteristics and delivers linear performance across a wide temperature range of -40℃to125℃. This sensor is suitable for consumer and industrial applications requiring magnetic field detection.

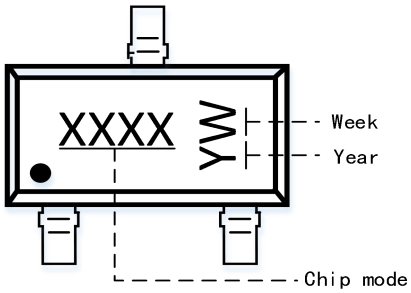
The KTH31xx features high sensitivity, enabling accurate response to changes in weak magnetic fields. In the absence of a magnetic field, the analog output remains at 1/2 VDD. The output varies linearly with the applied magnetic flux density, and multiple sensitivity options are available for selection. The sensor generates distinct voltage outputs for south and north magnetic poles.

The KTH31xx detects magnetic flux density perpendicular to the package top surface. It utilizes high-qualitySOT-23,TO-92S,andDFN1616 packages to accommodate diverse application requirements.

5 Pin Descriptions

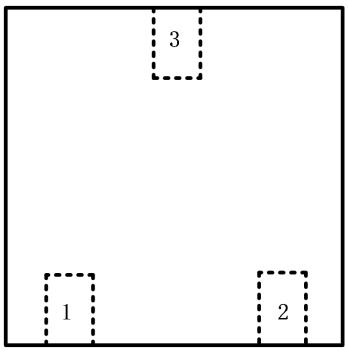
SOT-23

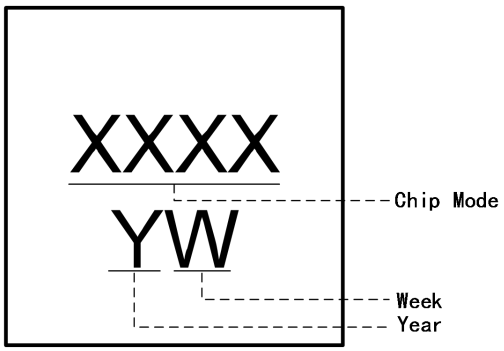




Pin Name	Pin Number	Pin Number
VDD	1	Power Supply Input
OUT	2	Output Pin
GND	3	Ground Pin

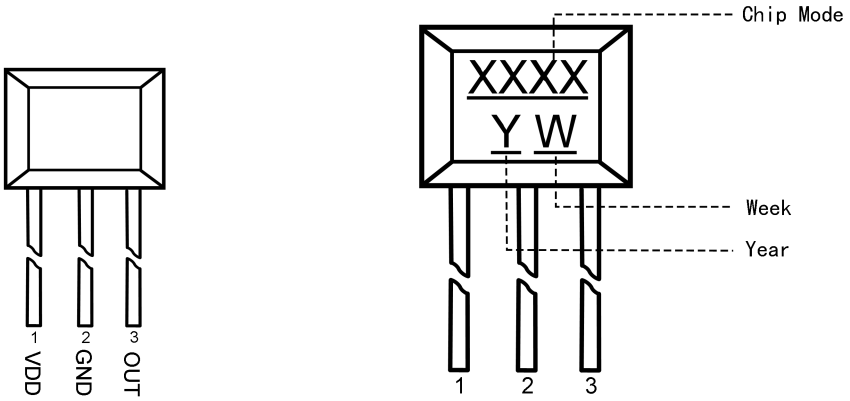
DFN1616





Pin Name	Pin Number	Pin Number
VDD	1	Power Supply Input
OUT	2	Output Pin
GND	3	Ground Pin

