1 Features and Benefits

- High sensitivity
- Digital output, bipolar latch
- Stable over the entire temperature range
- Wide operating voltage range: 4.5V ~ 24V
- Strong resistance to mechanical stress
- Reverse power supply protection
- Non-contact output, safety and reliable
- TO-92UA, SOT-23-3L and SOT-89 package options
- Developed according to the EU RoHS and REACH

2 Application Examples

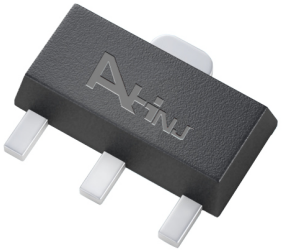
- Automotive electronics, Consumer electronics and Industrial electronics
- Water flow sensing
- Electronic steering column lock
- Door latch system
- Seat adjustment
- Speed measurement and tachometer
- Motor control
- Brushless DC motor

3 Selection Guide

Part Number	Packing	Mounting	Operating, T	B_{RP} (Min)	B_{OP} (Max)
AH3031/K-M	7-in. reel, 3000 pieces/reel	3-pin SOT23-3L surface mount	–40ºC to 125ºC	5.0mT	-5.0mT
AH3031/L-UA	Anti-static bag, 500 pieces/bag	3-pin SIP through hole	–40ºC to 150ºC	-5.0mT	5.0mT
AH3031/L-S	7-in. reel, 1000 pieces/reel	3-pin SOT89 surface mount	–40ºC to 150ºC	-5.0mT	5.0mT

NOTE 1. Hall ICs are soldered tin brazing for assembly, and wave soldering of SOT-23-3L and SOT-89 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.

SOT-23-3L
(Type M)



SOT-89
(Type S)

TO-92UA
(Type UA)

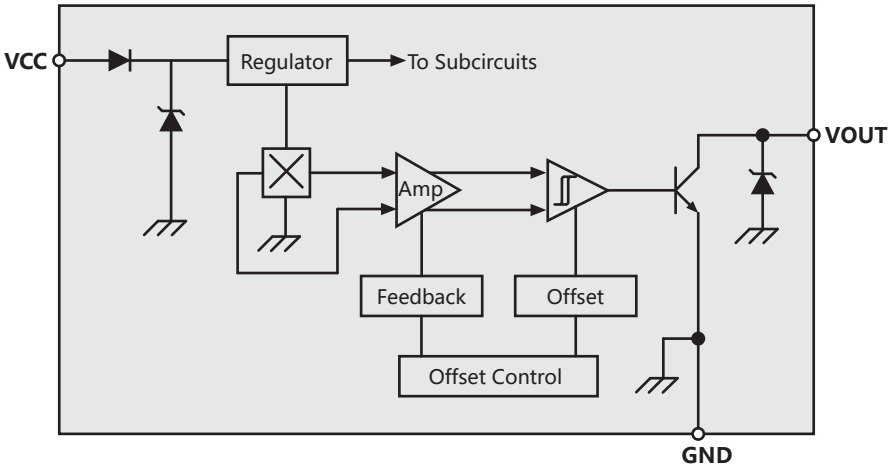
Nanjing AH Electronic Science & Technology Co., Ltd. TEL: 025-84670370 WEB: www.ahest.net
ADD: Building 3, Huaye Park, Qidi City, 8, Zhineng Road, KyLin Technology Innovation Park, Nanjing, China

4 General Description

THE AH3031 IS THE EQUIVALENT PARTS FOR AH512, AH513, AH3601 AND AH3602B.

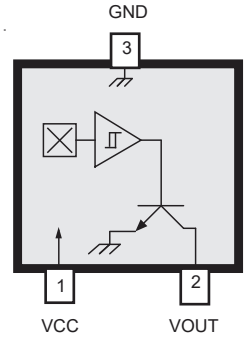
The AH3031 is a high sensitivity digital bipolar-latch Hall IC with single output. It has good temperature stability and latch function. The AH3031 includes the following on a single silicon chip: reverse voltage protector, voltage regulator, temperature compensation circuit, Hall-voltage generator, signal amplifier, Schmitt trigger and open collector output driver, etc. The integrated voltage regulator and temperature compensation circuit ensure that the sensor works stably in a wide voltage and temperature range. The reverse voltage protection circuit prevents the sensor from being damaged by reverse voltage.

