

## Description

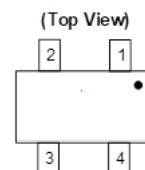
The AHE101 is an InSb (Ultra-High Sensitivity) Hall element with an output voltage of 415mV (max.).

The AHE101 is a device that operates even in weak magnetic fields due to its ultra-high sensitivity.

## Classification Hall Voltage $V_H$

Rank	$V_H$ (mV)	Conditions
C	168 to 204	B = 50mT, $V_C$ = 1V
D	196 to 236	
E	228 to 274	
F	266 to 320	
G	310 to 370	
H	360 to 415	

## Pin Assignments



Input	1(±)	3(∓)
Output	2(±)	4(∓)

**SOT23-4 (Type A)**

## Features

- Ultra-High Sensitivity
- Classic SOT23-4 (Type A) Package
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/104/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please [contact us](mailto:contact@diodes.com) or your local Diodes representative. <https://www.diodes.com/quality/product-definitions/>**

## Applications

- Detection of opening and closing of mobile phones and PCs
- Detection with Joysticks
- Magnetic encoders
- Current measurements with overhead wire ammeters (clamp type ammeters)
- Position detection with brushless motors, wheel rotation speed detection
- Contactless commutations, speed measurements, and angular position sensing/indexing in consumer home appliances, office equipment, and industrial applications

Notes:

1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
2. See <https://www.diodes.com/quality/lead-free/> for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.

# Absolute Maximum Ratings

Symbol	Characteristic	Value	Unit
$I_{C\_MAX}$	Maximum Input Current	20	mA
$V_{C\_MAX}$	Maximum Input Voltage	2	V
$T_{OP}$	Operating Temperature Range	-40 to +125	°C
$T_S$	Storage Temperature Range	-55 to +150	°C

