

1 Features and Benefits

- ▲ Digital output, omnipolar switch
- ▲ Quickly respond to changes in magnetic field
- ▲ Wide operating voltage range: 2.5V ~ 22V
- ▲ Strong resistance to mechanical stress
- ▲ Non-contact output, safety and reliable
- ▲ Operating temperature range: -40°C ~ 125°C
- ▲ TO-92 and SOT-23-3L package options
- ▲ Developed according to the EU RoHS and EU REACH

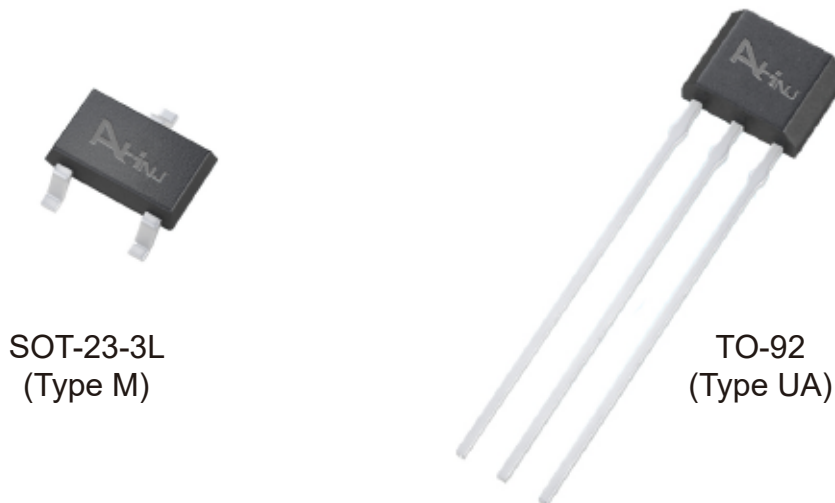
2 Application Examples

- ▲ Automotive electronics, Consumer electronics and Industrial electronics
- ▲ Water flow sensing
- ▲ Liquid level detection
- ▲ Position Sensing
- ▲ Speed Sensing
- ▲ Contactless key/button
- ▲ Bluetooth headset
- ▲ Door latchsystem

3 Selection Guide

Part Number	Packing	Mounting	Operating, T	B _{RP} (Min)	B _{OP} (Max)
AH3931/K-M	7-in. reel, 3000 pieces/reel	3-pin SOT23-3L surface mount	-40°C to 125°C	±1.0mT	±4.0mT
AH3931/K-UA	Anti-static bag, 1000 pieces/bag	3-pin SIP through hole	-40°C to 125°C	±1.0mT	±4.0mT

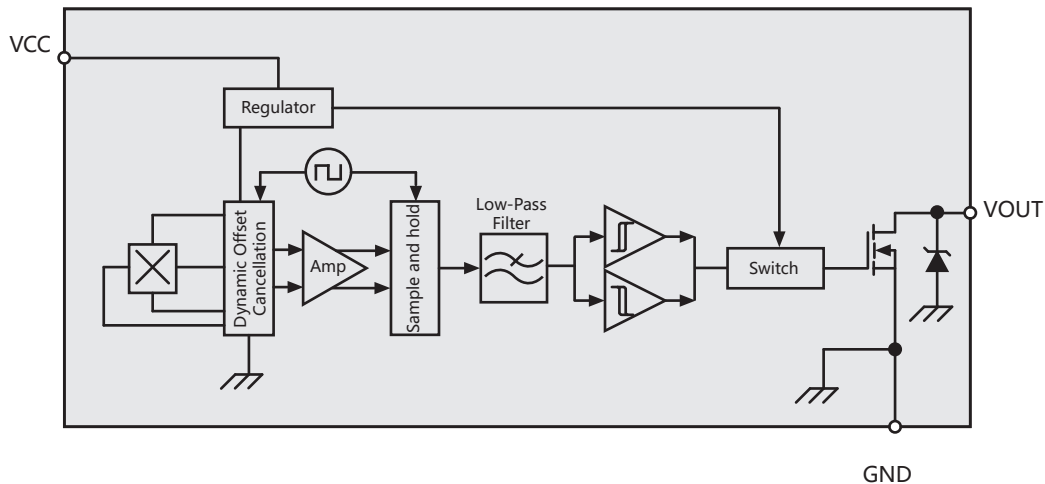
NOTE 1. Hall ICs are soldered tin brazing for assembly, and wave soldering of SOT-23-3L surface-mounted components poses a risk of failure.
 2. A risk of circuit failure may happen in non-brazing processes such as electric resistance welding, high-frequency welding, etc.
 3. E: -25~85°C; K: -40~125°C; L: -40~150°C.