The AH3031, produced with bipolar technology, is more stable and reliable in some special application. It is available in three package types: SOT-23-3L (Type M), SOT-89 (Type S), and TO-92UA (Type UA). Each package is lead (Pb) free, with 100% matte tin plated leadframes.

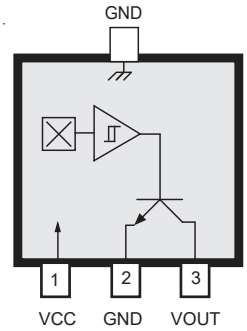


5 Terminal List

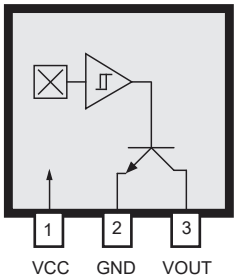
SOT-23-3L
(Type M)



SOT-89
(Type S)



TO-92UA
(Type UA)



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

Nanjing AH Electronic Science & Technology Co., Ltd. TEL: 025-84670370 WEB: www.ahest.net
ADD: Building 3, Huaye Park, Qidi City, 8, Zhineng Road, KyLin Technology Innovation Park, Nanjing, China

6 Absolute Maximum Ratings

Characteristic	Symbol	Note	Rating	Unit
Supply Voltage	V_{CC}		28	V
Reverse Supply Voltage	V_{RCC}		-22	V
Output Off Voltage	V_{OUT}		28	V
Reverse Output Voltage	V_{ROUT}		-0.5	V
Output Current	$I_{OUTSINK}$		50	mA
Magnetic Flux Density	B		Unlimited	G
Operating Temperature	T_A	L	-40 to 150	ºC
Operating Temperature	T_A	K	-40 to 125	ºC
Maximum Junction Temperature	$T_{J(max)}$	Too high a Tj could lead to electrical or thermal breakdown	165	ºC
Storage Temperature	T_{stg}		-50 to 160	ºC
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°C	4.5	-	24	V
High-level Output Voltage	V_{OH}	V_{CC}=24V, R_L=10kΩ, B < B_{RP}	23.5	-	24	V
Low-level Output Voltage	V_{OL}	I_{OUTMAX}=25mA, B >B_{OP}	0	-	0.5	V
Supply Current	I_{CC}	V_{CC}=24V	-	4.0	8.0	mA
Output leakage Current	I_{OUTOFF}	V_{OUT}=24V, B <B_{RP}	-	-	10	μA
Power-On Time	t_{PO}		-	-	30	μs
Output-Rise Time	t_R	V_{CC}=12V, R_L=1.2kΩ, C=12pF	-	-	2	μs
Output-Fall Time	t_F	V_{CC}=12V, R_L=1.2kΩ, C=12pF	-	-	2	μs

NOTE 1. Power-On Time, t_{PO}, is defined as: the time it takes for the output voltage to settle within ±10% of its steady state value under an applied magnetic field, after the power supply has reached its minimum specified operating voltage, V_{CC} (min).

8 Magnetic Operating Characteristics

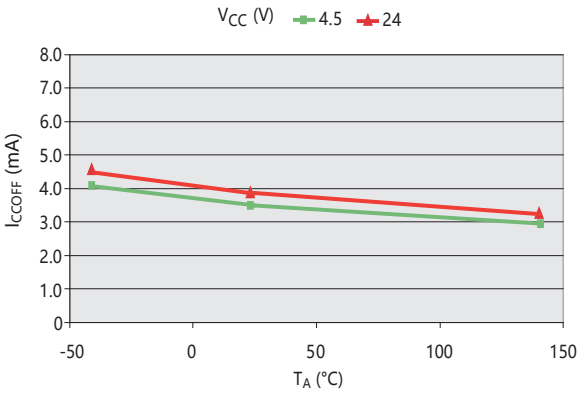
valid through the full operating temperature range; unless otherwise specified

