KH3206

Medium-sensitivity Unipolar Hall-Effect Switch

General Description

The KH3206 is a medium-sensitivity Unipolar Hall-effect switch with digital latched output, special designed for automotive, industrial and consumer applications.

The KH3206 combined with a voltage regulator, Hall voltage generator, small-signal amplifier, Schmitt trigger and open-drain output. The integrated voltage regulator permits operation from 3.8V to 30V and extended choice of temperature range. If the magnetic flux density is larger than operating point (B_{OP}), the output will be turned on; if it is less than releasing point (B_{RP}), the output will be turned off.

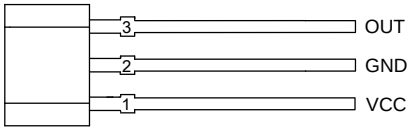
The KH3206 is available in TO-92S-3 and SOT-23-3 packages which are optimized for most applications.

Features

- 3.8V to 30V Wide Operating Voltage
- Bipolar technology
- Superior Temperature Stability: -40~+150℃
- Open drain Output
- 50mA Output Sink Current
- Lead Free package: TO-92S-3 and SOT23-3

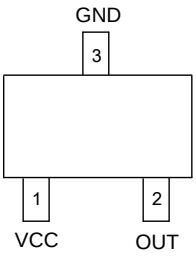
Pin Assignments

(Front View)



TO-92S-3

(Top View)

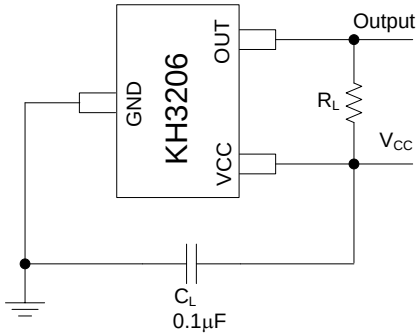


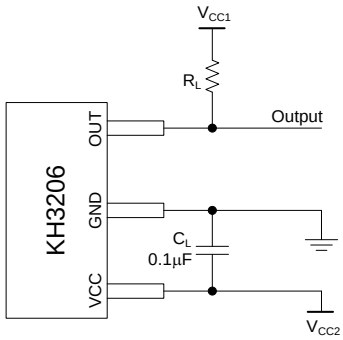
SOT-23-3

Applications

- Non-Contact Switch
- Automotive Ignition
- Position Control
- Break ICs
- Revolution Detection
- Safe Alarm Device
- Textile Control system

Typical Applications Circuit



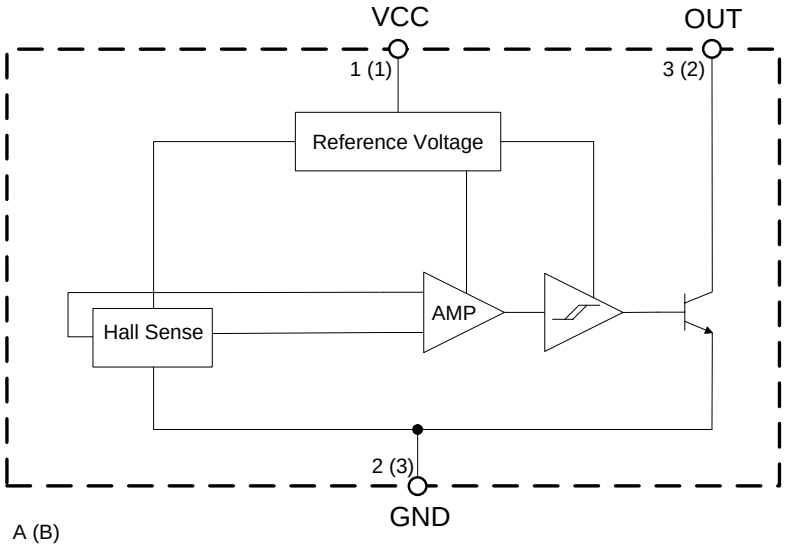


Pin Descriptions

Pin Number		Pin Name	Function
TO-92S-3	SOT-23-3		
1	1	VCC	Supply Voltage
2	3	GND	Ground Pin
3	2	OUT	Output Pin

Medium-sensitivity Unipolar Hall-Effect Switch

Functional Block Diagram



A (B)
A for TO-92S-3
B for SOT-23-3

Absolute Maximum Rates (@T_A=+25°C, Note 1)

