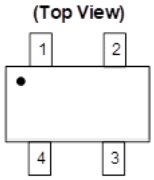
Description

The AHE102 is an InSb (Ultra-High Sensitivity) Hall element with an output voltage of 415mV (max.). The device operates even in weak magnetic fields due to its ultra-high sensitivity.

Classification Hall Voltage V_H

Rank	V_H (mV)	Conditions
D	196 to 236	B = 50mT, V_C = 1V
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 B)

Features

- Ultra-High Sensitivity
- Classic SOT23-4 (Type B) 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 or your local Diodes representative. https://www.diodes.com/quality/product-definitions/**

Applications

- Detection for opening and closing of mobile phones and PCs
- Detection for 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

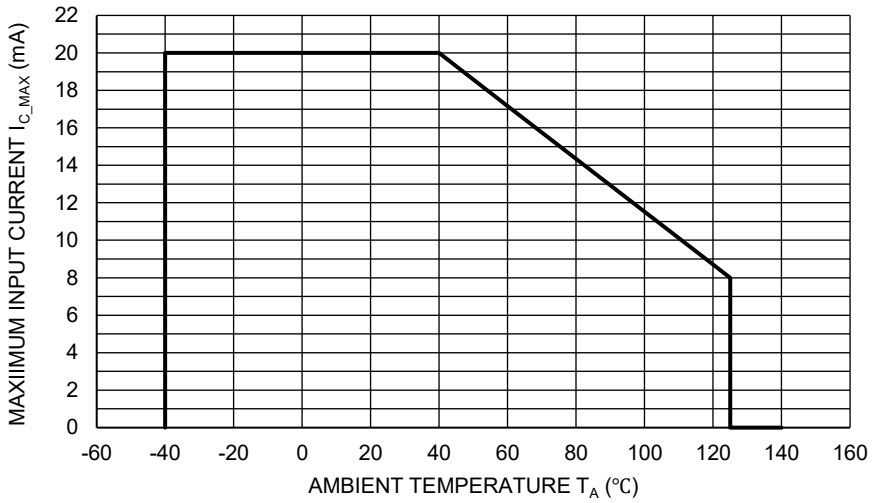


Figure 1. Maximum Input Current I_{C_MAX} vs Temperature

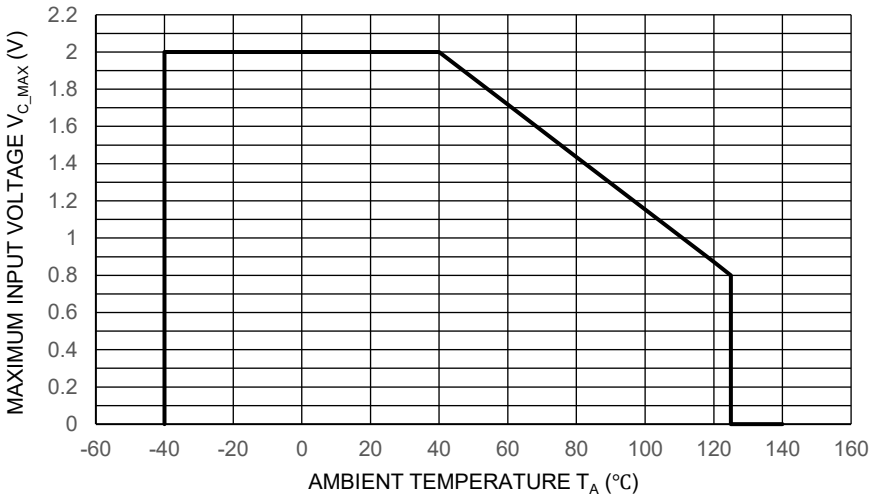


Figure 2. Maximum Input Voltage V_{C_MAX} vs Temperature

Electrical Characteristics (@T_A = +25°C, unless otherwise specified.) (Notes 4, 5, 6)

Item	Symbol	Test Condition	Min	Typ	Max	Unit
Hall Voltage	V_H	B = 50mT, V_C =1 V T_A = +25ºC	196	—	415	mV
Input Resistance	R_{IN}	B = 0mT, I_C = 0.1mA T_A = +25ºC	250	—	550	Ω
Output Resistance	R_{OUT}	B = 0mT, I_C = 0.1mA T_A = +25ºC	250	—	550	Ω
Offset Voltage	V_{OS}	B = 0mT, V_C = 1V T_A = +25ºC	-7	—	+7	mV
Temp. Coeffi. of V_H	αV_H	B = 50mT, I_C =5mA, T_A = 0ºC to +45ºC	—	-1.8	—	%/ºC
Temp. Coeffi. of R_{IN}	αR_{IN}	B = 0mT, I_C = 0.1mA, T_A = 0ºC to +45ºC	—	-1.8	—	%/ºC

Notes:

4. $V_H = V_{H-M} - V_{OS}$
   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.

