



# High Performance Low Power Hall-Effect Sensor

## MHA150N/S

### FEATURES

- Low power CMOS process
- Wide operation voltage range: 1.65~5.5V
- Ultra-low power consumption, <math><5\mu\text{A}</math>@1.8V
- Good RF noise immunity
- Unipolar operation
- Single output, Unipolar Hall switch for N or S
- -40°C to +85°C operation
- RoHS compliant
- SOT23 package with 2.90mmx1.6mmx1.2mm

### DESCRIPTION

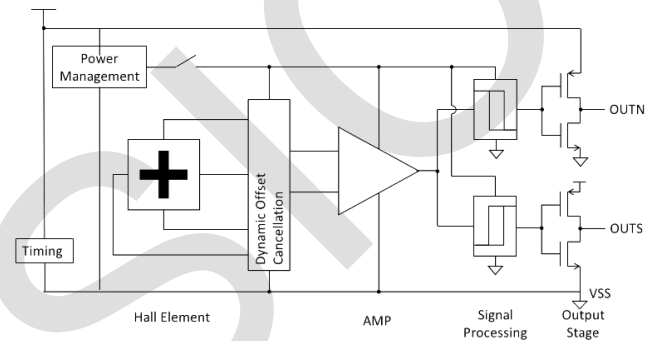


Figure 1 : Signal Path

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Room 4-501, Financial Center, No. 158, West Third Road,  
Tianjin Airport Economic Zone, Tianjin, China, 300308  
Tel: +86 022-59896226  
[www.memsic.com](http://www.memsic.com)

**SPECIFICATIONS** (Measurements @ 25 °C, unless otherwise noted; V<sub>DD</sub>=1.8V unless otherwise specified)

Parameter	Conditions	Min	Typ	Max	Units
Supply Voltage (V <sub>DD</sub> )		1.65	1.8	5.5	V
Supply Current			2.5	5.0	μA
	-40~85 °C		2.5	10.0	μA
Power Down Current			1.0		nA
Operating Temperature		-40		85	°C
Storage Temperature		-55		125	°C
Awake Tim (T <sub>awake</sub> )			50	100	μs
Period (T <sub>period</sub> )			50	100	ms
Duty Cycle			0.05		%
Output High (V <sub>OH</sub> )	I <sub>OUT</sub> =+0.5mA	V <sub>DD</sub> -0.3	V <sub>DD</sub> -0.1	V <sub>DD</sub> +0.1	V
Output Low (V <sub>OL</sub> )	I <sub>OUT</sub> =-0.5mA	-0.3	0.1	0.3	V
Output Current		-0.5		0.5	mA
Magnetic Opening Point (B <sub>OP</sub> )		15	25	35	Gauss
Magnetic Releasing Point (B <sub>RP</sub> )		10	20	30	Gauss
Hysteresis Window (B <sub>HYS</sub> )		2	5		Gauss

**HARDWARE DESIGN CONSIDERATION**

It is necessary to keep VDD voltage clean for best noise performance. A low-ESR bypass cap is required and recommended value is 0.1μF. It should be placed close to the device as much as possible.

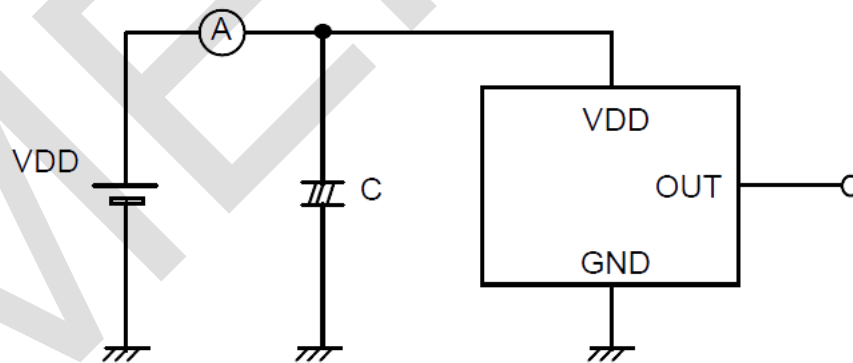


Figure 2 : Connection diagram

## PIN DEFINITION

### MHA150N

Pin NO.	Pin name	Description
1	VDD	Power supply
2	OUTN	Output, N pole detection
3	GND	Ground

### MHA150S

Pin NO.	Pin name	Description
1	VDD	Power supply
2	OUTS	Output, S pole detection
3	GND	Ground

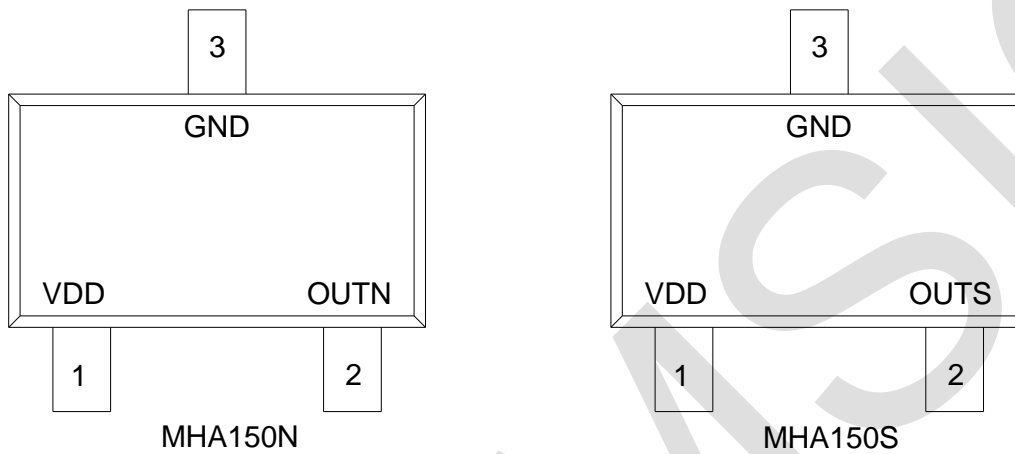


Figure 3: SOT23 pin definition (top view)

### THEORY OF OPERATION

This Hall switch is fully integrated CMOS IC. It output high-low signal following magnetic field changing. Normally it works with a magnet and detect the magnet close and away.