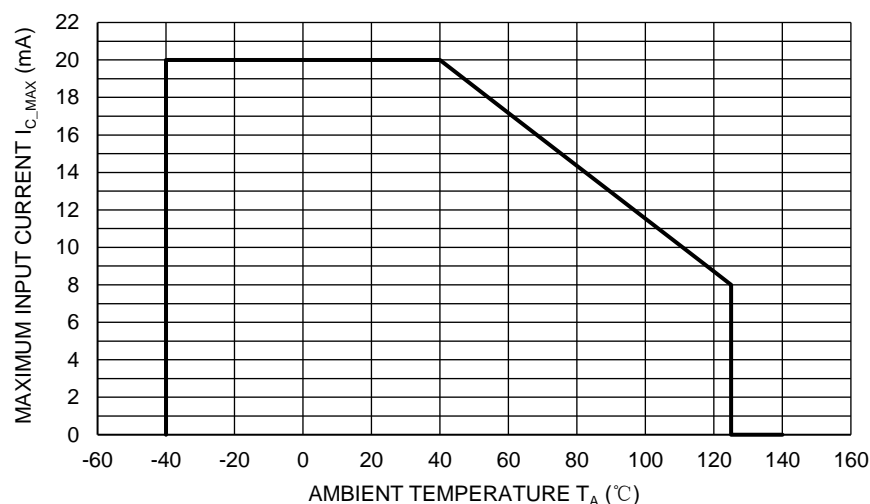


Figure 1. Maximum Input Current  $I_{C\_MAX}$  vs Temperature

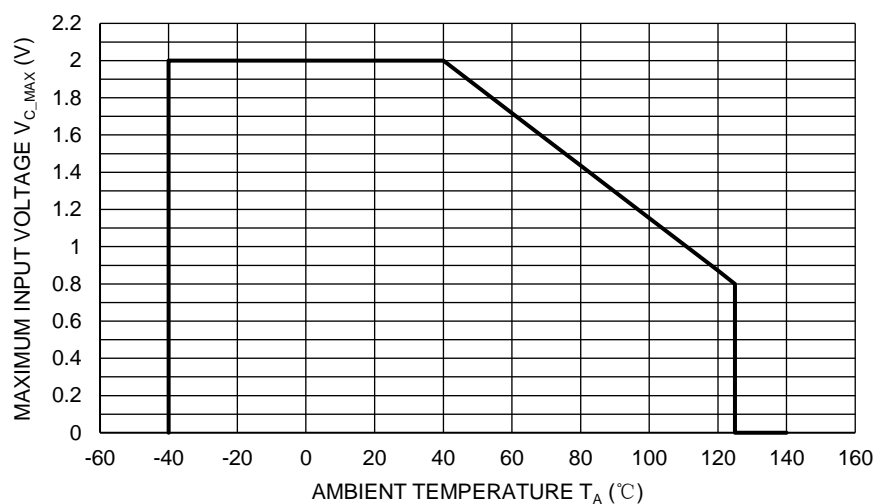


Figure 2. Maximum Input Voltage  $V_{C\_MAX}$  vs Temperature

# Electrical Characteristics (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Test Condition	Min	Typ	Max	Unit
Hall Voltage	V <sub>H</sub> (Note 4)	B = 50mT, V <sub>C</sub> = 1V T <sub>A</sub> = +25°C	168	—	415	mV
Input Resistance	R <sub>IN</sub>	B = 0mT, I <sub>C</sub> = 0.1mA T <sub>A</sub> = +25°C	240	—	550	Ω
Output Resistance	R <sub>OUT</sub>	B = 0mT, I <sub>C</sub> = 0.1mA T <sub>A</sub> = +25°C	240	—	550	Ω
Offset Voltage	V <sub>OS</sub>	B = 0mT, V <sub>C</sub> = 1V T <sub>A</sub> = +25°C	-5	—	+5	mV
Temp. Coeffi. of V <sub>H</sub>	αV <sub>H</sub> (Note 5)	B = 50mT, I <sub>C</sub> = 5mA, T <sub>A</sub> = 0°C to +40°C	—	-1.8	—	%/°C
Temp. Coeffi. of R <sub>IN</sub>	αR <sub>IN</sub> (Note 6)	B = 0mT, I <sub>C</sub> = 0.1mA, T <sub>A</sub> = 0°C to +40°C	—	-1.8	—	%/°C

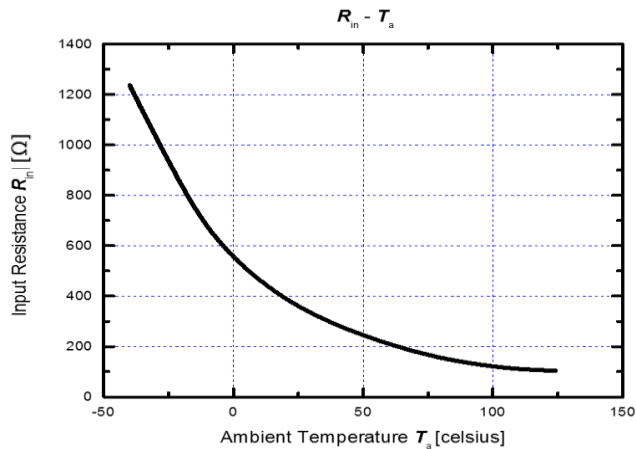
**Table 1. Electrical Characteristics of AHE101**

Notes:

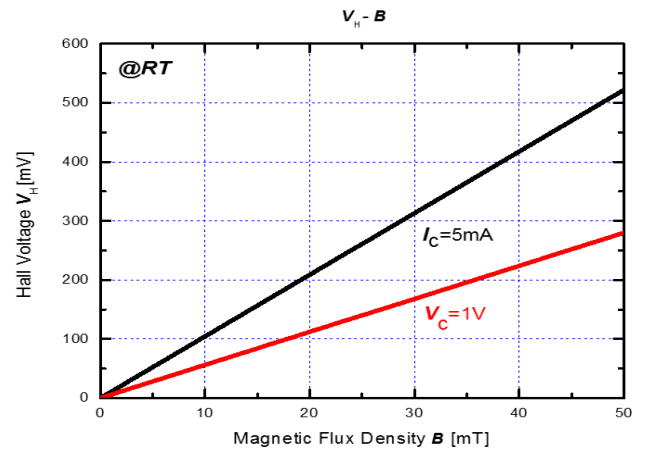
- $V_H = V_{H-M} - V_{OS}$   
In which  $V_{H-M}$  is the output Hall voltage,  $V_H$  is the Hall voltage and  $V_{OS}$  is the offset voltage under the identical electrical stimuli.
- $\alpha V_H = \frac{1}{V_H(T_1)} \times \frac{V_H(T_3) - V_H(T_2)}{(T_3 - T_2)} \times 100$
- $\alpha R_{IN} = \frac{1}{R_{IN}(T_1)} \times \frac{R_{IN}(T_3) - R_{IN}(T_2)}{(T_3 - T_2)} \times 100$   
T<sub>1</sub> = +20°C, T<sub>2</sub> = 0°C, T<sub>3</sub> = +40°C

## Typical Operating Characteristics

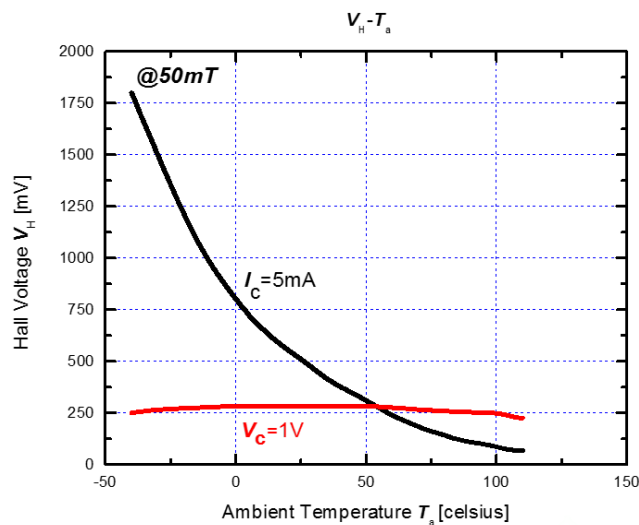
Input Resistance  $R_{in}$  as A Function of Temperature  $T_a$



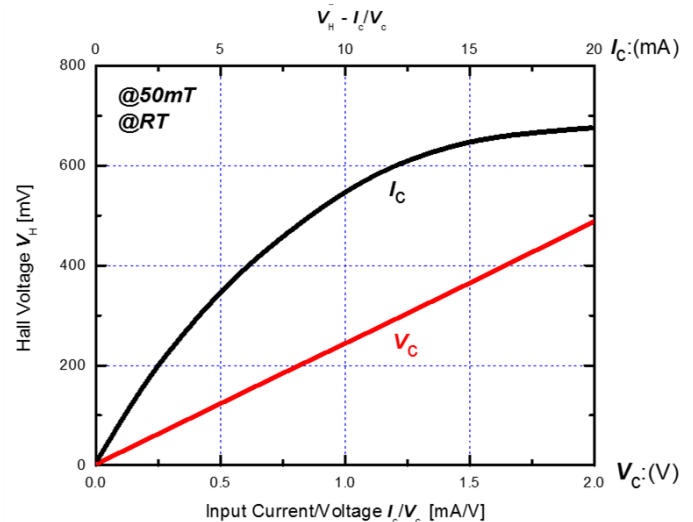
Hall Voltage  $V_H$  as A Function of Magnetic Flux Density  $B$