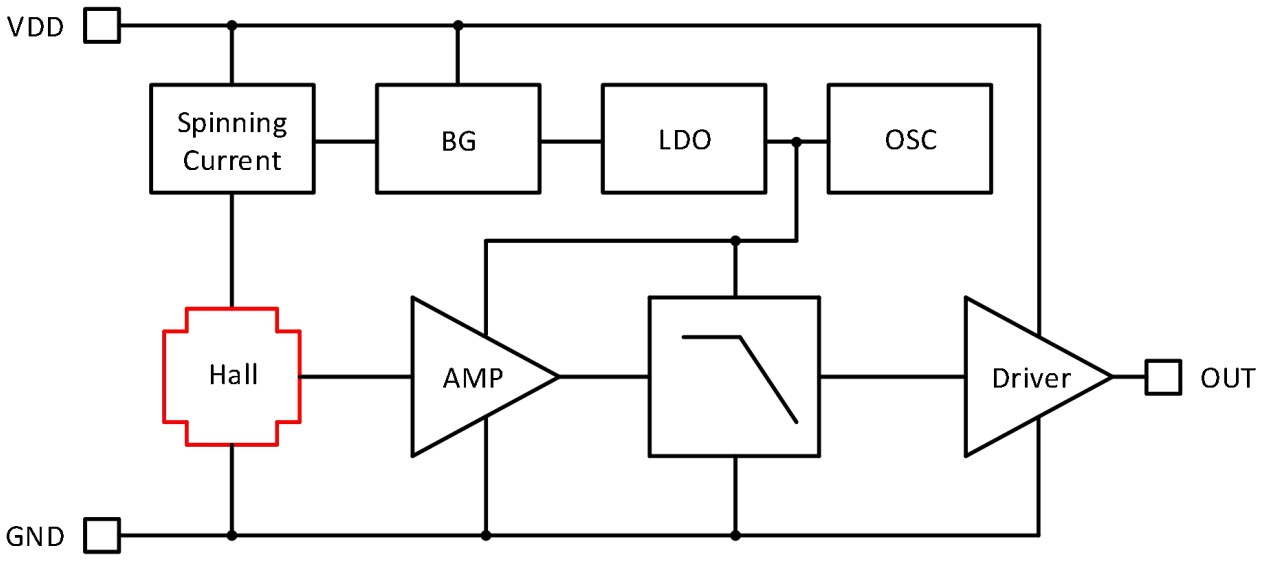
TO-92S



引脚结构（俯视图）

Pin Name	Pin Number	Pin Number
VDD	1	Power Supply Input
GND	2	Ground Pin
OUT	3	Output Pin

6 Block Diagram



7 Output Characteristics(TA=-40℃~125℃,V_{DD}=3.0V~5.5V)

7.1Typical Application Scenarios1

The KTH31XX can detect magnetic flux perpendicular to the top surface of the package.As shown in Table 1:When an S-pole magnetic field approaches the top surface of the chip package, the output voltage exceeds VDD/2. When an N-pole magnetic field approaches the top surface of the chip package, the output voltage drops below VDD/2.

Parameter	Conditions	Output
South pole	B>0 Gauss	>V_{DD}/2
North pole	B<0 Gauss	<V_{DD}/2

Table 1

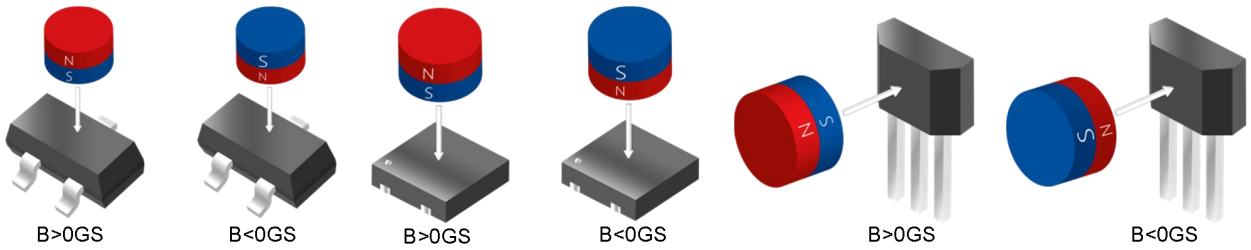
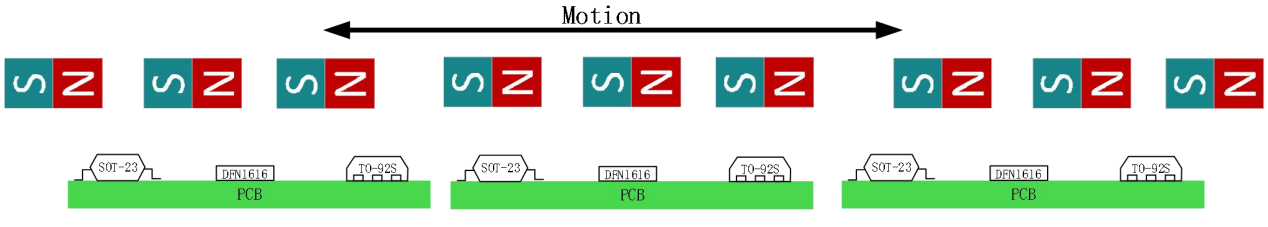


Figure 1. North Pole and South Pole approaching the front side of the chip

7.2Typical Application Scenarios2

The KTH31XX can detect magnetic flux perpendicular to the top surface of the package。As shown in Table 2，When the magnet is positioned to the left of the chip, the output voltage of the chip is less than VDD/2. As shown in Fig.3, when the magnet is directly above the chip, the output voltage equals VDD/2. As shown in Fig.4, when the magnet is positioned to the right of the chip, the output voltage exceeds VDD/2.