Characteristic	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Operating Point	B_{OP}	Operating, T_J<165ºC	-	2.5	5.0	mT
Release Point	B_{RP}	V_{CC}=24V, R_L=10kΩ, B < B_{RP}	-5.0	-2.5	-	mT
Hysteresis	B_H	I_{OUT}=25mA, B > B_{OP}	-	5.0	-	mT

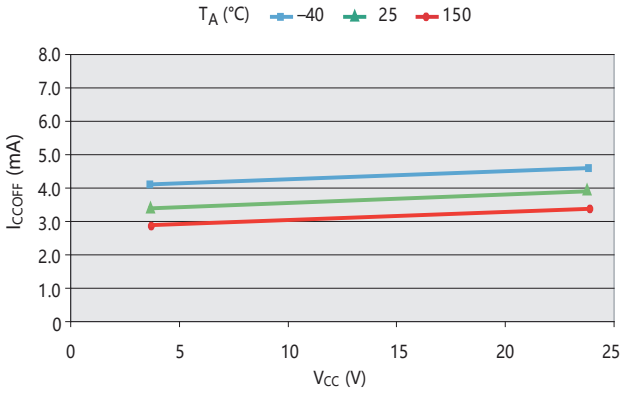
Nanjing AH Electronic Science & Technology Co., Ltd. TEL: 025-84670370 WEB: www.ahest.net
ADD: Building 3, Huaye Park, Qidi City, 8, Zhineng Road, KyLin Technology Innovation Park, Nanjing, China

9 Characteristic Curves (Type UA)

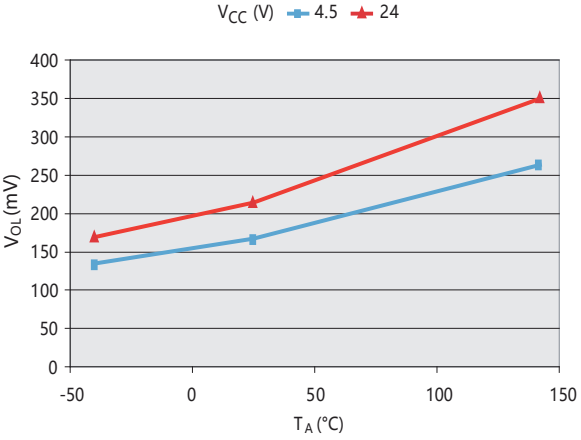
Supply Current (Off) versus Ambient Temperature



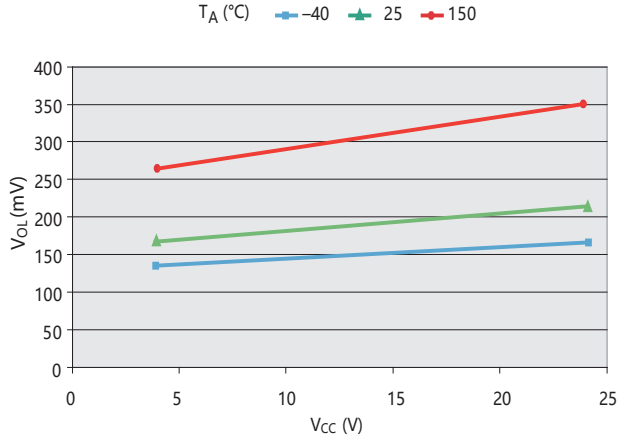
Supply Current (Off) versus Supply Voltage



