

1 Features and Benefits

- ▲ Operating voltage range: 3.5 ~ 6.5V
- ▲ Rated output current: 6 mA
- ▲ Stable switching signal without mechanical contact and spark
- ▲ High reliability and safety without shaking moment
- ▲ TO-92UA and SOT23-3L package options
- ▲ Developed according to the EU RoHS and REACH

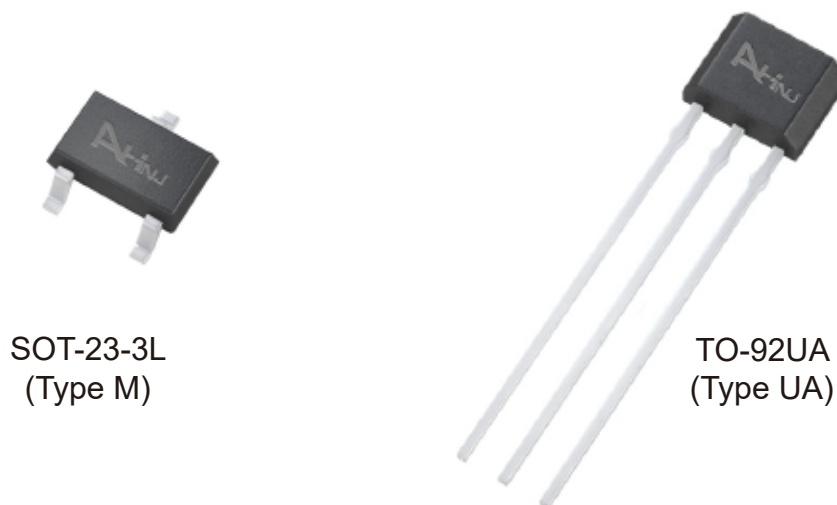
2 Application Examples

- ▲ Automotive electronics, Consumer electronics and Industrial electronics
- ▲ Brake light wake-up switch
- ▲ Electronic steering column lock
- ▲ Door latch system
- ▲ BLDC Encoder
- ▲ Sunroof/Tailgate opener
- ▲ Transmission applications
- ▲ Electrical power steering

3 Selection Guide

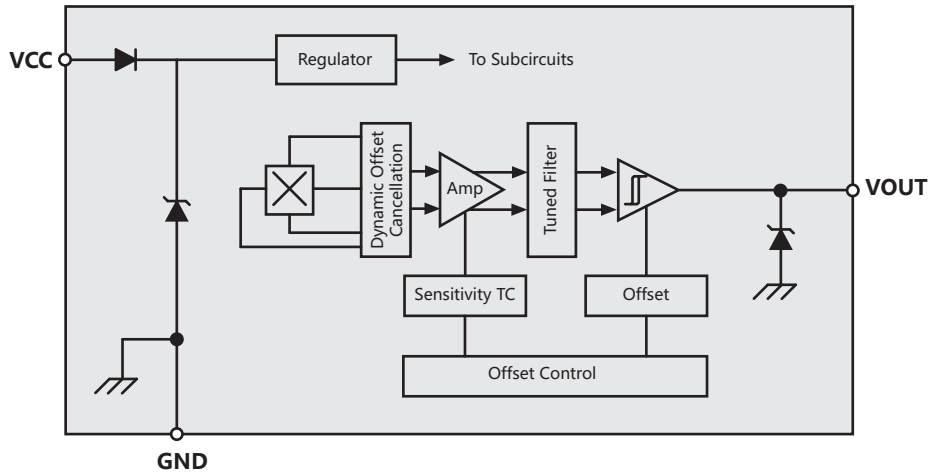
Part Number	Packing	Mounting	Operating, T	S(Min)	S(Max)
AH3503/E-UA	Bulk, 1000 pieces/bag	3-pin SIP through hole	-40°C to 85°C	12mV/mT	17mV/mT
AH3503/E-M	7-in. reel, 3000 pieces/reel	3-pin SOT23-3L surface mount	-40°C to 85°C	12mV/mT	17mV/mT
AH3503/K-UA	Bulk, 1000 pieces/bag	3-pin SIP through hole	-40°C to 125°C	12mV/mT	17mV/mT
AH3503/K-M	7-in. reel, 3000 pieces/reel	3-pin SOT23-3L surface mount	-40°C to 125°C	12mV/mT	17mV/mT

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: -40~85°C; K: -40~125°C; L: -40~150°C.