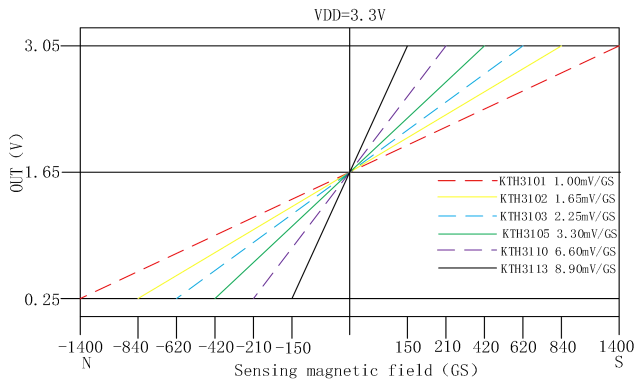


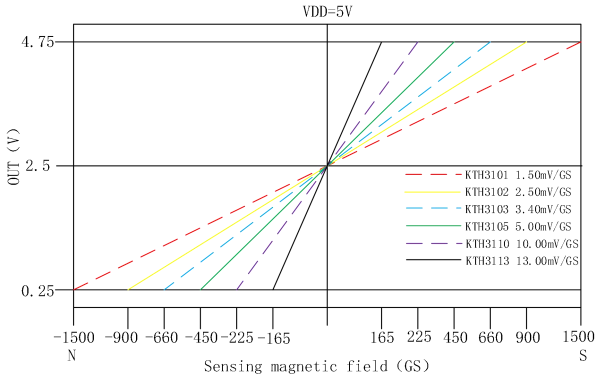
Figuse2 The magnet is positioned to the left of the chip

Figuse3 The magnet is positioned at the center of the chip

Figuse4 The magnet is positioned to the right of the chip

7.3 Output characteristic curve





8 Product Name Structure

KTH31 XX-XXX

Package abbreviation:：SS3：SOT-23
DF16：DFN1616
TO3：TO-92S

Sensitivity：01：1.00mV/Gs(@V_{DD}=3.3V) 1.50mV/Gs(@V_{DD}=5V)
02：1.65mV/Gs(@V_{DD}=3.3V) 2.50mV/Gs(@V_{DD}=5V)
03：2.25mV/Gs(@V_{DD}=3.3V) 3.40mV/Gs(@V_{DD}=5V)
05：3.30mV/Gs(@V_{DD}=3.3V) 5.00mV/Gs(@V_{DD}=5V)
10：6.60mV/Gs(@V_{DD}=3.3V) 10.00mV/Gs(@V_{DD}=5V)
13：8.90mV/Gs(@V_{DD}=3.3V) 13.50mV/Gs(@V_{DD}=5V)

9 Absolute Maximum Ratings （@TA=+25℃, unless otherwise specified）

Symbol	Parameter	Value	Unit
V_{DD}	Supply Voltage	6.5	V
I_{OUTPUT}	Output Current	1.5	mA
V_{OUT}	Analog Output Voltage	-0.2~V_{DD} + 0.2	V
T_A	Operating temperature Range	-40～+125	ºC
T_{STG}	Storage Temperature Range	-65～+150	ºC
T_J	Maximum Junction Temperature	+150	ºC

Note: Exceeding the absolute maximum ratings may cause permanent damage. Exposure to absolute-maximum rated conditions for extended periods may affect device reliability.

10 ESD

ESD	Value	Unit
HBM	5K	V

11 Electronics Characteristics（@TA=-40℃~125℃, VDD=3.0V~5.5V, unless otherwise specified）

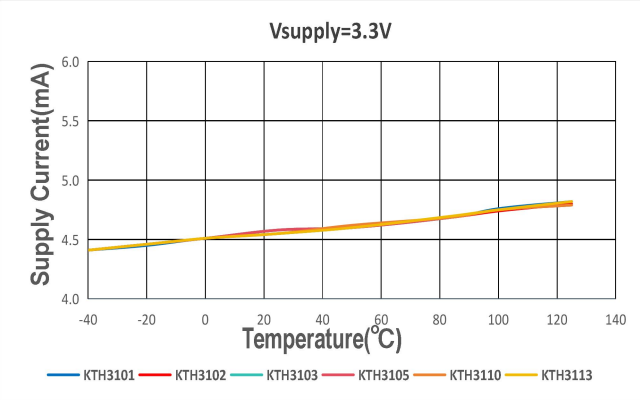
KTH31XX Series						
Symbol	**Parameter**	**Condition**	**Min.**	**Typ.**	**Max.**	**Unit**
V_{DD}	Supply Voltage	Operating	3.0	3.3	5.5	V
I_{DD}	Supply Current	V_{DD}=3.3V B=0 Gs TA=25℃	—	4.5	5.5	mA
		V_{DD}=5.0V B=0 Gs TA=25℃	—	5.4	6.5	mA
I_{SC}	Sink Current	T_A=25℃	-1.5	—	1.5	mA
B_W	Bandwidth		—	30	—	KHz
T_{PO}	Power on Time	T_A=25℃	—	20	40	μS
N_F	Noise	KTH3101, T_A=25℃	—	2.4	—	mV_{RMS}
		KTH3102, T_A=25℃	—	3.0	—	mV_{RMS}
		KTH3103, T_A=25℃	—	3.5	—	mV_{RMS}
		KTH3105, T_A=25℃	—	4.8	—	mV_{RMS}
		KTH3110, T_A=25℃	—	7.2	—	mV_{RMS}
		KTH3113, T_A=25℃	—	8.6	—	mV_{RMS}
C_L	Output Loading Capacitance		—	—	10	nF