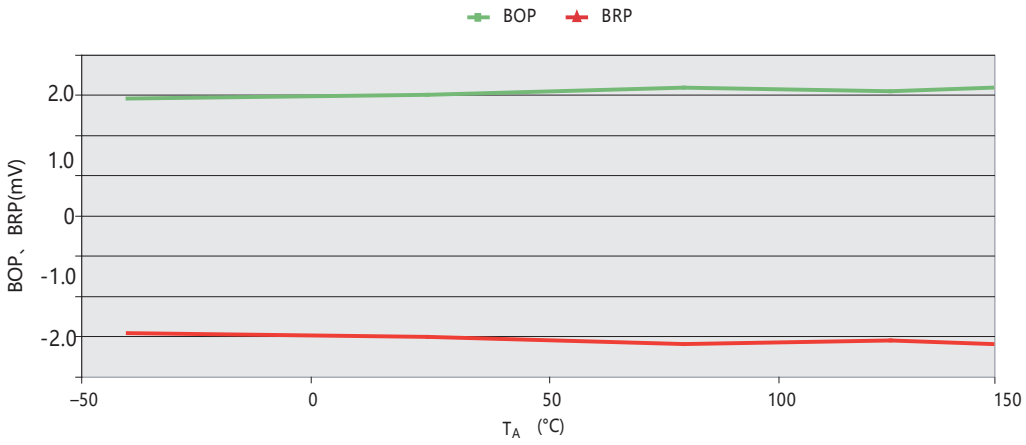
Low-level Output (On) versus Ambient Temperature



Low-level Output (On) versus Supply Voltage



Operating and Release Point versus Ambient Temperature

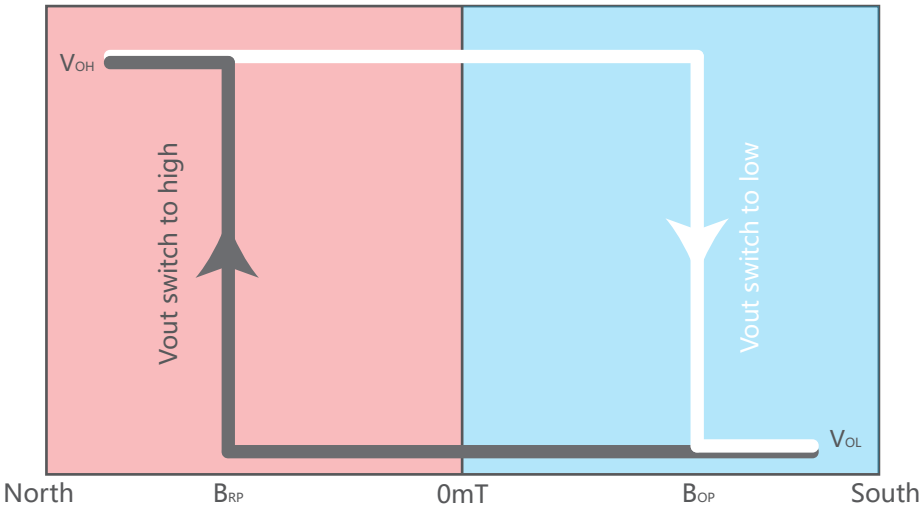


Nanjing AH Electronic Science & Technology Co., Ltd. TEL: 025-84670370 WEB: www.ahest.net
ADD: Building 3, Huaye Park, Qidi City, 8, Zhineng Road, KyLin Technology Innovation Park, Nanjing, China

10 Magnetic Behavior

South Pole Active

When the S pole of the magnet faces the mark surface of the sensor and is close to it ($B \geq B_{OP}$), the sensor outputs a low level; when the N pole faces the mark surface and is close to it ($B \leq B_{RP}$), the sensor outputs a high level. When the magnet is far away from the sensor (B=0), the output status of the sensor is latched and remains unchanged. In order to change the output status, the applied magnetic field must be opposite polarity. The magnetoelectric conversion characteristics of AH3031 are shown in the figure:



Bipolar Latch

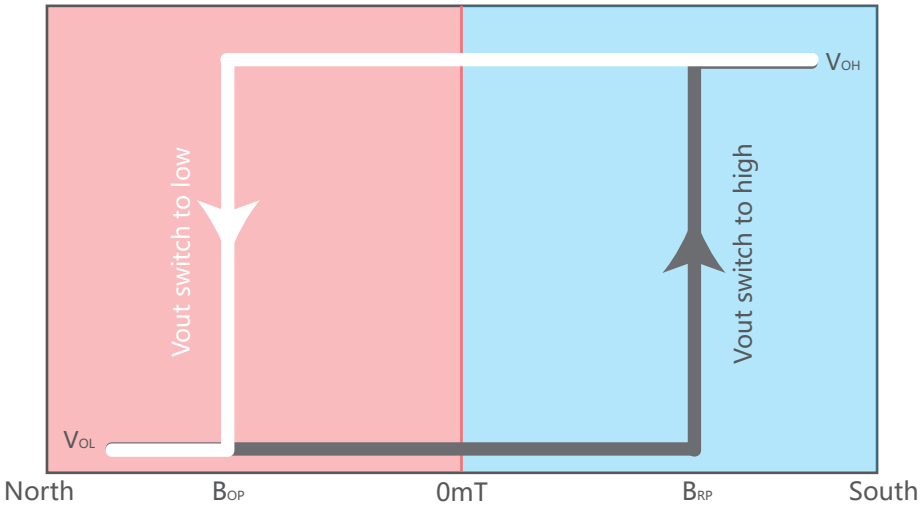
South Pole Active

South Pole Active

Nanjing AH Electronic Science & Technology Co., Ltd. TEL: 025-84670370 WEB: www.ahest.net
ADD: Building 3, Huaye Park, Qidi City, 8, Zhineng Road, KyLin Technology Innovation Park, Nanjing, China

North Pole Active

When the N pole of the magnet faces the mark surface of the sensor and is close to it ($|B| \geq |B_{OP}|$), the sensor outputs a low level; when the S pole faces the mark surface and is close to it ($|B| \geq |B_{RP}|$), the sensor outputs a high level. When the magnet is far away from the sensor (B=0), the output status of the sensor is latched and remains unchanged. In order to change the output status, the applied magnetic field must be opposite polarity. The magneto-electric conversion characteristics of AH3031 are shown in the figure:



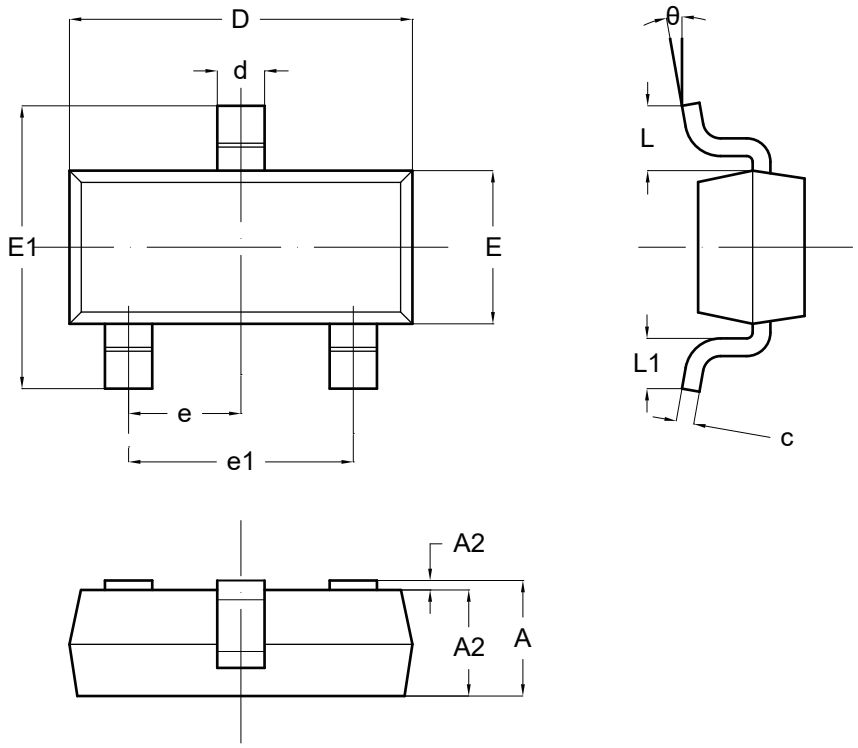
Bipolar Latch

North Pole Active

Nanjing AH Electronic Science & Technology Co., Ltd. TEL: 025-84670370 WEB: www.ahest.net
ADD: Building 3, Huaye Park, Qidi City, 8, Zhineng Road, KyLin Technology Innovation Park, Nanjing, China