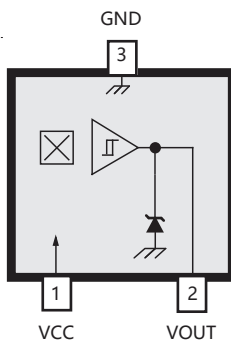
4 General Description

The AH3503 is an analog signal output Hall IC, the output voltage changes with the changes of magnetic field. It has built-in circuit units such as reverse voltage protector, voltage regulator, temperature compensation circuit, Hall voltage generator, signal amplifier, etc. The high performance voltage regulator and temperature compensation circuit ensure that the sensor operates steadily over the operating temperatures range, and the reverse voltage protection circuit prevents the sensor from being damaged by the reverse voltage. The AH3503 is produced with bipolar technology. It is available in two package types: SOT-23-3L (Type M), and TO-92UA (Type UA). Each package is lead (Pb) free, with 100% matte tin plated leadframes.

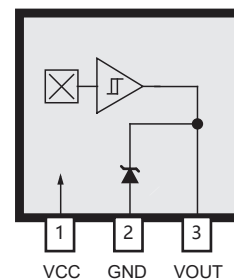


5 Terminal List

SOT-23-3L
(Type M)



TO-92UA
(Type UA)



Name	Description	Number	
		Package M	Package UA
VCC	Connects power supply to chip	1	1
GND	Ground	2	2
VOUT	Output	3	3

6 Absolute Maximum Ratings

Characteristic	Symbol	Note	Rating	Unit
Supply Voltage	V_{CC}		11	V
Reverse Supply Voltage	V_{RCC}		-0.5	V
Maximum Output Voltage	V_{OUTmax}	test at 11V Supply Voltage	10.95	V
Minimum Output Voltage	V_{OUTmin}	test at 11V Supply Voltage	0.02	V
Output Current	$I_{OUTSINK}$		1	mA
Magnetic Flux Density	B		Unlimited	G
Operating Temperature	T_A	E	-40 to 85	°C
Operating Temperature	T_A	K	-40 to 125	°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	-		6	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, $T_J < 165^\circ\text{C}$	3.5	-	6.5	V
Null Voltage	V_{OH}	$V_{CC}=5\text{V}$, no load on V_{OUT}	2.3	-	2.7	V
Output Voltage	V_{OL}	$V_{CC}=5\text{V}$, $I_{OUTMAX}=1.0\text{mA}$	0.1	-	4.9	V
Supply Current	I_{CC}	$V_{CC}=5\text{V}$	-	4.5	7	mA

8 Magnetic Operating Characteristics

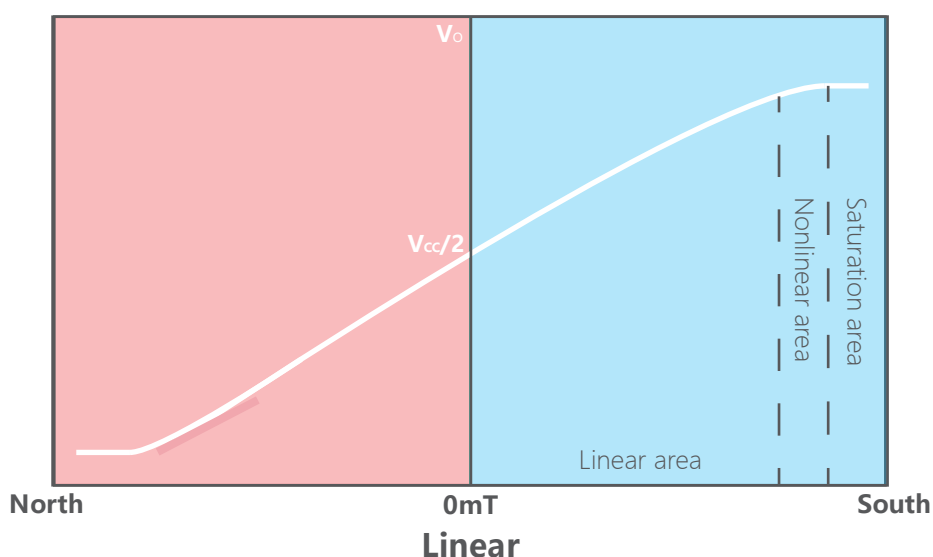
valid through the full operating temperature range; unless otherwise specified