12 Magnetic Characteristics（@TA=-40℃~125℃, VDD=3.0V~5.5V, unless otherwise specified）

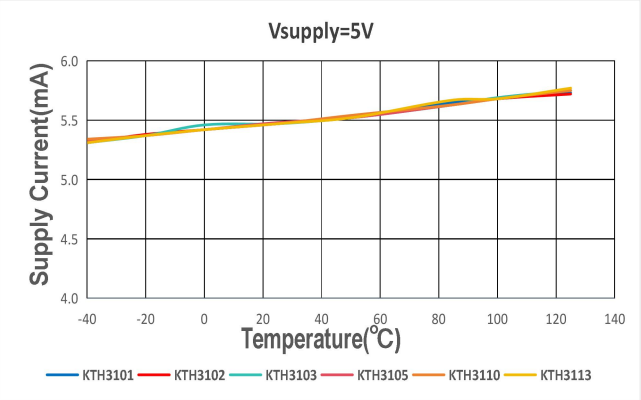
KTH31XX Series						
Symbol	**Parameter**	**Condition**	**Min.**	**Typ.**	**Max.**	**Unit**
V_Q	Quiescent Voltage	V_{DD}=3.3V, B=0, T_A=25℃	1.630	1.65	1.670	V
		V_{DD}=5.0V, B=0, T_A=25℃	2.475	2.5	2.525	V
V_Q(T)	V_Q Variation Over Temperature	B=0, T_A=-40℃~125℃	—	±1%*V_{DD}	—	V
V_{QRE}	Quiescent Voltage Ratio Error		—	±0.5	—	%
V_L	Output Voltage Linearity Range		0.25	—	V_{DD}-0.25	V
S_{ENS}(T)	S_{ENS} Variation Over Temperature		—	0.1	—	%/℃
S_{LE}	Sensitivity Linearity Error		-1.5	—	1.5	%
Sensitivity	Sensitivity（V_{DD}=3.3V，T_A=25℃）	KTH3101	0.93	1.00	1.07	mV/Gs
		KTH3102	1.53	1.65	1.76	mV/Gs
		KTH3103	2.10	2.25	2.41	mV/Gs
		KTH3105	3.07	3.30	3.53	mV/Gs
		KTH3110	6.14	6.60	7.06	mV/Gs
		KTH3113	8.28	8.90	9.52	mV/Gs
	Sensitivity（V_{DD}=5.0V，T_A=25℃）	KTH3101	1.40	1.50	1.61	mV/Gs
		KTH3102	2.33	2.50	2.67	mV/Gs
		KTH3103	3.16	3.40	3.68	mV/Gs
		KTH3105	4.65	5.00	5.35	mV/Gs
		KTH3110	9.30	10.00	10.70	mV/Gs
		KTH3113	12.56	13.50	14.45	mV/Gs
Magnetic Range	Magnetic Field Range（V_{DD}=3.3V）	KTH3101	—	±1400	—	Gs
		KTH3102	—	±840	—	Gs
		KTH3103	—	±620	—	Gs
		KTH3105	—	±420	—	Gs
		KTH3110	—	±210	—	Gs
		KTH3113	—	±150	—	Gs

Magnetic Range	Magnetic Field Range (V_{DD}=5.0V)	KTH3101	—	±1500	—	Gs
		KTH3102	—	±900	—	Gs
		KTH3103	—	±660	—	Gs
		KTH3105	—	±450	—	Gs
		KTH3110	—	±225	—	Gs
		KTH3113	—	±165	—	Gs

