

## **P3A**

### **Highly sensitive Hall Effect sensor**

Advanced Hall Sensors Ltd (AHS) specialises in the design and manufacture of semiconductor sensors using the technique of Molecular Beam Epitaxy (MBE), which provides excellent uniformity and reproducibility. P3A Hall Sensor is outstanding for its High sensitivity and its low temperature coefficients. The P3A Hall Sensor is fabricated from AlGaAs/InGaAs/GaAs-2DEG (Two-dimensional electron gas) heterojunction semiconductors. Due to its wide band-gap material and high mobility, this sensor provides numerous advantages over existing Silicon technology.

#### **Features and benefits**

- High Sensitivity (300V/AT)
- Low current requirement
- Very low power consumption
- Extended operating temperature range
- Small linearity error of the Hall voltage
- Plastic miniature package for through slot and SOT-143 surface mounting

#### **Potential applications**

- Magnetic field measurement
- Low temperature applications
- Current and power measurements
- Control of brushless DC motors
- Micro switches
- Position sensing
- Speed and RPM sensing

**Table 1. Absolute maximum ratings**

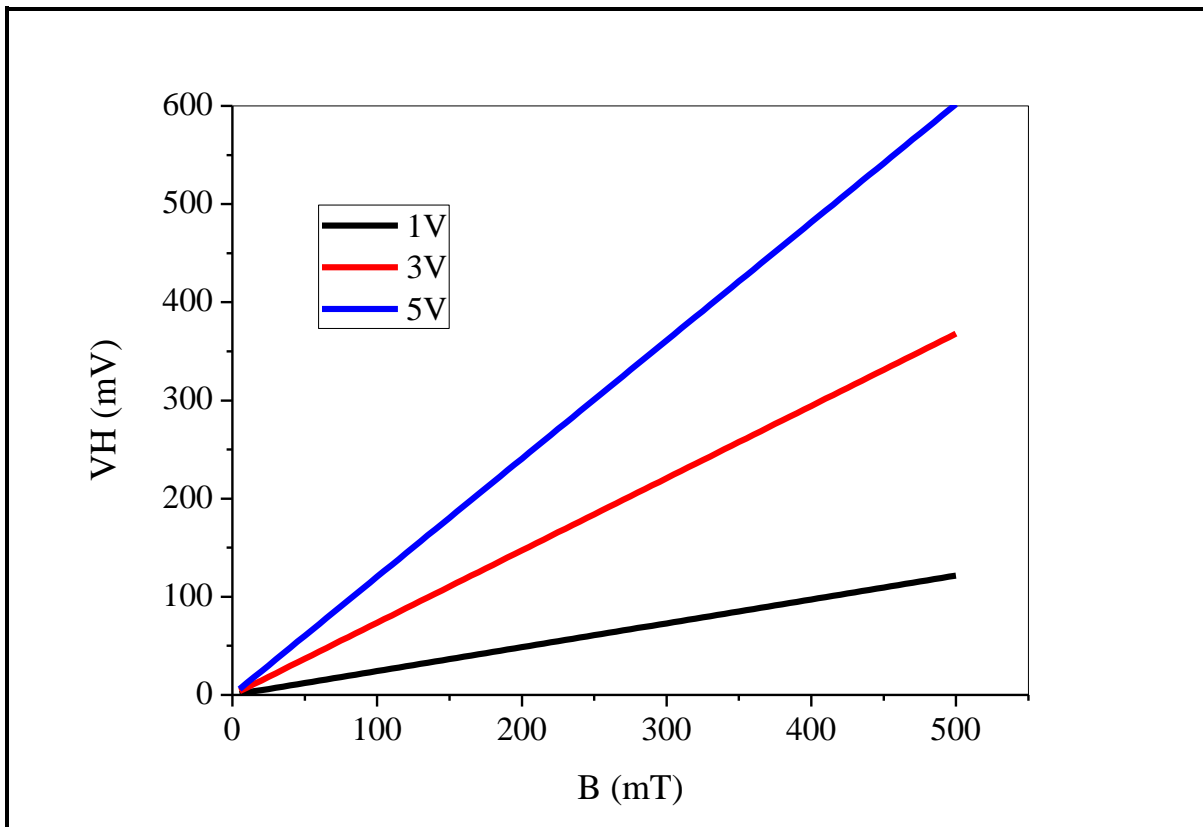
Parameter	Symbol	Rating	Unit
Control Voltage	$V_C$	5	V
Control Current	$I_C$	4	mA
Power Dissipation	$P_D$	20	mW
Operating Temperature	$T_{OP}$	-100 to +200	°C
Storage temperature	$T_S$	-100 to +200	°C
Soldering temperature	$T_{SOL}$	260	°C