Symbol	Parameter	Rating		Unit
V_{CC}	Supply Voltage	-30 to +40		V
I_{CC}	Supply Current (Fault)	10		mA
V_{OUT}	Output Voltage	+40V DC max, OFF condition only -0.5V min., OFF or ON condition		V
I_{OUT}	Output Current	50		mA
B	Magnetic Flux Density	Unlimited		Gauss
P_D	Power Dissipation	TO-92S-3	400	mW
		SOT-23-3	230	
Top	Operation Temperature range	-40 to +150		°C
T_{STG}	Storage Temperature Range	-55 to +150		°C
T_J	Junction Temperature Range	+150		°C
–	ESD (Human Body Model) (Note 2)	4000		V
–	ESD (Machine Model) (Note 2)	400		V

Notes: 1. Stresses greater than those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “Recommended Operating Conditions” is not implied. Exposure to “Absolute Maximum Ratings” for extended periods may affect device reliability.
2. Electronic semiconductor products are sensitive to Electro Static Discharge (ESD). Always observe Electro Static Discharge control procedures whenever handling semiconductor products.

Recommended Operating Conditions

Symbol	Parameter	Min	Max	Unit
V_{CC}	Supply Voltage	3.8	30	V
T_{OP}	Operating Temperature	-40	+150	°C

Medium-sensitivity Unipolar Hall-Effect Switch

Electrical Characteristics (@T_A=+25°C, V_{CC}=12V, unless otherwise specified.)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CC}	Supply Voltage	Operating	3.8	12	30	V
I_{cc}	Supply current	VDD=3.5 to 30V, Output Off	–	4	10	mA
I_{LE}	Output Leakage current	Released	–	–	10	uA
V_{SAT}	Saturation Voltage	I_{OUT}=25mA	–	150	250	mV
		I_{OUT}=45mA	–	350	500	mV
T_r	Rise Time	RL=820Ω,CL=20pF	–	0.2	–	μs
T_f	Fall Time	RL=820Ω,CL=20pF	–	0.5	–	μs
Fsw	Maximum Switching Frequency	–	–	10	–	kHz

Magnetic Characteristics (@T_A=+25°C, V_{CC}=12V, unless otherwise specified. Note 3)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
B_{OP}	Operating Point	B>B_{OP},V_{OUT}=low(output on)	70	150	200	Gauss
B_{RP}	Releasing Point	B<B_{RP},V_{OUT}=high(output off)	50	100	170	Gauss
B_{HYS}	Hysteresis	| B_{OP} - B_{RP} | (Note 4)	20	50	80	Gauss

Notes: 3. The specifications stated here are guaranteed by design. 1 Gauss=0.1mT
4. B_{OP}=operating point (output turns on); B_{RP}=releasing point (output turns off)

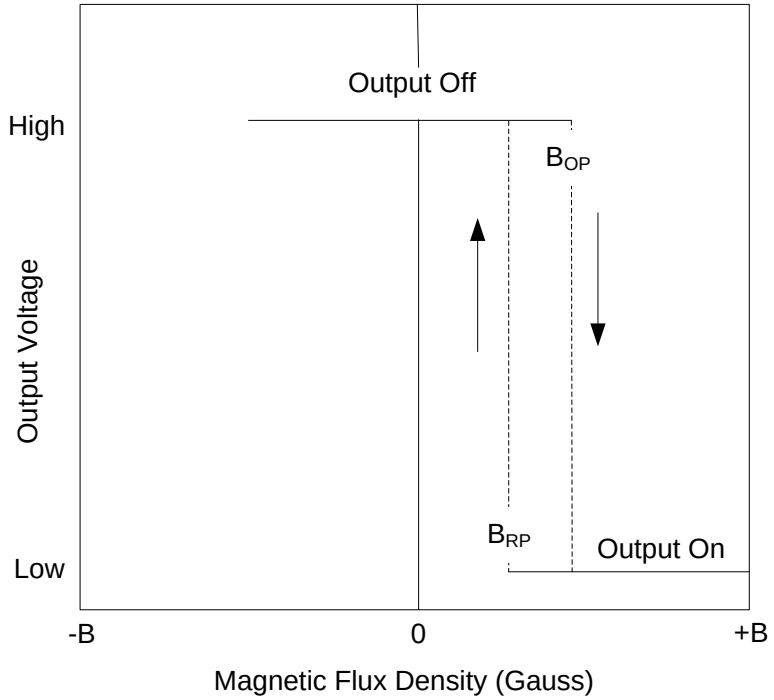
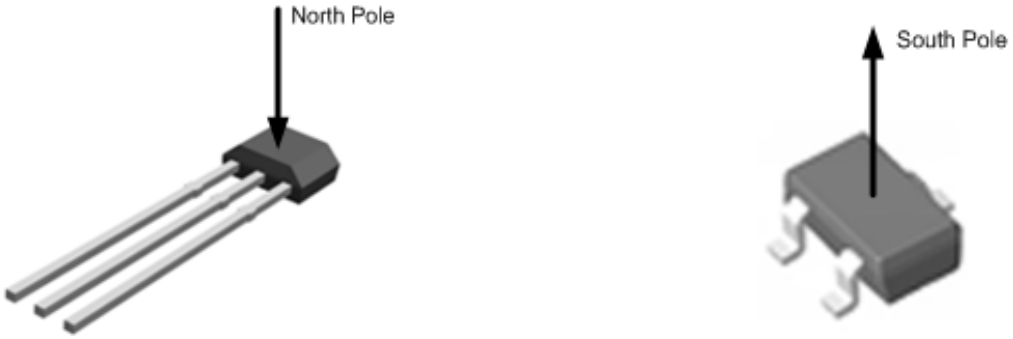


