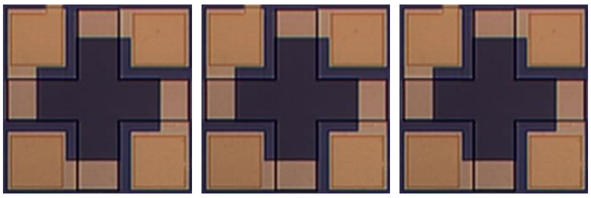

P15A

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. P15A Hall Sensor is outstanding for its High sensitivity and its low temperature coefficients. The P15A 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.

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Features and benefits

- High Sensitivity (850V/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	1.4	mA
Power Dissipation	P_D	7	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	75	85	95	mV
Residual Ratio*1	V_{HO}/V_H	I_C=1mA	-10		+10	%
Residual Ratio	V_{HO}/V_H	I_C=0.5mA	-5		+5	%
Input Resistance	R_{IN}	I_C=0.5mA, B=0mT	3.1	3.5	4.1	kΩ
Output Resistance	R_{OUT}	I_C=0.5mA, B=0mT	3.1	3.5	4.1	kΩ
Temperature coefficient of Hall Voltage*2	α	I_C=1mA, B=100mT (T_1=-100°C, T_2=150°C)	-0.05	-0.08	-0.13	%/°C
Temperature coefficient of Input Resistance*3	β	I_C=1mA, B=0mT (T_1=-100°C, T_2=150°C)	-----	0.3	0.4	%/°C
Linearity of Hall Voltage*4	γ	I_C=1mA, B_1=60mT, B_2=500mT	-----	1	1.5	%

Notes:

1. $$\mathrm{Re}\,sidual\_Ratio = \frac{V_{HO}(B=0mT)}{V_H(B=100mT)}$$
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. $$\gamma = \frac{K_H(B_2) - K_H(B_1)}{\frac{1}{2}\left[K_H(B_1) + K_H(B_2)\right]} \times 100$$

$$K_H = \frac{V_H}{IB}$$

V_{HO}: Offset voltage
B: Magnetic flux density
T_1, T_2: Ambient Temperature
K_H: Current sensitivity