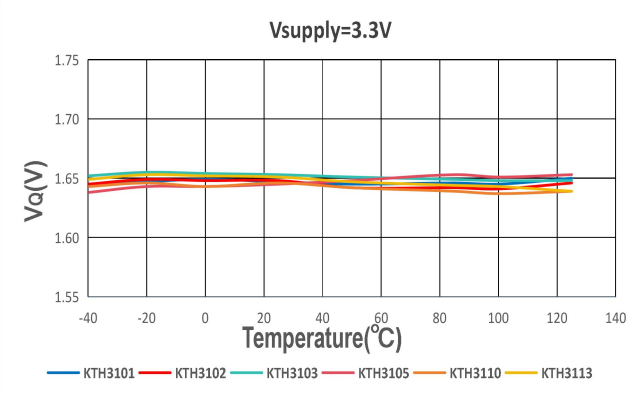
13 Performance Graphs



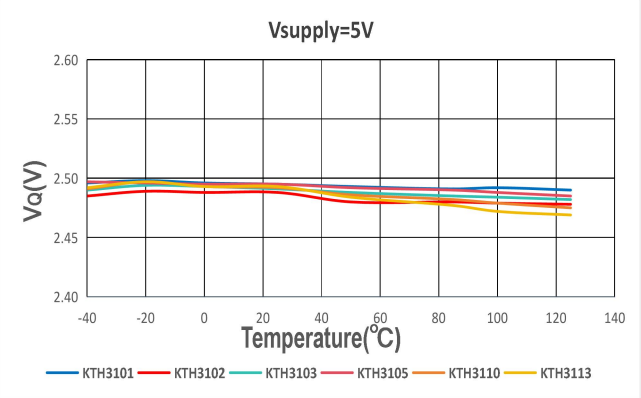
Supply Voltage VS Temperature @VDD=3.3V



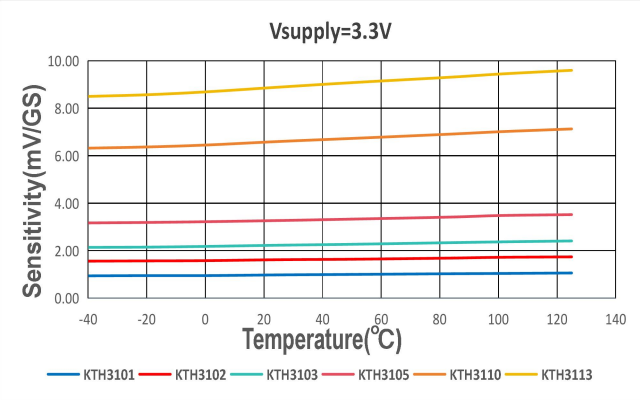
Supply Voltage VS Temperature @VDD=5V



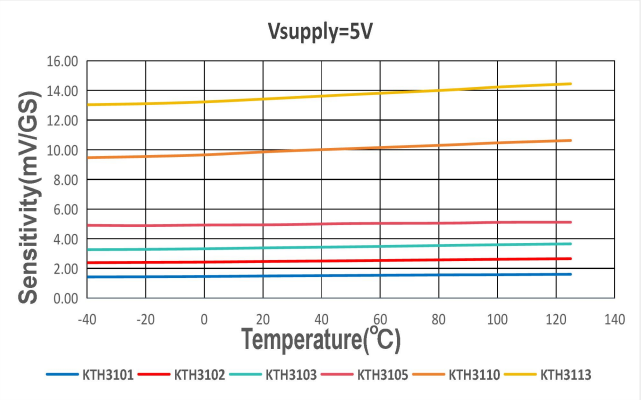
Quiescent Voltage VS Temperature @VDD=3.3V



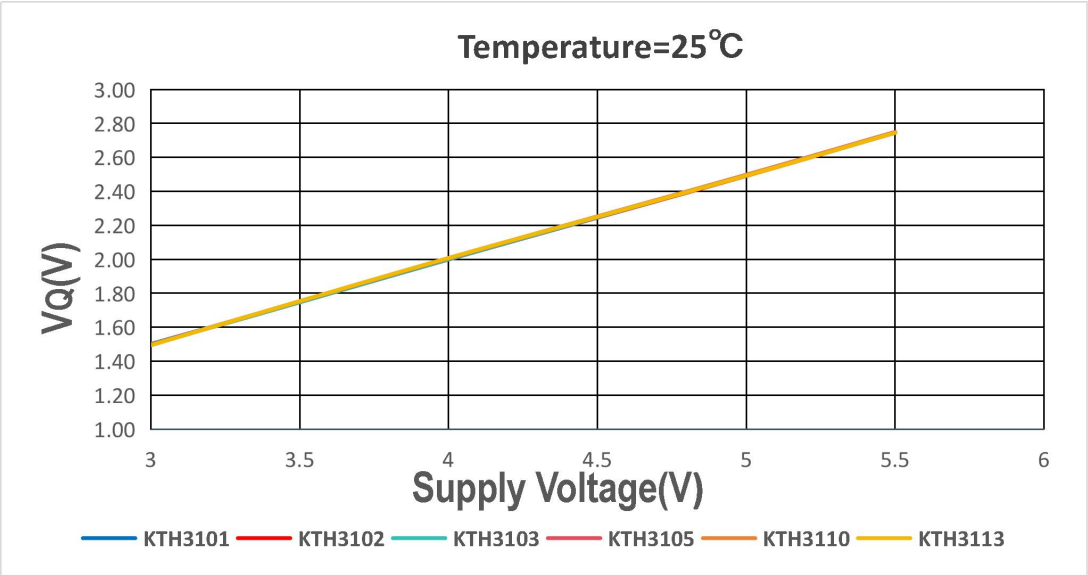
Quiescent Voltage VS Temperature @VDD=5V