11 Package Information

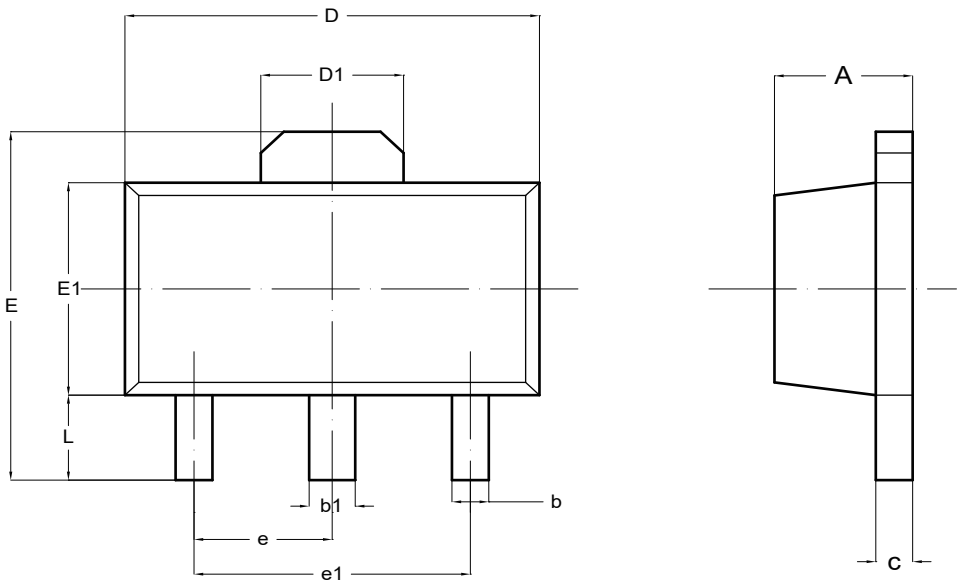
SOT-23-3L



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°

Nanjing AH Electronic Science & Technology Co., Ltd. TEL: 025-84670370 WEB: www.ahest.net
ADD: Building 3, Huaye Park, Qidi City, 8, Zhineng Road, KyLin Technology Innovation Park, Nanjing, China