Characteristic	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Sensitivity	S	$V_{CC}=5\text{V}$, $T_A=25^\circ\text{C}$	12	15.25	17	mV/mT
Sensitivity Tolerance	ΔS	—	-10	-	+10	%
Ratiometry V_{NULL}	$V_{NULL}(V)$	—	-5	-	+5	%
Linearity	L	—	-2.5	-	+2.5	%
Linear Area	L_{IN}	—	-80	-	+80	mT

9 Magnetic Behavior

Vo raises with increasing B (S pole)

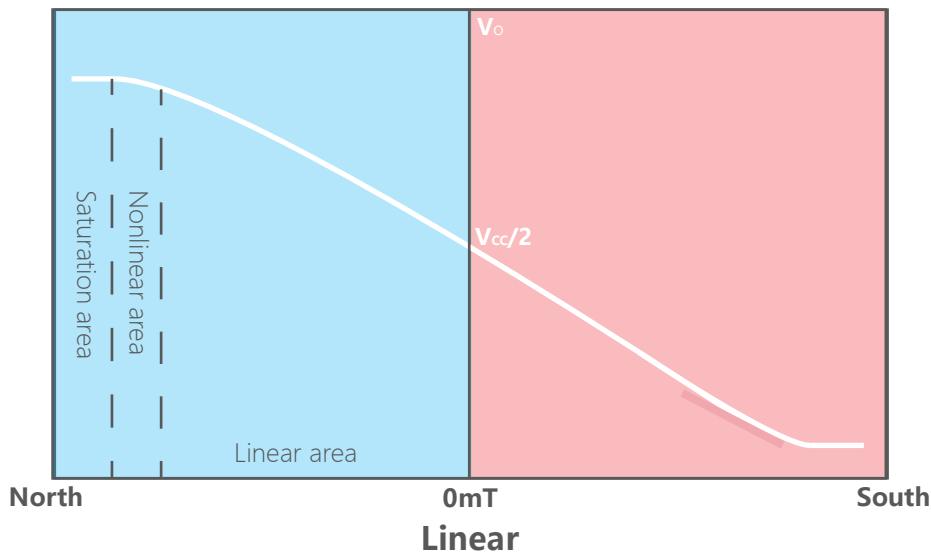
The sensor will pass linear area /nonlinear area/ saturation area during the magnetic induction increases. When there is no magnetic field that applies in sensor ($B=0$), the output voltage of sensor is only half of V_{CC} ($V_{CC}/2$); when N pole faces mark surface of the sensor and is close to it gradually ($B \rightarrow -\infty$), the output voltage begins to decrease, and the voltage doesn't reduce with the increased magnetic field after it reaches saturation voltage; When the S pole of magnet faces the mark surface of the sensor and is closed to it gradually ($B \rightarrow +\infty$), the output voltage of sensor begins to increase, and it doesn't increase with the increased magnetic field after it reaches saturation voltage. The magnetolectric conversion characteristics of AH3503 are shown in the figure:



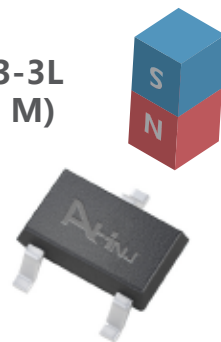
Vo raises with increasing B (S pole)

Vo raises with increasing B (N pole)