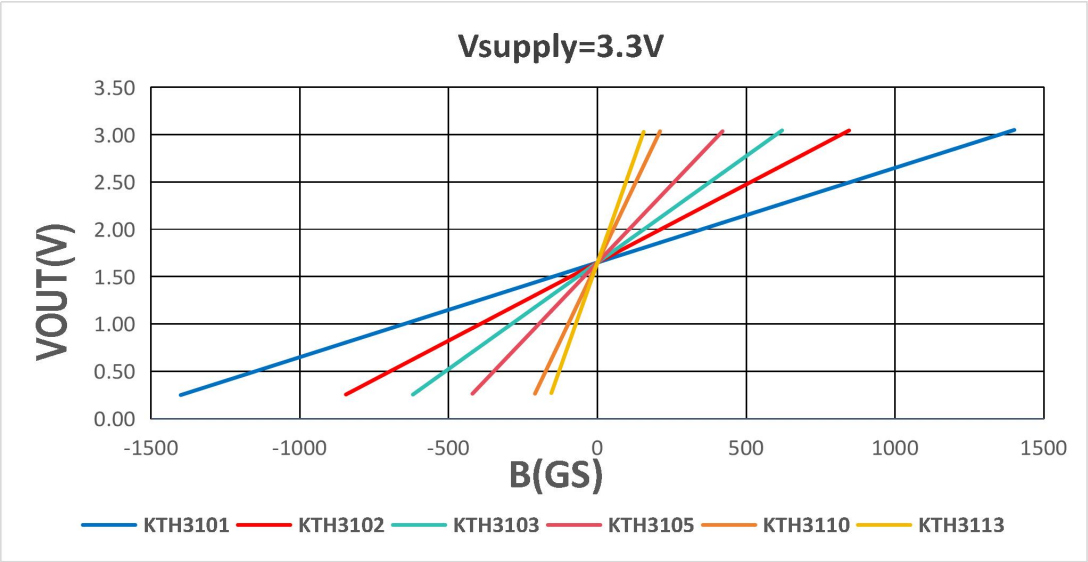
Sensitivity VS Temperature @VDD=3.3V



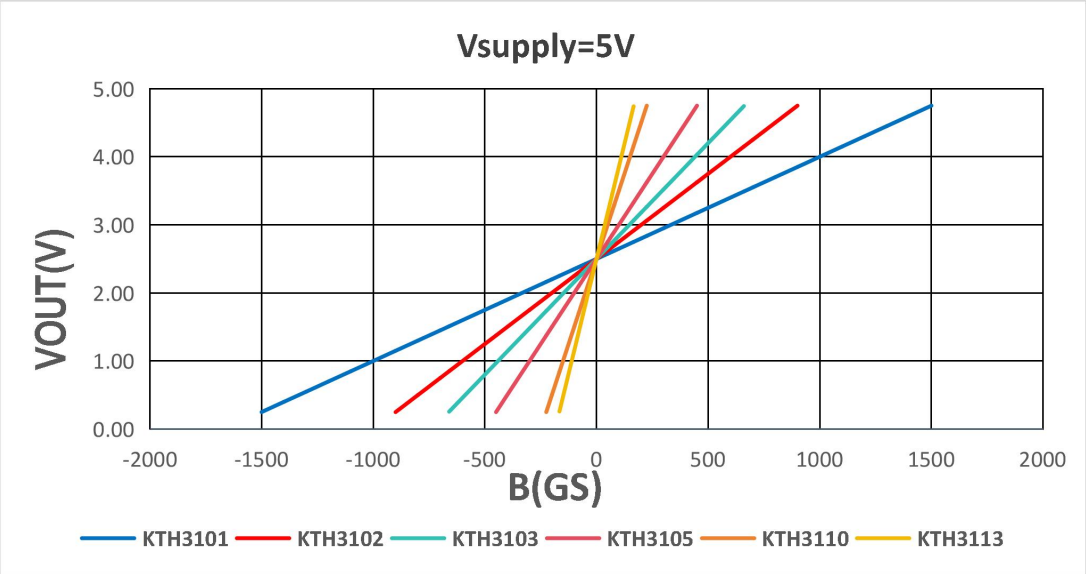
Sensitivity VS Temperature @VDD=5V



Quiescent Voltage VS Supply Voltage @TA=25℃



Output VS Magnetic @VDD=3.3V



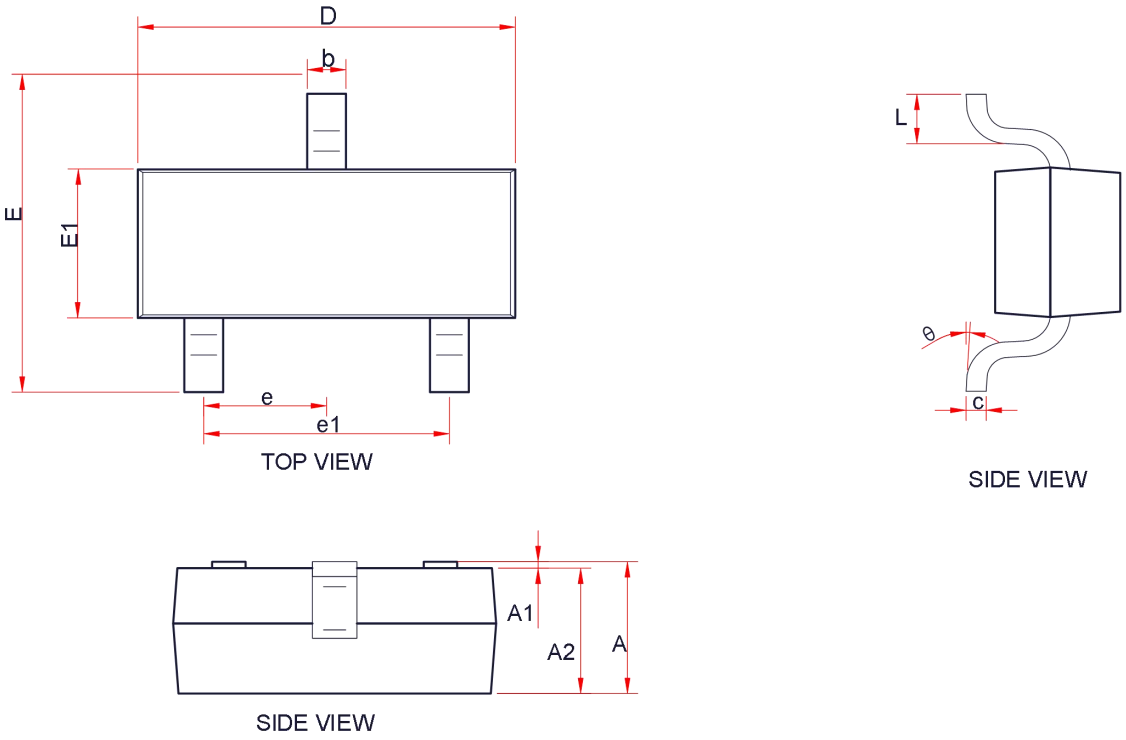
Output VS Magnetic @VDD=5V

14 Order Information

Part Numbers	Package	Number of Pins	Operating Temperature	Sensitivity (@V_{DD}=3.3V)	Sensitivity (@V_{DD}=5V)
KTH3101-SS3	SOT-23	3	-40℃～+125℃	1.00mV/Gs	1.50mV/Gs
KTH3101-DF16	DFN1616	3	--40℃～+125℃	1.00mV/Gs	1.50mV/Gs
KTH3101-TO3	TO-92S	3	-40℃～+125℃	1.00mV/Gs	1.50mV/Gs
KTH3102-SS3	SOT-23	3	-40℃～+125℃	1.65mV/Gs	2.50mV/Gs
KTH3102-DF16	DFN1616	3	--40℃～+125℃	1.65mV/Gs	2.50mV/Gs