Figure 1. Output Voltage vs. Magnetic Flux Density



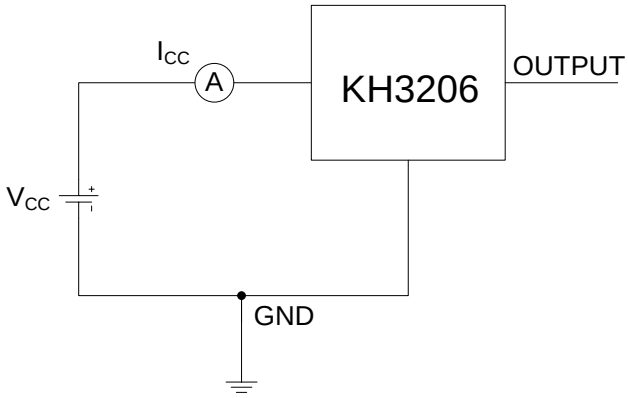
The TO-92S-3 package is north pole active and the SOT-23-3 package is south pole active. Removing the magnetic field (B=0) switches the output high.

Figure 2. Output Status vs. Magnetic Pole

Package Type	Parameter	Test Condition	Output
TO-92S-3	North Pole Active	$B > B_{OP}$	High
		$B < B_{RP}$	Low
SOT-23-3	South Pole Active	$B > B_{OP}$	High
		$B < B_{RP}$	Low

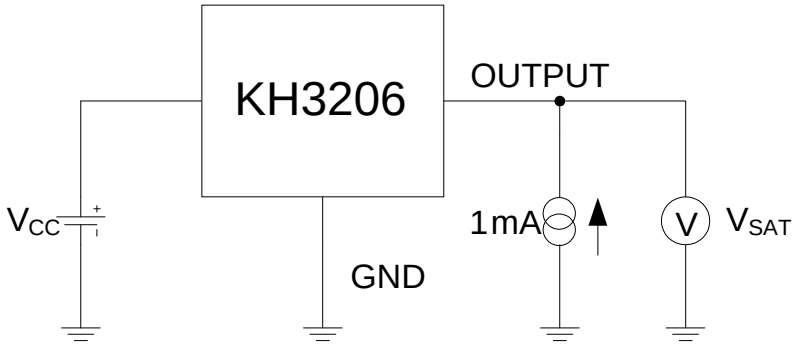
Table 1. Output Status vs. Magnetic Flux Density

Test Conditions



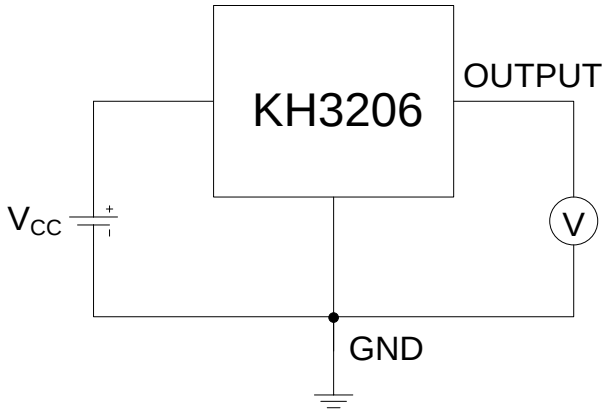
Supply Current (Note 5, Note 6)

Note 5: I_{CC} represents the supply current. OUTPUT is open during measurement.
Note 6: The device is put under magnetic field with $B<B_{RP}$.