**Table 2. Electrical characteristics**

Parameter	Symbol	Test conditions	Min	Typ	Max	Unit
Output Hall Voltage	$V_H$	$I_C=1mA, B=100mT$	25	28	35	mV
Residual Ratio <sup>*1</sup>	$V_{HO}/V_H$	$I_C=1mA$	-10		+10	%
Residual Ratio	$V_{HO}/V_H$	$I_C=0.5mA$	-4		+4	%
Input Resistance	$R_{IN}$	$I_C=1mA, B=0mT$	1.1	1.25	1.45	k $\Omega$
Output Resistance	$R_{OUT}$	$I_C=1mA, B=0mT$	1.1	1.25	1.45	k $\Omega$
Temperature coefficient of Hall Voltage <sup>*2</sup>	$\alpha$	$I_C=1mA, B=100mT$ ( $T_1=-100^\circ C, T_2=150^\circ C$ )	-0.05	-0.08	-0.1	%/°C
Temperature coefficient of Input Resistance <sup>*3</sup>	$\beta$	$I_C=1mA, B=0mT$ ( $T_1=-100^\circ C, T_2=150^\circ C$ )	-----	0.3	0.4	%/°C
Linearity of Hall Voltage <sup>*4</sup>	$\gamma$	$I_C=1mA, B_1=60mT,$ $B_2=500mT$	-----	1	1.5	%

**Notes:**

1. $Residual\_Ratio = \frac{V_{HO}(B=0mT)}{V_H(B=100mT)}$	2. $\alpha = \frac{1}{V_H(T_1)} \times \frac{V_H(T_2) - V_H(T_1)}{T_2 - T_1} \times 100$
3. $\beta = \frac{1}{R_{IN}(T_1)} \times \frac{R_{IN}(T_2) - R_{IN}(T_1)}{T_2 - T_1} \times 100$	4. $\gamma = \frac{K_H(B_2) - K_H(B_1)}{\frac{1}{2}[K_H(B_1) + K_H(B_2)]} \times 100$
$V_{HO}$ : Offset voltage	
$B$ : Magnetic flux density	
$T_1, T_2$ : Ambient Temperature	
$K_H$ : Current sensitivity	$K_H = \frac{V_H}{IB}$