KTH3102-TO3	TO-92S	3	-40℃～+125℃	1.65mV/Gs	2.50mV/Gs
KTH3103-SS3	SOT-23	3	-40℃～+125℃	2.25mV/Gs	3.40mV/Gs
KTH3103-DF16	DFN1616	3	--40℃～+125℃	2.25mV/Gs	3.40mV/Gs
KTH3103-TO3	TO-92S	3	-40℃～+125℃	2.25mV/Gs	3.40mV/Gs
KTH3105-SS3	SOT-23	3	-40℃～+125℃	3.30mV/Gs	5.00mV/Gs
KTH3105-DF16	DFN1616	3	--40℃～+125℃	3.30mV/Gs	5.00mV/Gs
KTH3105-TO3	TO-92S	3	-40℃～+125℃	3.30mV/Gs	5.00mV/Gs
KTH3110-SS3	SOT-23	3	-40℃～+125℃	6.60mV/Gs	10.00mV/Gs
KTH3110-DF16	DFN1616	3	--40℃～+125℃	6.60mV/Gs	10.00mV/Gs
KTH3110-TO3	TO-92S	3	-40℃～+125℃	6.60mV/Gs	10.00mV/Gs
KTH3113-SS3	SOT-23	3	-40℃～+125℃	8.90mV/Gs	13.50mV/Gs
KTH3113-DF16	DFN1616	3	--40℃～+125℃	8.90mV/Gs	13.50mV/Gs
KTH3113-TO3	TO-92S	3	-40℃～+125℃	8.90mV/Gs	13.50mV/Gs