Output Saturation Voltage (Note 7, Note 8)

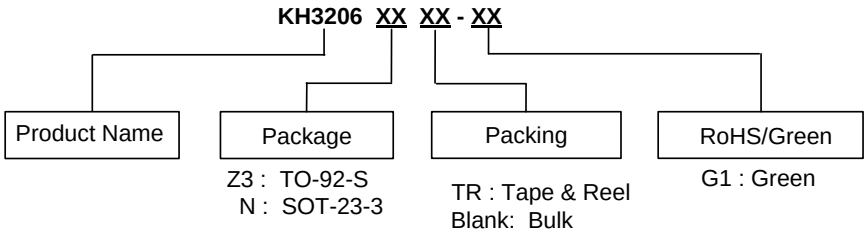
Note 7: The output saturation voltage V_{SAT} is measured at V_{CC}=3.8V and V_{CC}=30V.
Note 8: The device is put under magnetic field with B>B_{OP}.



Magnetic Thresholds (Note 9, Note10)

Note 9: B_{OP} is determined by putting the device under magnetic field swept from $B_{RP(min)}$ to $B_{OP(max)}$ until the output is switched on.
Note 10: B_{RP} is determined by putting the device under magnetic field swept from $B_{OP(max)}$ to $B_{RP(min)}$ until the output is switched off.

Ordering Information

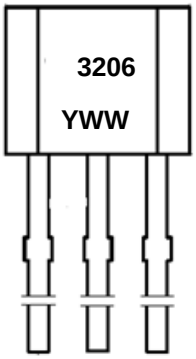


Our Pb-free products with "G1" suffix in the part number are RoHS compliant and green.

Package	Temperature Range	Part Number	Marking ID	Packing Type
TO-92-S	-40 to +85°C	KH3206Z3-G1	320	1000/Bulk
SOT-23-3		KH3206NTR-G1	CW	3000/Tape & Reel

Marking Informaiton

(1) Package Type: TO-92S-3

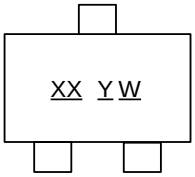


First lines: Identification Code
Second line: Date Code
Y: Year 0 to 9
WW: Week 00 to 52 (Work week of molding)

Part Number	Package	Identification Code
KH3206Z3-G1	TO-92S-3	320

(2) Package Type: SOT-23-3

(Top View)

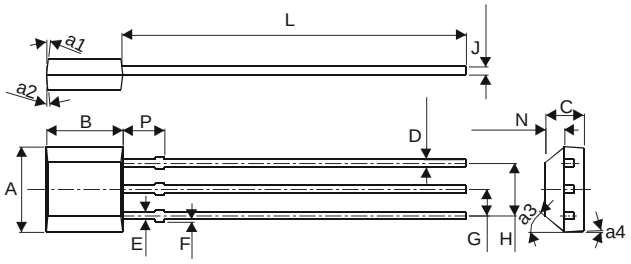


XX : Identification code
Y : Year 0 to 9
W : Week
A to Z : 1 to 26 week;
a to z : 27 to 52 week; z represents 52 and 53 week

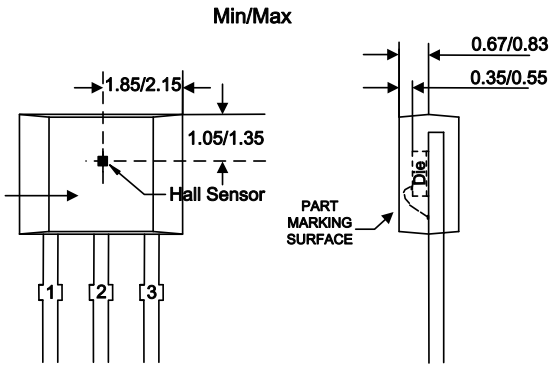
Part Number	Package	Identification Code
KH3206NTR-G1	SOT-23-3	CW