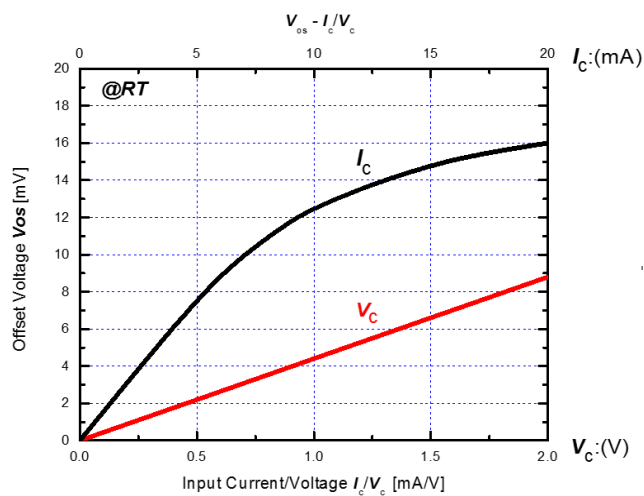
Hall Voltage  $V_H$  as A Function of Ambient Temperature  $T_a$



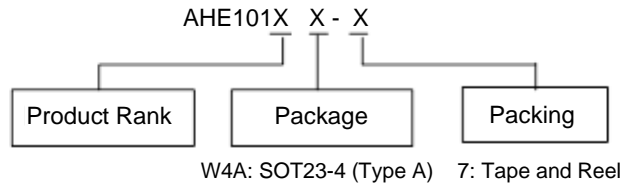
Hall Voltage  $V_H$  as A Function of Electrical Stimuli  $I_C/V_C$



Offset Voltage  $V_{os}$  as A Function of Electrical Stimuli  $I_C/V_C$



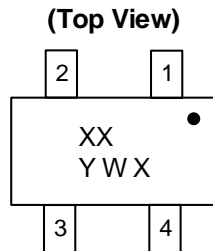
## Ordering Information



Orderable Part Number	Package Code	Package	Part Number Suffix	Packing	
				Qty.	Carrier
AHE101C-W4A-7	W4A	SOT23-4 (Type A)	-7	3,000	7" Tape & Reel
AHE101D-W4A-7	W4A	SOT23-4 (Type A)	-7	3,000	7" Tape & Reel
AHE101E-W4A-7	W4A	SOT23-4 (Type A)	-7	3,000	7" Tape & Reel
AHE101F-W4A-7	W4A	SOT23-4 (Type A)	-7	3,000	7" Tape & Reel
AHE101G-W4A-7	W4A	SOT23-4 (Type A)	-7	3,000	7" Tape & Reel
AHE101H-W4A-7	W4A	SOT23-4 (Type A)	-7	3,000	7" Tape & Reel

## Marking Information

Package Type: SOT23-4 (Type A)



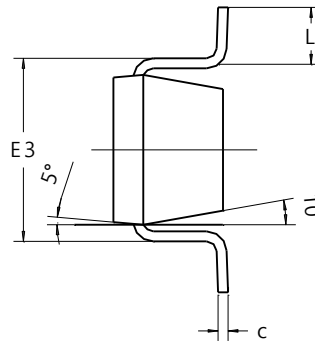
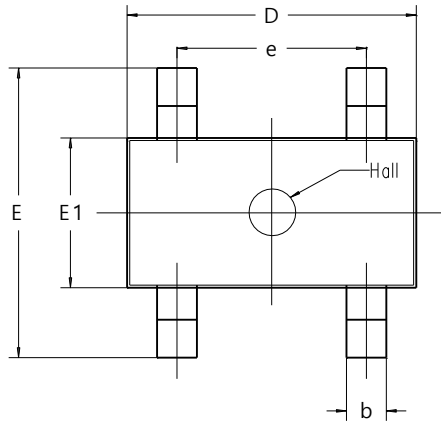
XX: Identification Code  
Y: Year 0 to 9  
W: Week: A to Z: Week 1 to 26;  
a to z: Week 27 to 52; z Represents  
52 and 53 Week  
X: Internal Code