4 General Description

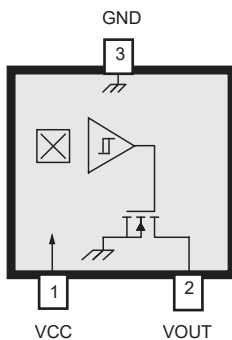
The AH3931 is a digital omnipolar Hall switch. The device includes a voltage regulator, Hall-voltage generator, small-signal amplifier, chopper stabilization, Schmitt trigger, and a short circuit protected open-drain output to sink up to 25 mA. An on-board regulator permits operation with supply voltages of 2.5 to 22 V. The advantage of operating down to 2.5V is that the device can be used in 2.5V applications or with additional external resistance in series with the supply pin for greater protection against high-voltage transient events.

The AH3931, produced with CMOS technology, is asked for lower supply voltage and less power supply. It is available in two package types: SOT-23-3L (Type M), and TO-92 (Type UA). Each package is lead (Pb) free, with 100% matte tin plated leadframes.

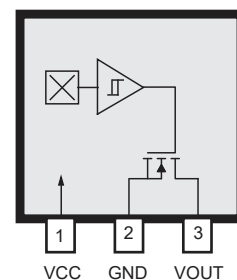


5 Terminal List

SOT-23-3L
(Type M)



TO-92
(Type UA)



Name	Description	Number	
		Type M	Type UA
VCC	Power Supply	1	1
GND	Ground	3	2
VOUT	Output	2	3

6 Absolute Maximum Ratings

Characteristic	Symbol	Note	Rating	Unit
Supply Voltage	V_{CC}		22	V
Output Current	$I_{OUTSINK}$		5	mA
Magnetic Flux Density	B		Unlimited	G
Operating Temperature	T_A	E	-40 to 85	°C
Maximum Junction Temperature	$T_{J(max)}$	Too high a T_j could lead to electrical or thermal breakdown	165	°C
Storage Temperature	T_{stg}		-50 to 160	°C
ESD sensitivity – HBM	-		2	kV

NOTE 1. Human Body Model according to AEC-Q100-002 standard.

7 Electrical Operating Characteristics

valid through the full operating temperature range; unless otherwise specified

Characteristic	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Supply Voltage	V_{CC}	Operating, $T_J < 165^\circ\text{C}$	2.5	-	22	V
High-level Output Voltage	V_{OH}	$V_{CC}=22\text{V}$, $R_L=10\text{k}\Omega$, $B < B_{RP}$	21.5	-	22	V
Low-level Output Voltage	V_{OL}	$I_{OUTMAX}=25\text{mA}$, $B > B_{OP}$	0	-	0.5	V
Supply Current	I_{CC}	$V_{CC}=24\text{V}$	-	1.5	3.5	mA
Output leakage Current	I_{OUTOFF}	$V_{OUT}=24\text{V}$, $B < B_{RP}$	-	-	10	μA
Power-On Time	t_{PO}		-	-	30	μs
Output-Rise Time	t_R	$V_{CC}=12\text{V}$, $R_L=1.2\text{k}\Omega$, $C=12\text{pF}$	-	-	2	μs
Output-Fall Time	t_F	$V_{CC}=12\text{V}$, $R_L=1.2\text{k}\Omega$, $C=12\text{pF}$	-	-	2	μs