The sensor will pass linear area /nonlinear area/ saturation area during the magnetic induction increases. When there is no magnetic field that applies in sensor ($B=0$), the output voltage of sensor is only half of V_{cc} ($V_{cc}/2$); when S pole faces mark surface of the sensor and is close to it gradually ($B \rightarrow -\infty$), the output voltage begins to decrease, and the voltage doesn't reduce with the increased magnetic field after it reaches saturation voltage; When the N pole of magnet faces the mark surface of the sensor and is closed to it gradually ($B \rightarrow +\infty$), the output voltage of sensor begins to increase, and it doesn't increase with the increased magnetic field after it reaches saturation voltage. The magnetoelectric conversion characteristics of AH3503 are shown in the figure:



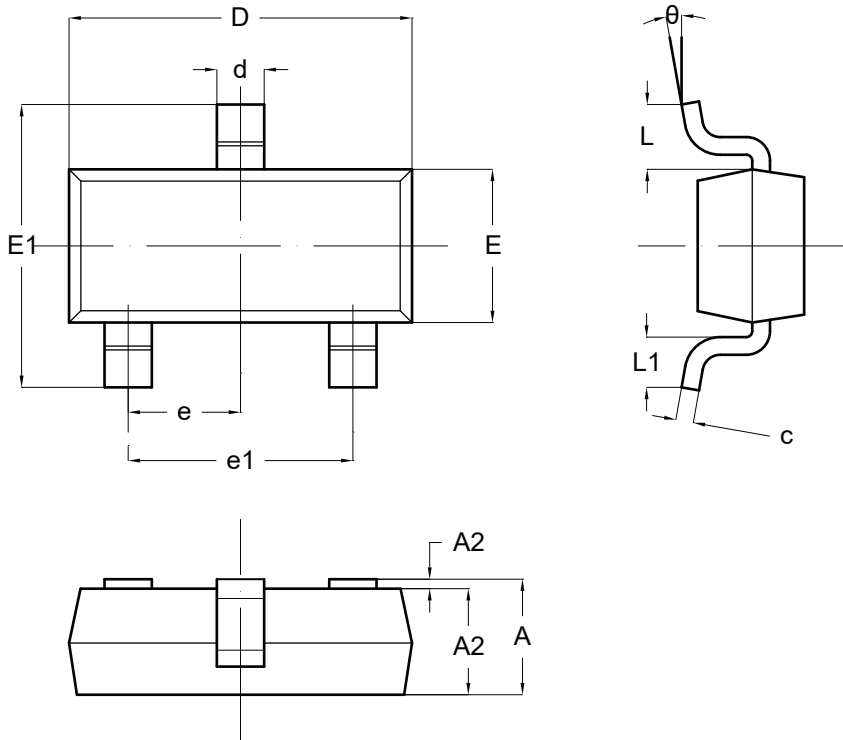
SOT-23-3L
(Type M)



Vo raises with increasing B (N pole)