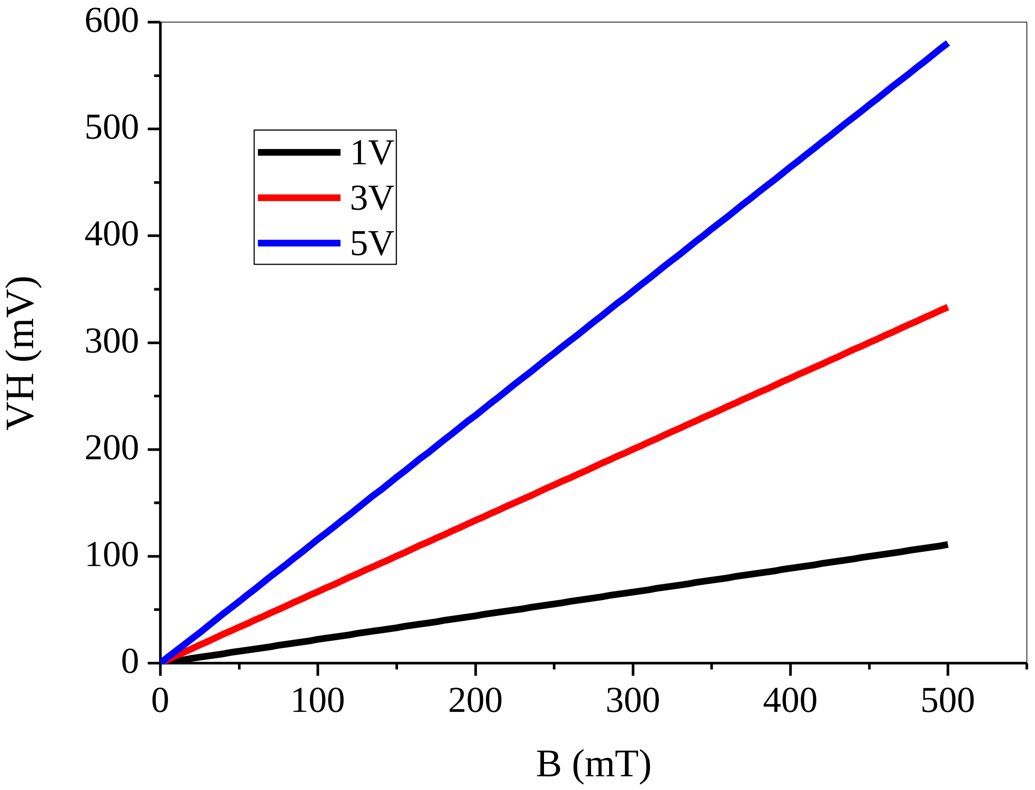

Figure 1. Output Hall Voltage versus Magnetic field at inputs of 1V, 3V and 5V across the Hall sensor.

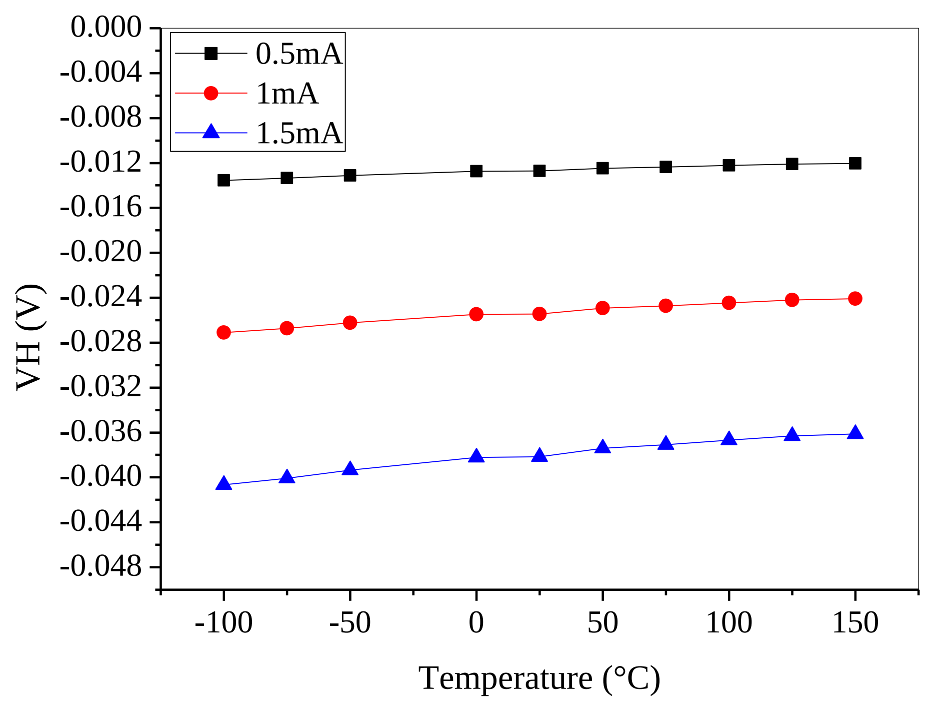

Figure 2. Output Hall Voltage versus Temperature at input bias currents of 0.5mA, 1mA and 1.5mA across the Hall sensor and at 30mT magnetic field.