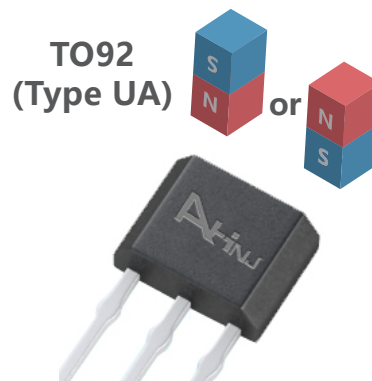
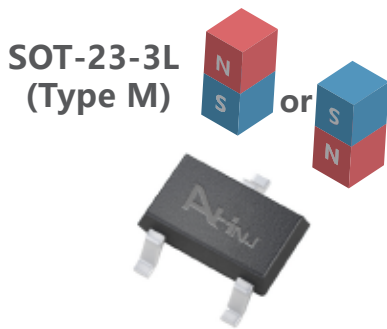
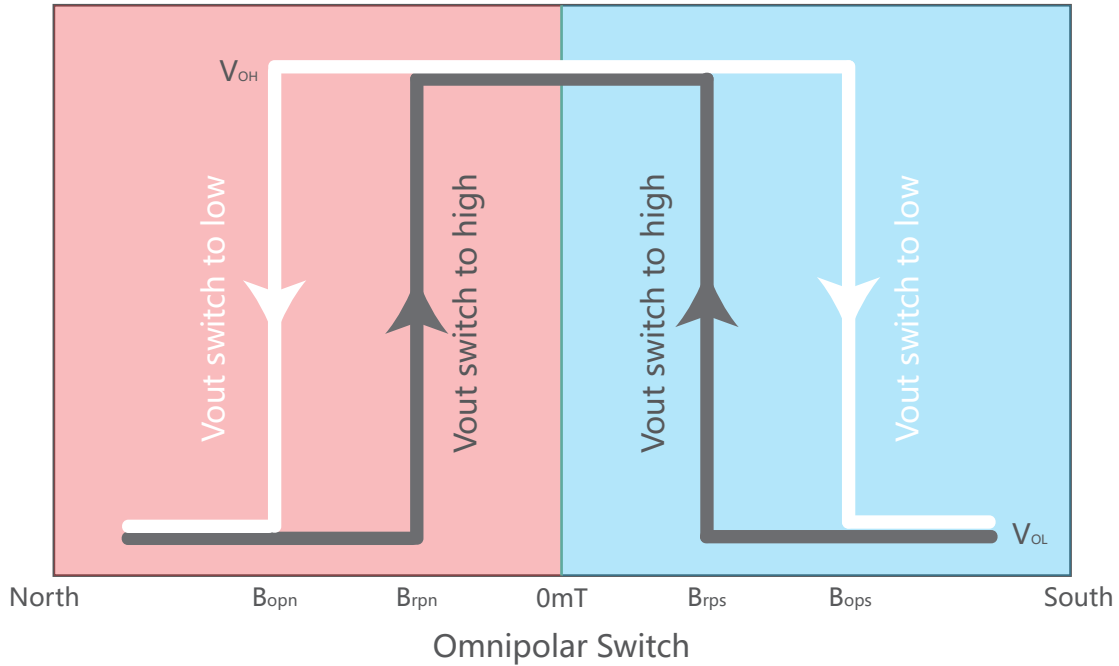
8 Magnetic Operating Characteristics

valid through the full operating temperature range; unless otherwise specified

Characteristic	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
South Operating Point	B_{OPS}	Operating, $T_J < 165^\circ\text{C}$	-	3.0	4.0	mT
South Release Point	B_{RPS}	$V_{CC}=3.3\text{V}$, $I_{OUT}=1\text{mA}$	1.0	1.5	-	mT
Nouth Operating Point	B_{OPN}	Operating, $T_J < 165^\circ\text{C}$	-4.0	-3.0	-	mT
Nouth Release Point	B_{RPN}	$V_{CC}=3.3\text{V}$, $I_{OUT}=1\text{mA}$	-	-1.5	-1.0	mT
Hysteresis	B_H	$I_{OUT}=1\text{mA}$	-	1.5	-	mT