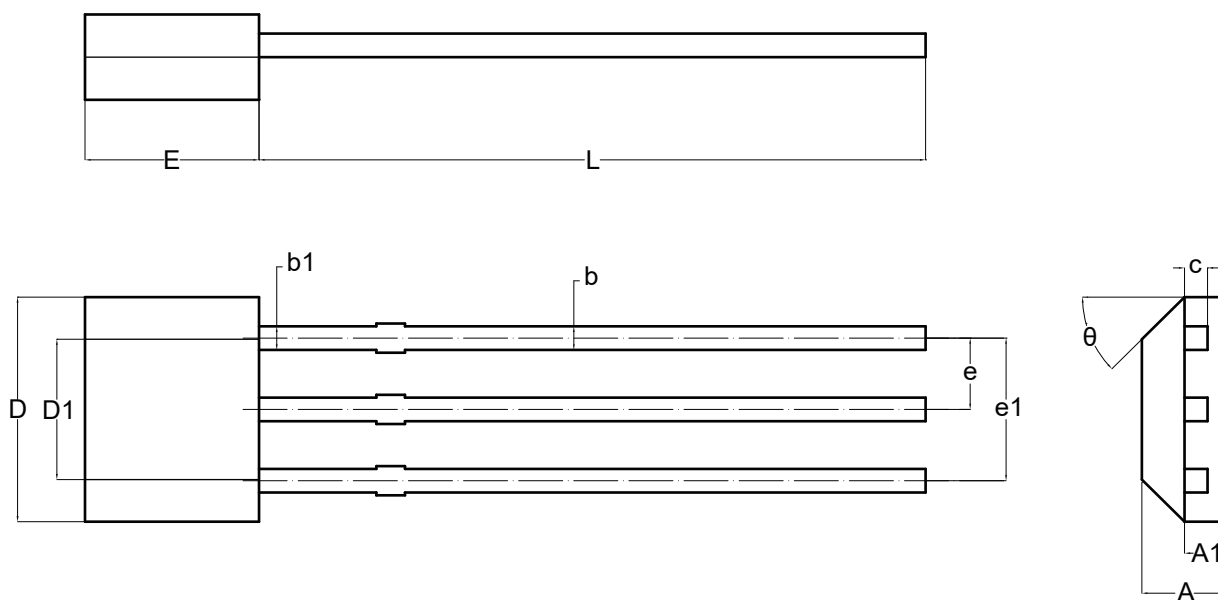
10 Package Information

SOT-23-3L



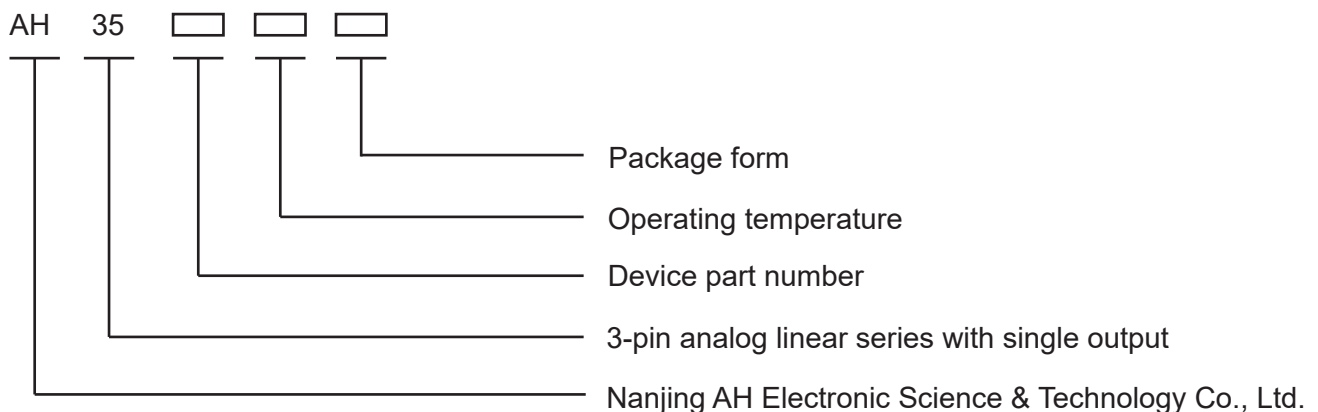
Symbol	Dimension (Unit: mm)	
	Min	Max
A	1.050	1.250
A1	0.000	0.100
A2	1.050	1.150
b	0.300	0.500
c	0.100	0.200
D	2.820	3.020
E	1.500	1.700
E1	2.650	2.950
e	0.950BSC.	
e1	1.800	2.000
L	0.550REF.	
L1	0.300	0.600
θ	0°	8°

TO-92UA



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.	

12 Marking Information



- Package Form:

M — SOT-23-3L (SMD)

S — SOT-89 (SMD)

UA — TO-92UA/TO-92S (SIP)

Note: M and S type are packed in reels, M 3k/reel, S 1k/reel;

UA type is packed in bags of 1k/bag or 0.5k/bag.

- Operating Temperature:

E — -40°C ~ +85°C

L — -40°C ~ +150°C

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