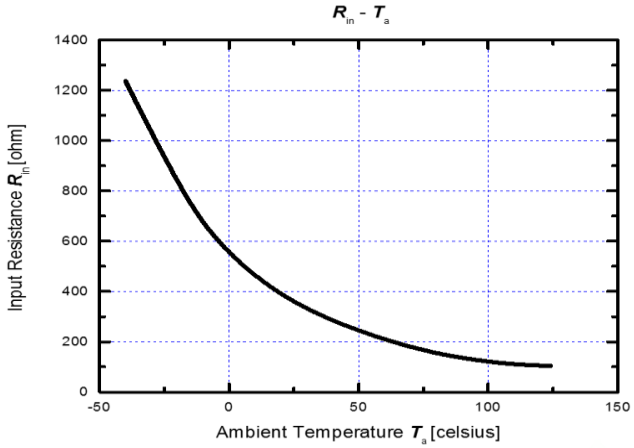
5. $\alpha V_H = \frac{1}{V_H(T_1)} \times \frac{V_H(T_3) - V_H(T_2)}{(T_3 - T_2)} \times 100$

6. $\alpha R_{IN} = \frac{1}{R_{IN}(T_1)} \times \frac{R_{IN}(T_3) - R_{IN}(T_2)}{(T_3 - T_2)} \times 100$

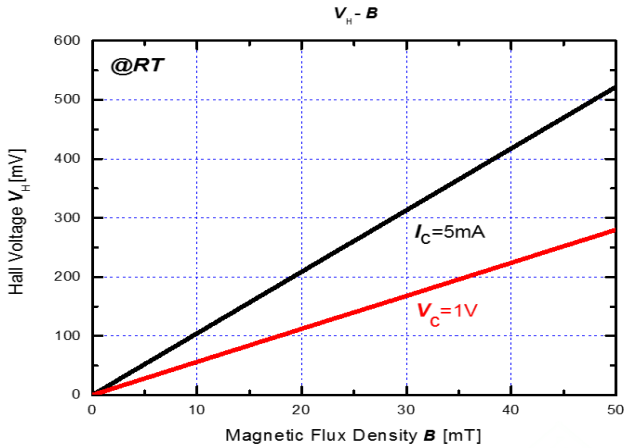
   $T_1 = +20℃, \quad T_2 = 0℃, \quad T_3 = +40℃$

Typical Operating Characteristics

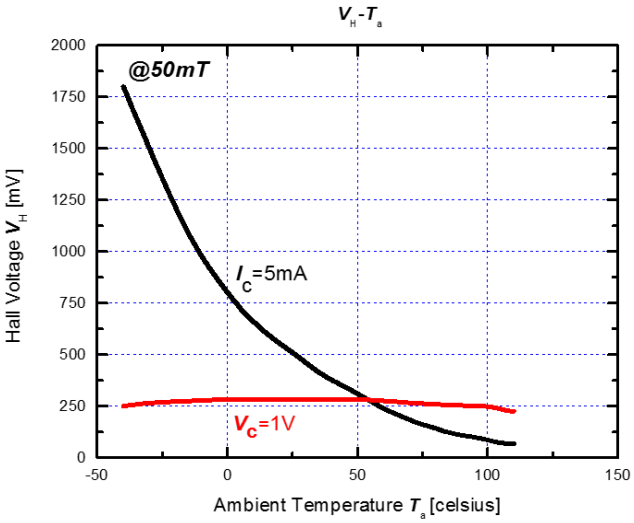
Input Resistance R_{IN} as A Function of Temperature T_A