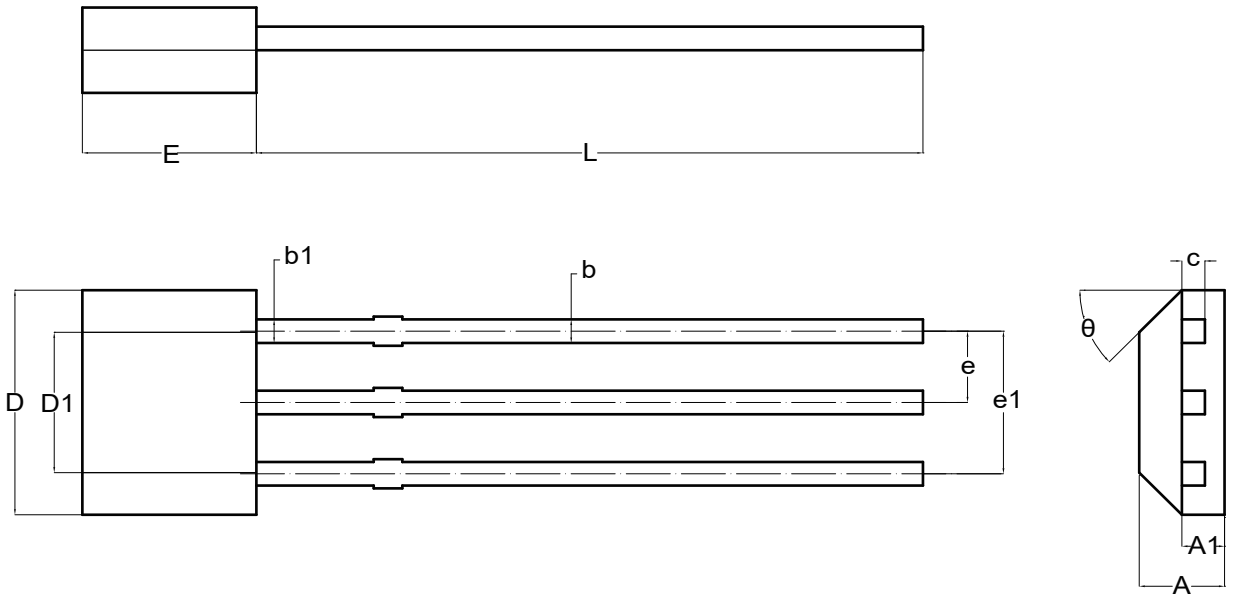
SOT-89



Symbol	Dimension (Unit: mm)	
	Min	Max
A	1.400	1.600
b	0.320	0.520
b1	0.380	0.580
c	0.350	0.440
D	4.400	4.600
D1	1.550REF.	
E	3.940	4.250
E1	2.300	2.600
e	1.500TYP.	
e1	3.000TYP.	
L	0.900	1.200

Nanjing AH Electronic Science & Technology Co., Ltd. TEL: 025-84670370 WEB: www.ahest.net
ADD: Building 3, Huaye Park, Qidi City, 8, Zhineng Road, KyLin Technology Innovation Park, Nanjing, China

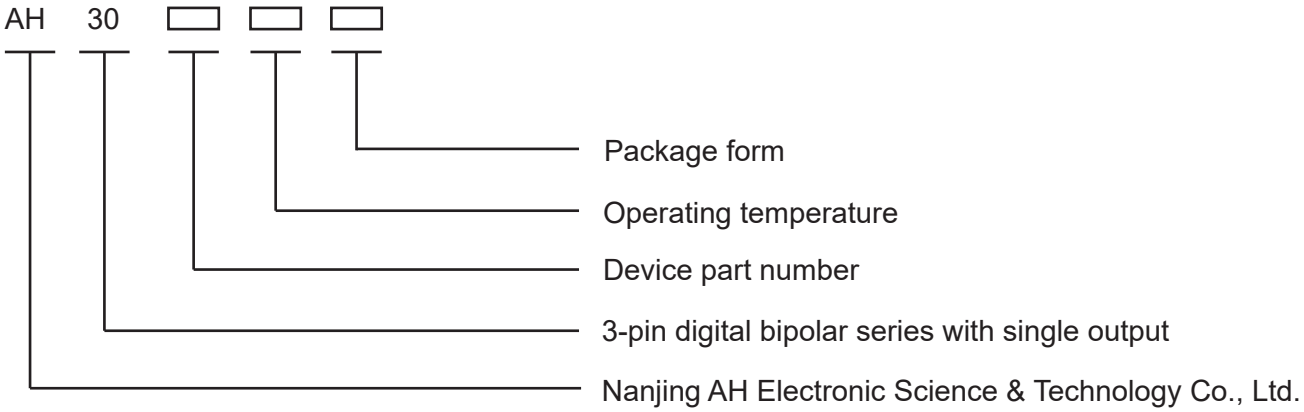
TO-92UA



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.	

Nanjing AH Electronic Science & Technology Co., Ltd. TEL: 025-84670370 WEB: www.ahest.net
ADD: Building 3, Huaye Park, Qidi City, 8, Zhineng Road, KyLin Technology Innovation Park, Nanjing, China

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℃~+85℃

  L —— -40℃~+150℃

nianrong@ahest.com

Nanjing AH Electronic Science & Technology Co., Ltd. TEL: 025-84670370 WEB: www.ahest.net
ADD: Building 3, Huaye Park, Qidi City, 8, Zhineng Road, KyLin Technology Innovation Park, Nanjing, China