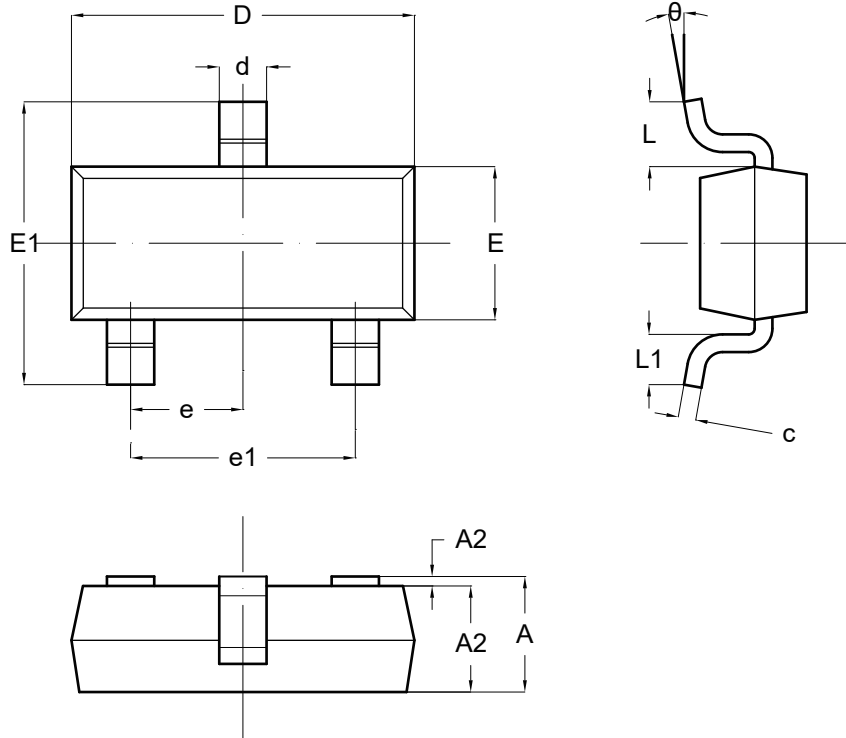
9 Magnetic Behavior

When the magnet (S or N pole) is close to the sensor ($|B| \geq |B_{OP}|$), the sensor outputs a low level; when the magnet is far away from sensor ($|B| \leq |B_{RP}|$), the sensor outputs a high level. Steady Hysteresis ($B_{HX} = |B_{OPX} - B_{RPX}|$) ensures its stable switch status. The magnetoelectric conversion characteristics of AH3931 are shown in the figure:



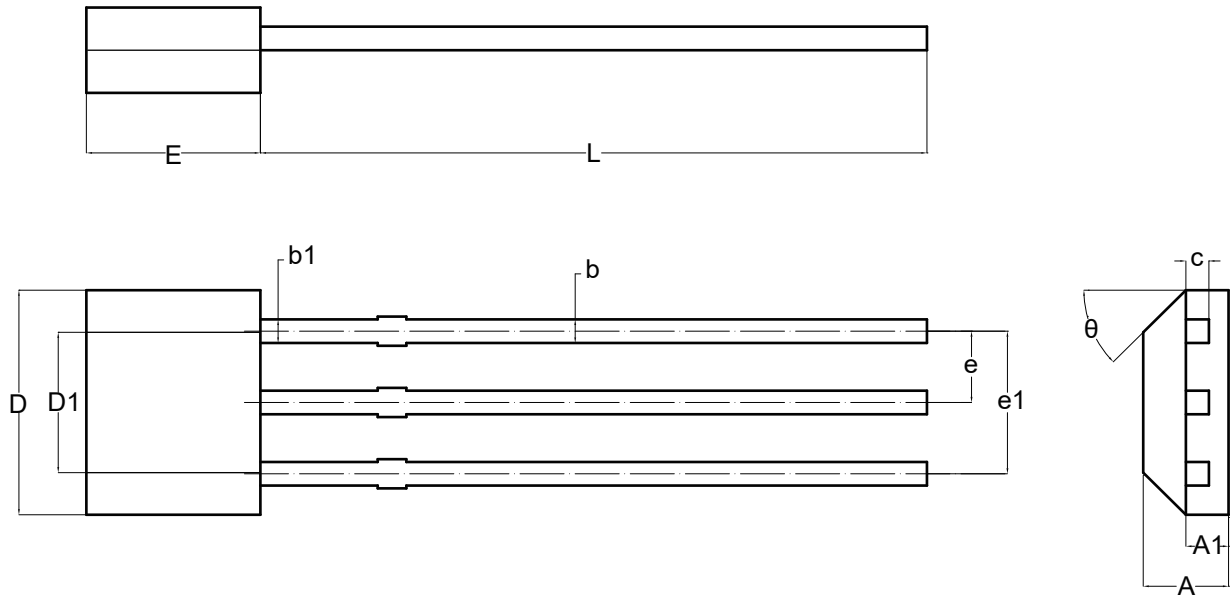
11 Package Information

SOT-23-3L



Symbol	Dimension (Unit: mm)	
	Min	Max
A	1.050	1.250
A1	0.000	0.100
A2	1.050	1.150
b	0.300	0.500
c	0.100	0.200
D	2.820	3.020
E	1.500	1.700
E1	2.650	2.950
e	0.950BSC.	
e1	1.800	2.000
L	0.550REF.	
L1	0.300	0.600
θ	0°	8°

TO-92



Symbol	Dimension (Unit: mm)	
	Min	Max
A	1.420	1.620
A1	0.660	0.860
b	0.330	0.480
b1	0.400	0.510
c	0.330	0.510
D	3.900	4.100
D1	2.280	2.680
E	3.050	3.250
e	1.270TYP.	
e1	2.440	2.640
L	14.350	14.750
θ	45°TYP.	

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