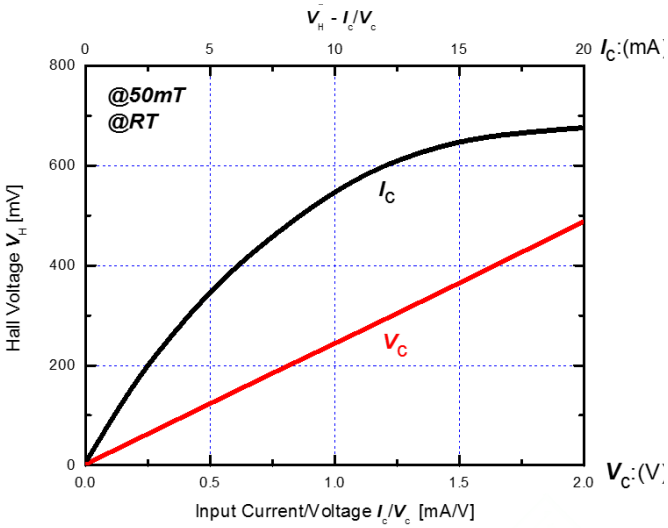
Hall Voltage V_H as A Function of Magnetic Flux Density B



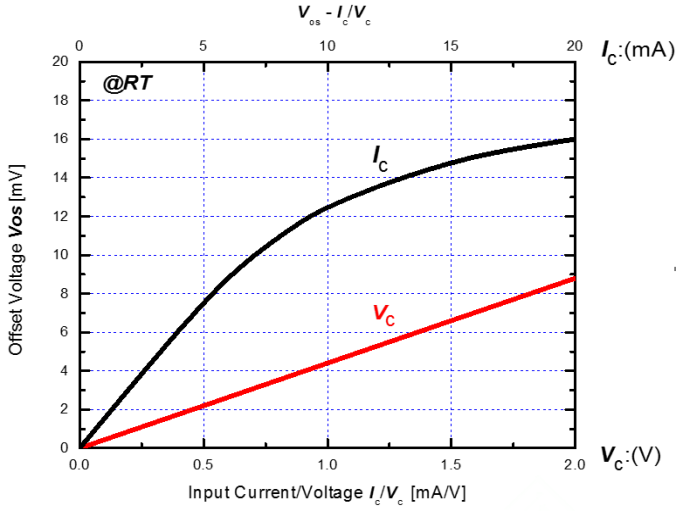
Hall Voltage V_H as A Function of Ambient Temperature T_A



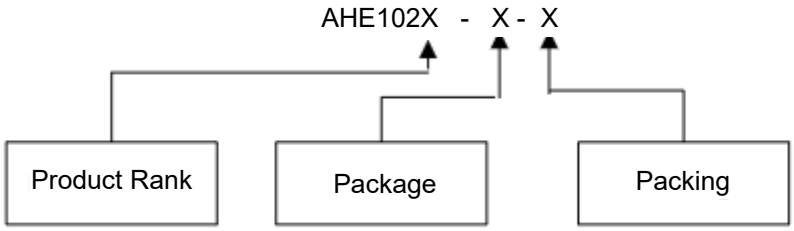
Hall Voltage V_H as A Function of Electrical Stimuli I_C/V_C



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



Ordering Information



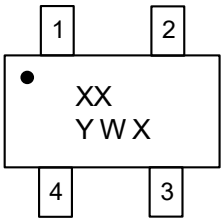
W4B: SOT23-4 (Type B)

13: Tape and Reel
-13R: Tape and Reel, Bottom Side Up

Orderable Part Number	Package Code	Package	Part Number Suffix	Packing	
				Qty.	Carrier
AHE102D-W4B-13	W4B	SOT23-4 (Type B)	-13	6,000	13” Tape & Reel
AHE102E-W4B-13	W4B	SOT23-4 (Type B)	-13	6,000	13” Tape & Reel
AHE102F-W4B-13	W4B	SOT23-4 (Type B)	-13	6,000	13” Tape & Reel
AHE102G-W4B-13	W4B	SOT23-4 (Type B)	-13	6,000	13” Tape & Reel
AHE102H-W4B-13	W4B	SOT23-4 (Type B)	-13	6,000	13” Tape & Reel
AHE102D-W4B-13R	W4B	SOT23-4 (Type B)	-13R	6,000	13” Tape & Reel
AHE102E-W4B-13R	W4B	SOT23-4 (Type B)	-13R	6,000	13” Tape & Reel
AHE102F-W4B-13R	W4B	SOT23-4 (Type B)	-13R	6,000	13” Tape & Reel
AHE102G-W4B-13R	W4B	SOT23-4 (Type B)	-13R	6,000	13” Tape & Reel
AHE102H-W4B-13R	W4B	SOT23-4 (Type B)	-13R	6,000	13” Tape & Reel

Marking Information

(Top View)