Package Outline Demension

1) Package Type: TO-92S-3

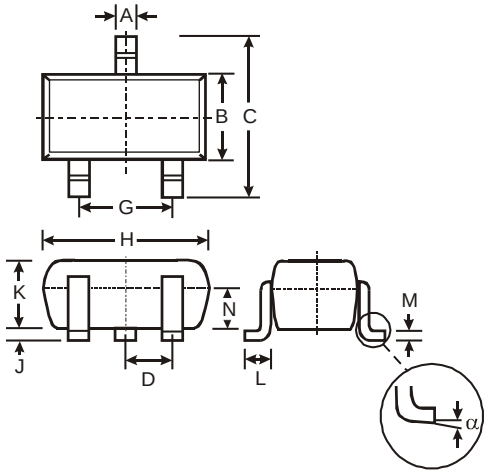


TO-92S-3		
Dim	**Min**	**Max**
A	3.85	4.15
a1	3° Typ	
a2	6° Typ	
a3	44°	46°
a4	3° Typ	
B	2.90	3.10
C	1.42	1.62
D	0.36	0.51
E	0.44 Typ	
F	-0.05	0.10
G	1.27 Typ	
H	2.54 Typ	
J	0.36	0.51
L	13.5	15.5
N	0.67	0.83
P	1.40	1.80
All Dimensions in mm		

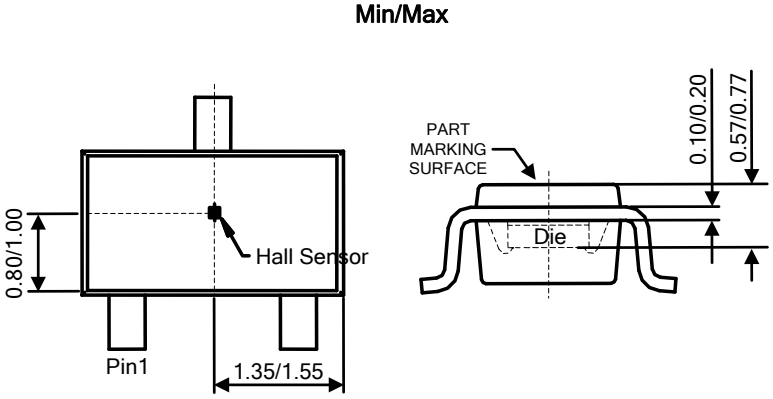


Sensor Location

2) Package Type: SOT-23-3



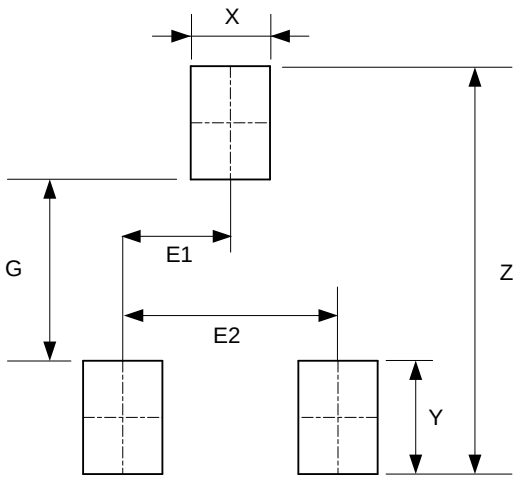
SOT-23-3			
Dim	**Min**	**Max**	**Typ**
A	0.35	0.50	0.38
B	1.50	1.70	1.60
C	2.70	3.00	2.80
D	-	-	0.95
G	-	-	1.90
H	2.90	3.10	3.00
J	0.013	0.10	0.05
K	1.00	1.30	1.10
L	0.35	0.55	0.40
M	0.10	0.20	0.15
N	0.70	0.80	0.75
α	0°	8°	-
All Dimensions in mm			



Sensor Location

Suggested Pad layout

(1) Package Type:SOT-23-3



Dimensions	Z (mm)/(inch)	G (mm)/(inch)	X (mm)/(inch)	Y (mm)/(inch)	E1 (mm)/(inch)	E2 (mm)/(inch)
Value	3.600/0.142	1.600/0.063	0.700/0.028	1.000/0.039	0.950/0.037	1.900/0.075

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