Orderable Part Number	Package	Identification Code
AHE101C-W4A-7	SOT23-4 (Type A)	AC
AHE101D-W4A-7	SOT23-4 (Type A)	AD
AHE101E-W4A-7	SOT23-4 (Type A)	AE
AHE101F-W4A-7	SOT23-4 (Type A)	AF
AHE101G-W4A-7	SOT23-4 (Type A)	AG
AHE101H-W4A-7	SOT23-4 (Type A)	AH

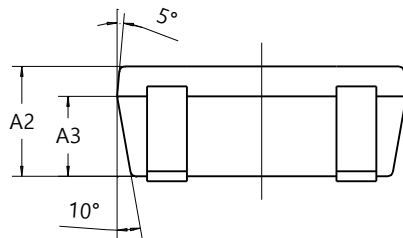
## Package Outline Dimensions

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

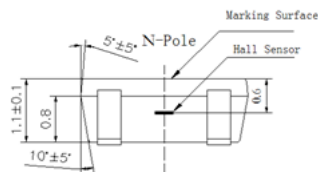
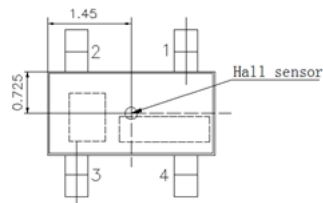
SOT23-4 (Type A)



SOT23-4 (Type A)			
Dim	Min	Max	Typ
A2	1.00	1.20	1.10
A3	0.75	0.85	0.80
b	0.35	0.45	0.40
c	0.10	0.105	--
D	2.80	3.00	2.90
E	2.70	3.10	2.90
E1	1.35	1.55	1.45
E3	1.73	1.93	1.83
e	1.80	2.00	1.90
L	0.47	0.67	0.57
All Dimensions in mm			



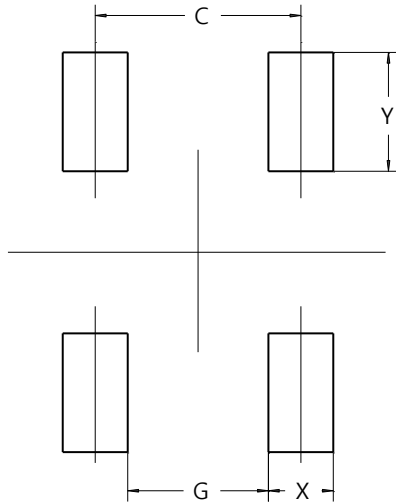
Sensor Location



## Suggested Pad Layout

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

### SOT23-4 (Type A)



Dimensions	Value (in mm)
C	1.900
G	1.300
X	0.600
Y	1.400

## Reliability Test Terms

Criteria:

Terms	Conditions	Duration
High Temperature Storage	(JEITA EIAJ ED-4701) $T_A = +150$ (0 to $+10$ )°C	1000hrs
Heat Cycle	(JEITA EIAJ ED-4701) $T_A = -55$ °C to $+150$ °C High Temp. - Normal Temp. - Low Temp. 30min - 5min - 30min	30 cycles
Temperature Humidity Storage	(JEITA EIAJ ED-4701) $T_A = +85 \pm 3$ °C, $R_H = 85 \pm 5\%$	1000hrs
Reflow Soldering	(JEITA EIAJ ED-4701) $T_A = +260 \pm 5$ °C	10sec
High Temperature Operating	$T_A = +125$ °C, $V_C = 1$ V	1000hrs

- Variation of Hall voltage  $V_H$  and input/output resistances  $R_{IN/OUT}$  are less than 20%.
- Variation of offset voltage  $V_{OS}$  is less than  $\pm 16$ mV.
- Other parameters in Table 1 are still within their ranges stated in Table 1.

## Mechanical Data

- Moisture Sensitivity: Level 3 per J-STD-020
- Terminals: Finish – Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 ③
- Weight: 0.00126 grams (Approximate)

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