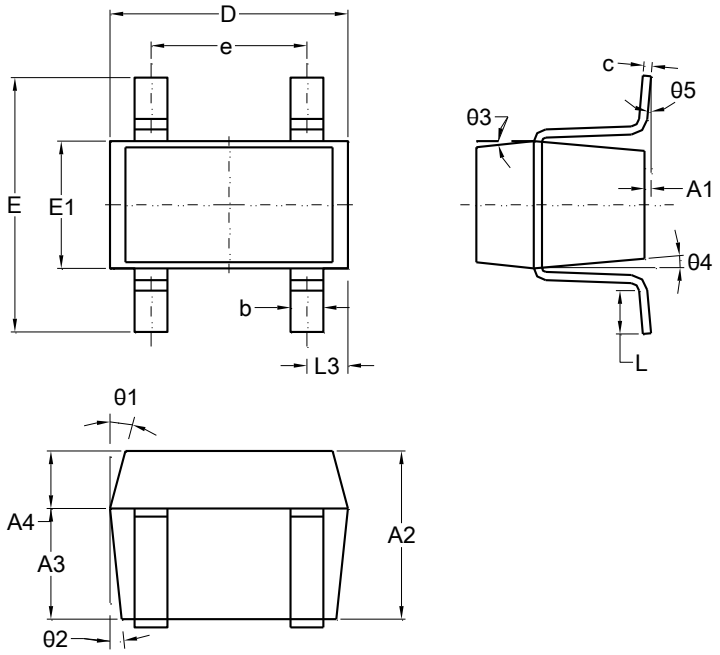
XX: Identification Code
Y: Year 0 to 9
W: Week: A to Z: Week 1 to 26;
a to z: Week 27 to 52; z Represents 52 and 53 Week
X: Internal Code

Orderable Part Number	Package	Identification Code
AHE102D-W4B-13	SOT23-4 (Type B)	BD
AHE102E-W4B-13	SOT23-4 (Type B)	BE
AHE102F-W4B-13	SOT23-4 (Type B)	BF
AHE102G-W4B-13	SOT23-4 (Type B)	BG
AHE102H-W4B-13	SOT23-4 (Type B)	BH
AHE102D-W4B-13R	SOT23-4 (Type B)	BD
AHE102E-W4B-13R	SOT23-4 (Type B)	BE
AHE102F-W4B-13R	SOT23-4 (Type B)	BF
AHE102G-W4B-13R	SOT23-4 (Type B)	BG
AHE102H-W4B-13R	SOT23-4 (Type B)	BH

Package Outline Dimensions

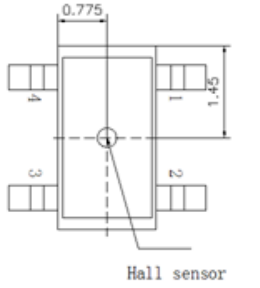
Please see http://www.diodes.com/package-outlines.html for the latest version.

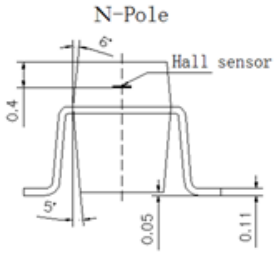
SOT23-4 (Type B)



SOT23-4 (Type B)			
Dim	**Min**	**Max**	**Typ**
A1	0.00	0.10	0.05
A2	1.95	2.15	2.05
A3	1.25	1.45	1.35
A4	0.60	0.80	0.70
b	0.35	0.45	0.40
c	0.09	0.13	0.11
D	2.80	3.00	2.90
E	2.90	3.30	3.10
E1	1.45	1.65	1.55
e	1.85	1.95	1.90
L	0.43	0.63	0.53
L3	0.45	0.55	0.50
θ1	1°	11°	6°
θ2	1°	11°	6°
θ3	1°	11°	6°
θ4	1°	11°	6°
θ5	0°	6°	3°
All Dimensions in mm			

Sensor Location

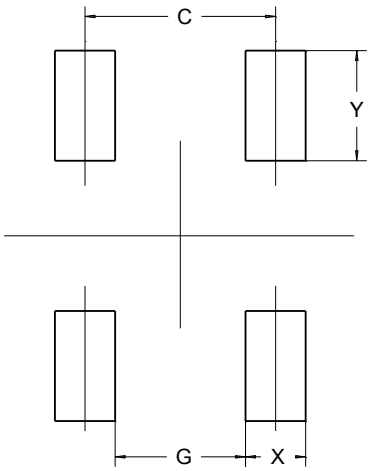




Suggested Pad Layout

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

SOT23-4 (Type B)