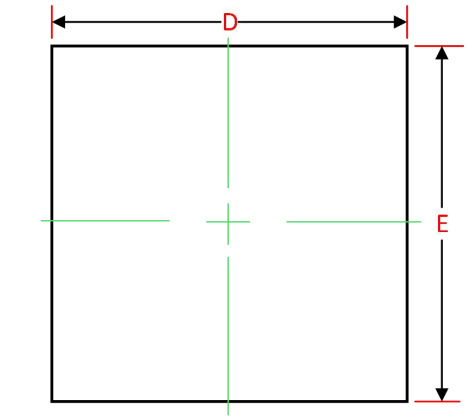
15 PACKAGE OUTLINE DIMENSIONS

SOT-23

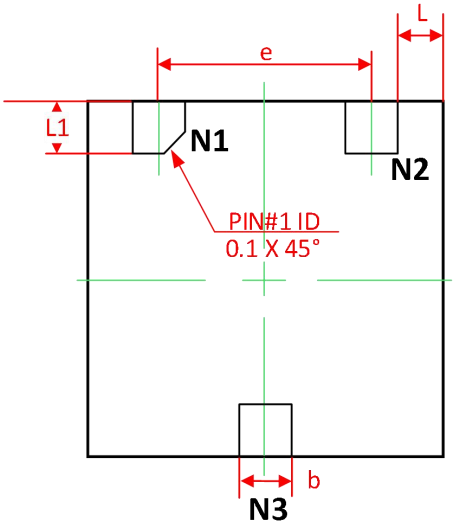


Symbol	Dimensions in Millimeters	
	Min.	Max.
A	-	1.15
A1	0.00	0.1
A2	0.9	1.1
b	0.30	0.50
c	0.132	0.202
D	2.8	3.0
E	2.25	2.55
E1	1.2	1.4
e	0.95 TYP	
e1	1.8	2.0
L	0.30	0.50
θ	0 °	8 °

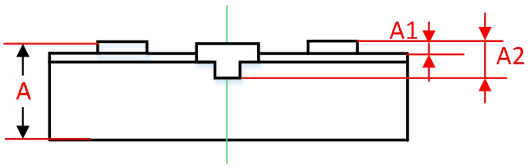
DFN1616



TOP VIEW



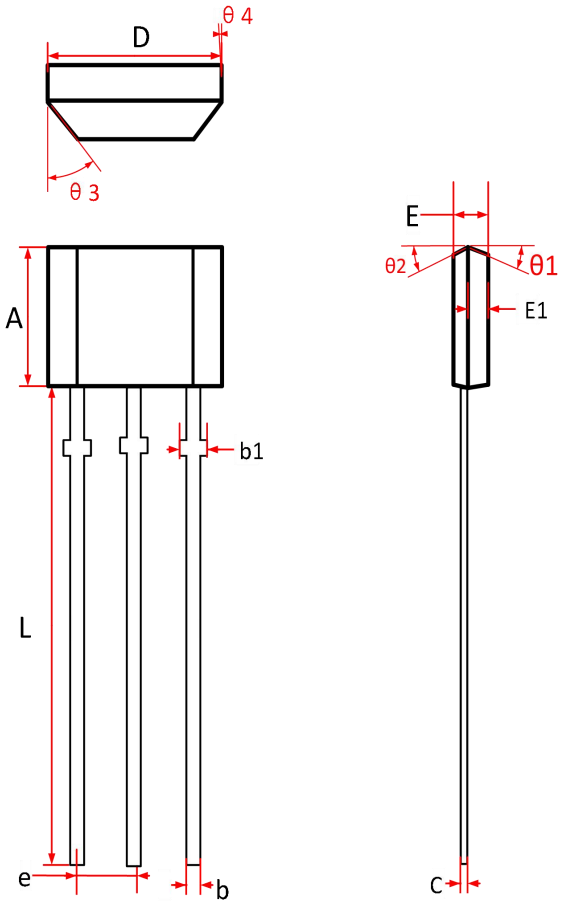
BOTTOM VIEW



SIDE VIEW

Symbol	Dimensions in Millimeters		
	Min.	Typ.	Max.
A	0.450	-	0.550
A1	0.000	-	0.050
A2	0.150 REF.		
D	1.550	-	1.650
E	1.550	-	1.650
b	0.200	-	0.300
e	0.950	-	1.050
L	0.175 REF		
L1	0.200	-	0.300

TO-92S



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
θ 1		6°	
θ 2		3°	
θ 3		45°	
θ 4		3°	