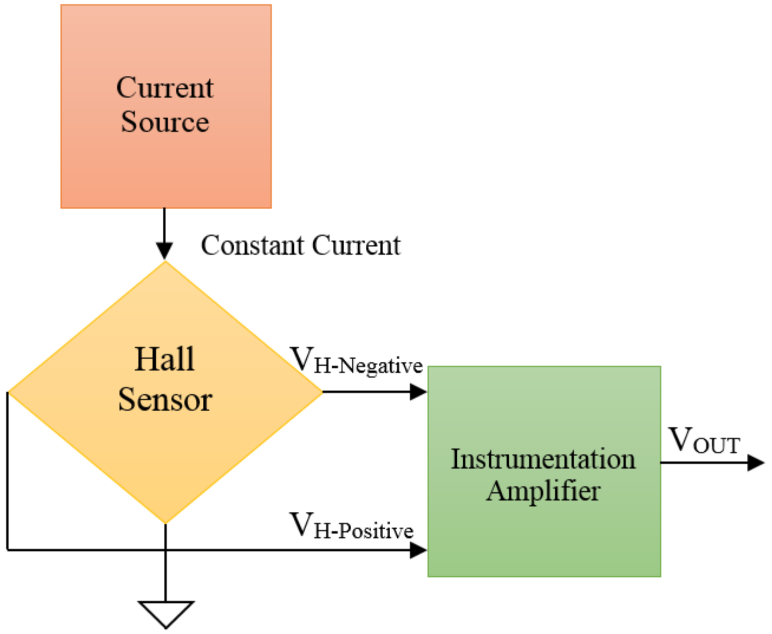

Figure 3. Recommended circuit.

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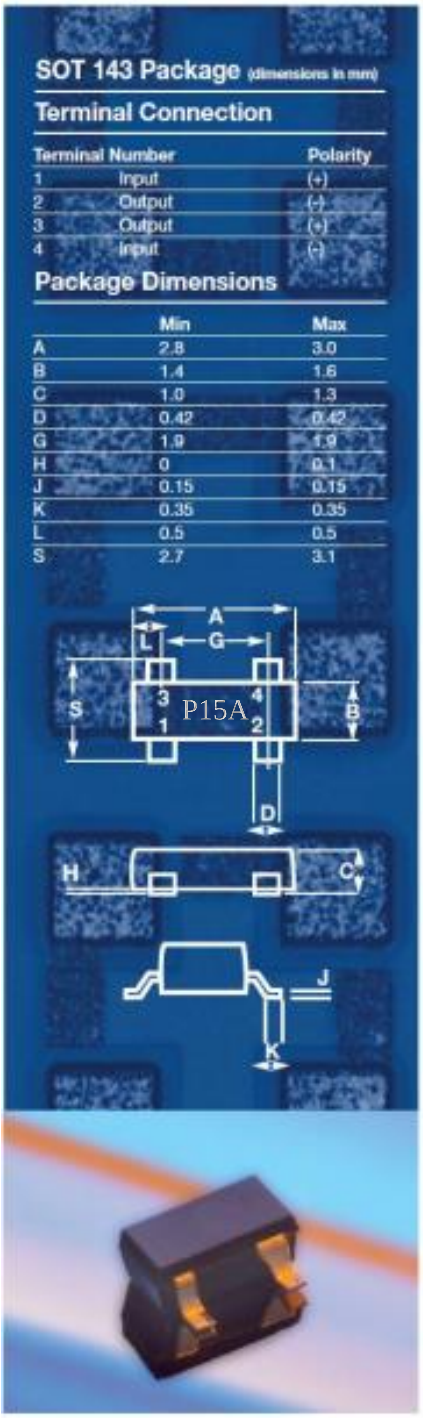
Outline drawings (unit: mm)



SOT 143 Package (dimensions in mm)

Terminal Connection

Terminal Number		Polarity
1	Input	(+)
2	Output	(-)
3	Output	(+)
4	Input	(-)

Package Dimensions

	Min	Max
A	2.8	3.0
B	1.4	1.6
C	1.0	1.3
D	0.42	0.42
G	1.9	1.9
H	0	0.1
J	0.15	0.15
K	0.35	0.35
L	0.5	0.5
S	2.7	3.1