**Figure 1. Output Hall Voltage versus Magnetic field at inputs of 1V, 3V and 5V across the Hall sensor.**

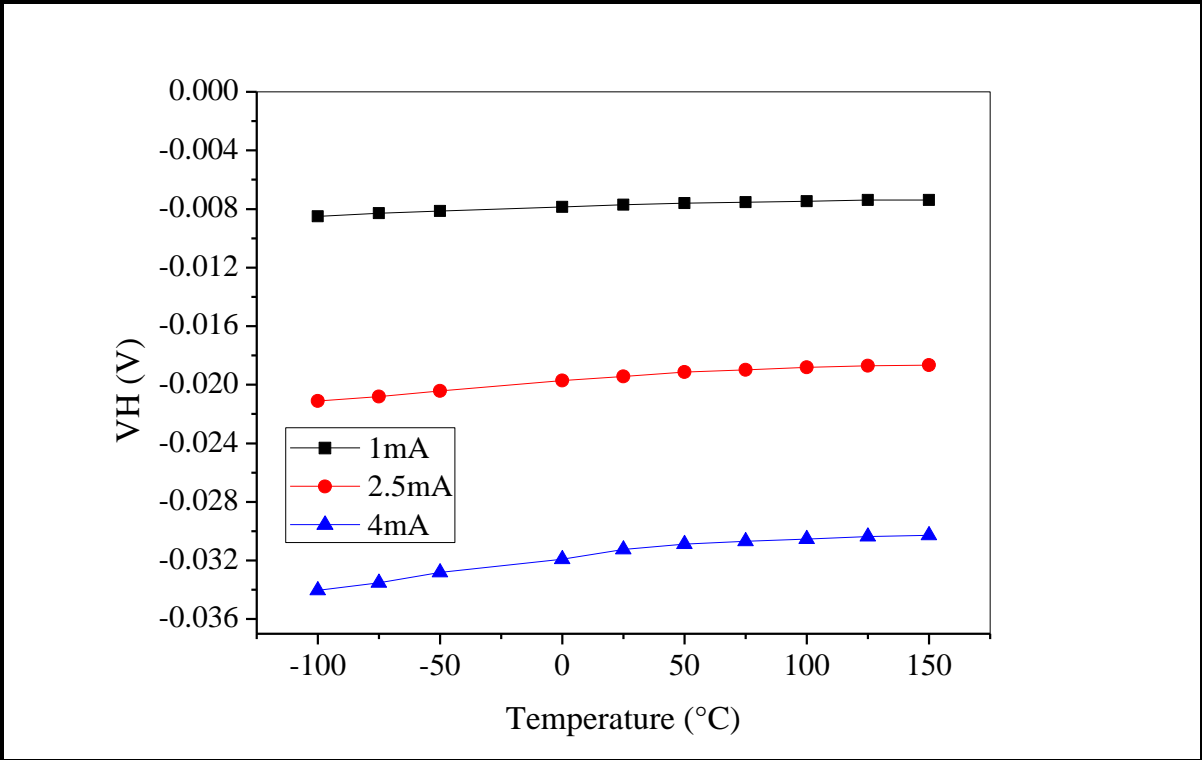


Figure 2. Output Hall Voltage versus Temperature at input bias currents of 1mA, 2.5mA and 4mA across the Hall sensor and at 30mT magnetic field.

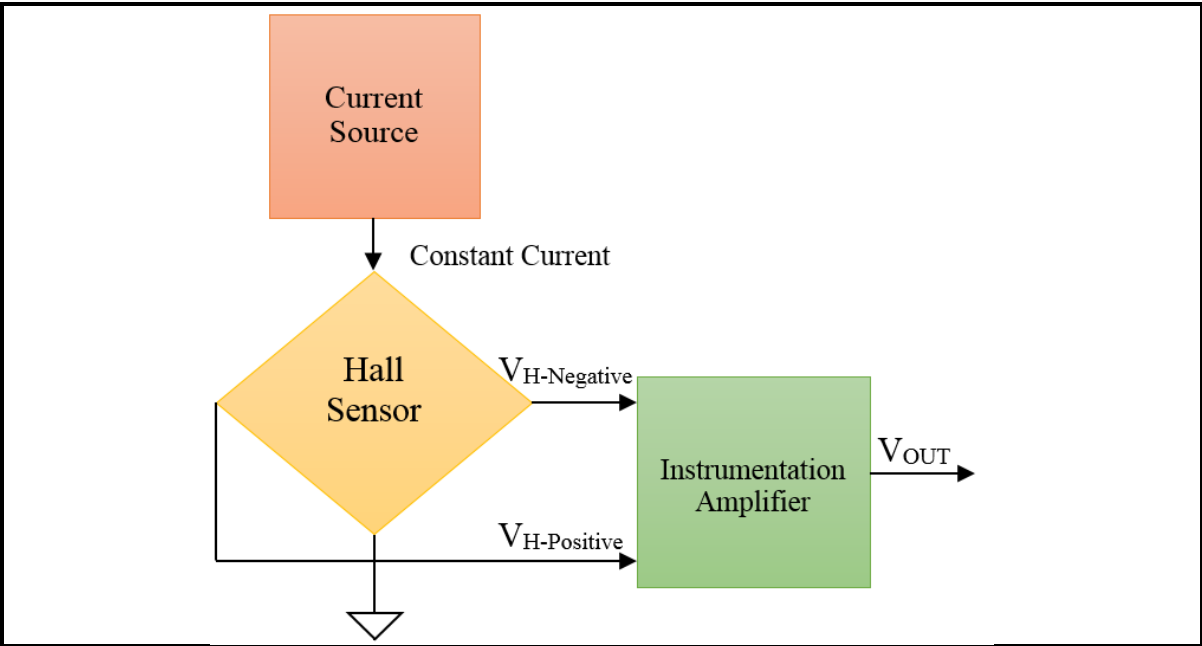


Figure 3. Recommended circuit.

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Outline drawings (unit: mm)