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

Reliability Test Terms (Notes 7, 8, 9)

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 ± 3°C, R_H = 85 ± 5%	1000hrs
Reflow Soldering	(JEITA EIAJ ED-4701) T_A = +260 ± 5°C	10sec
High-Temperature Operation	T_A = +125°C, V_C = 1V	1000hrs

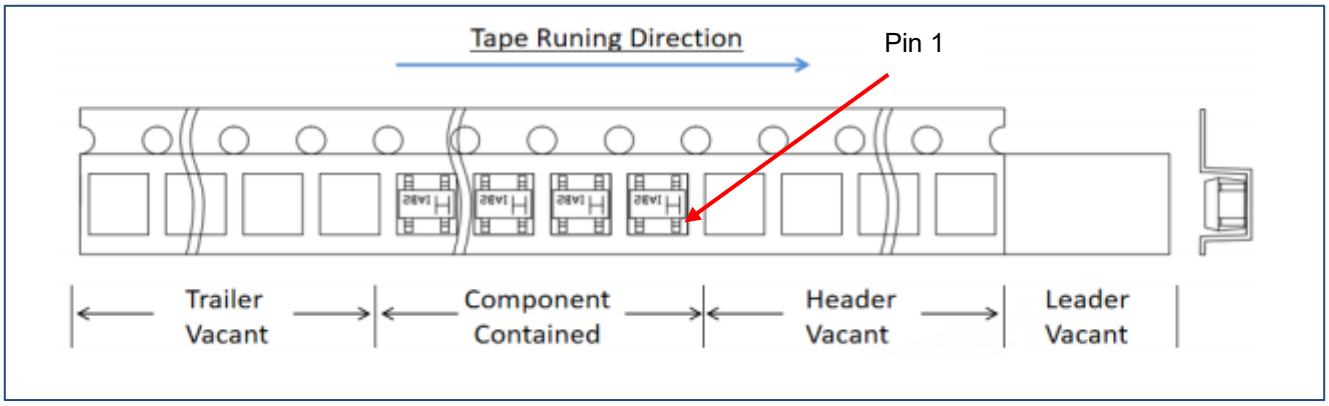
Notes: 7. Variation of Hall voltage V_H and input/output resistances R_{IN}/out are less than 20%.
8. Variation of offset voltage V_{OS} is less than ±16mV.
9. Other parameters in the *Electrical Characteristics* table are still within their ranges, as stated in the *Electrical Characteristics* table.

Mechanical Data

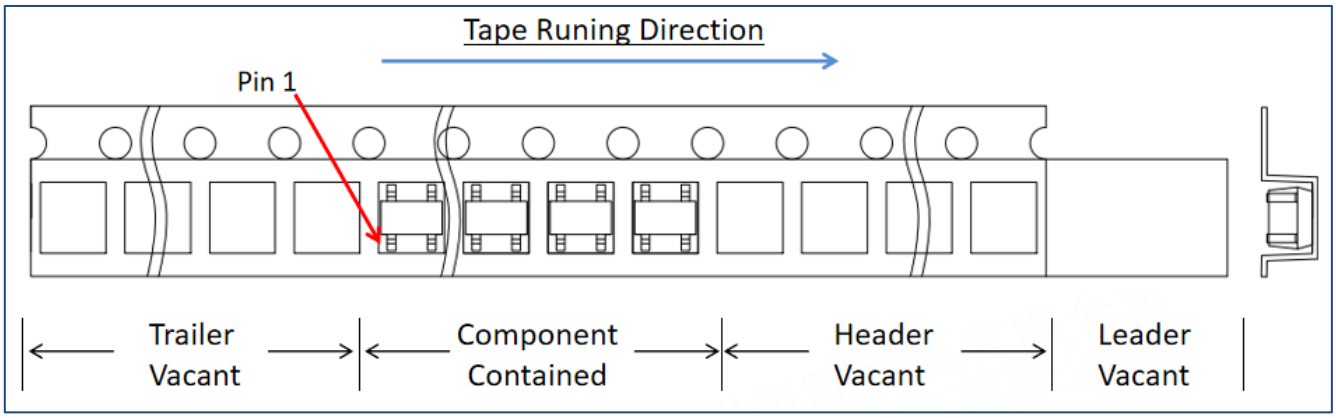
- Moisture Sensitivity: Level 3 per J-STD-020
- Terminals: Finish – Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.00212 grams (Approximate)

Tape Orientation

For AHE102x-W4B-13



For AHE102x-W4B-13R: Bottom Side Up



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