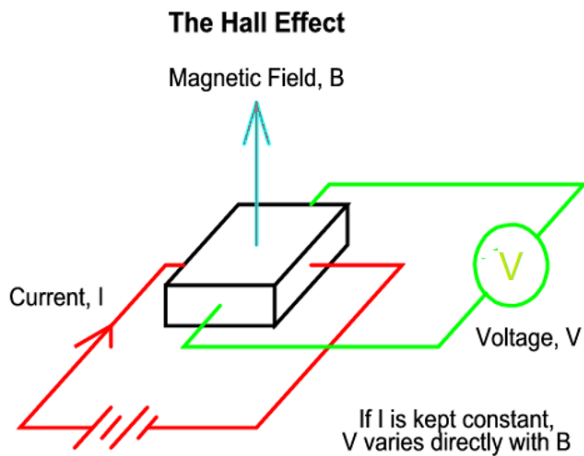


Figure 4: Hall Effect

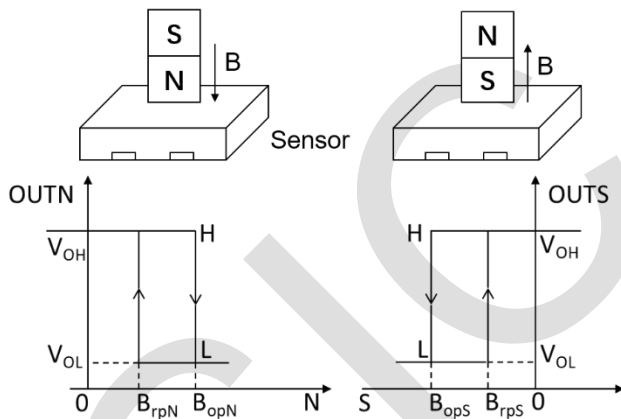


Figure 5: Output signals of OUT pins

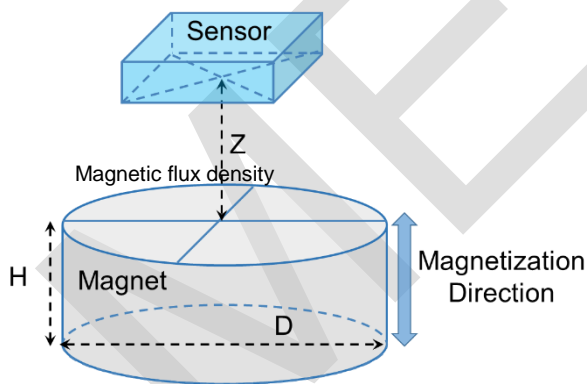


Figure 6: Sensor and magnet

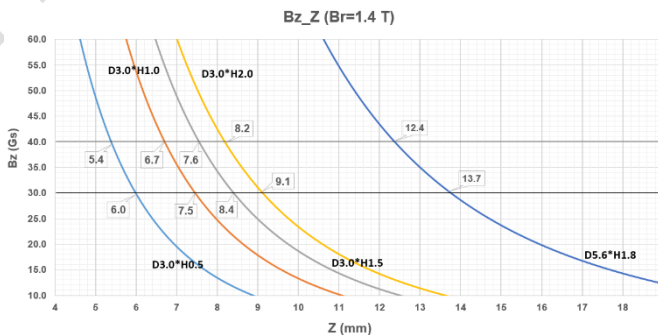


Figure 7: Field by magnet (different size and distance)

## SOLDER REFLOW PROFILE

1. Reflow is limited by 2 times. Second reflow should be applied after device has cooled down to room temperature (25°C).
2. Recommended reflow profile for Pb free process is shown in Figure 3. The time duration of peak temperature (260°C) should be limited to 10 seconds.
3. Type 4 solder paste is recommended for a better SMT quality.

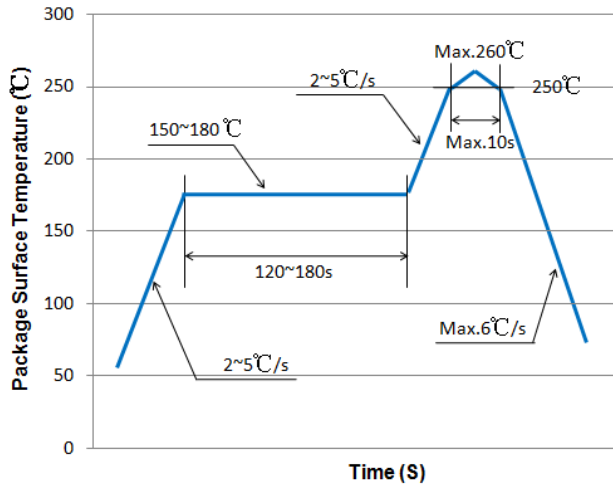


Figure 8: Recommended solder reflow profile

## MANUAL SOLDERING

1. Soldering/repairing MHA150N/S manually via solder iron or heater gun is not recommended.
2. Avoid bending or torqueing the PCB after the sensor is assembled.

# PACKAGE OUTLINE DIMENSION

Unit: mm

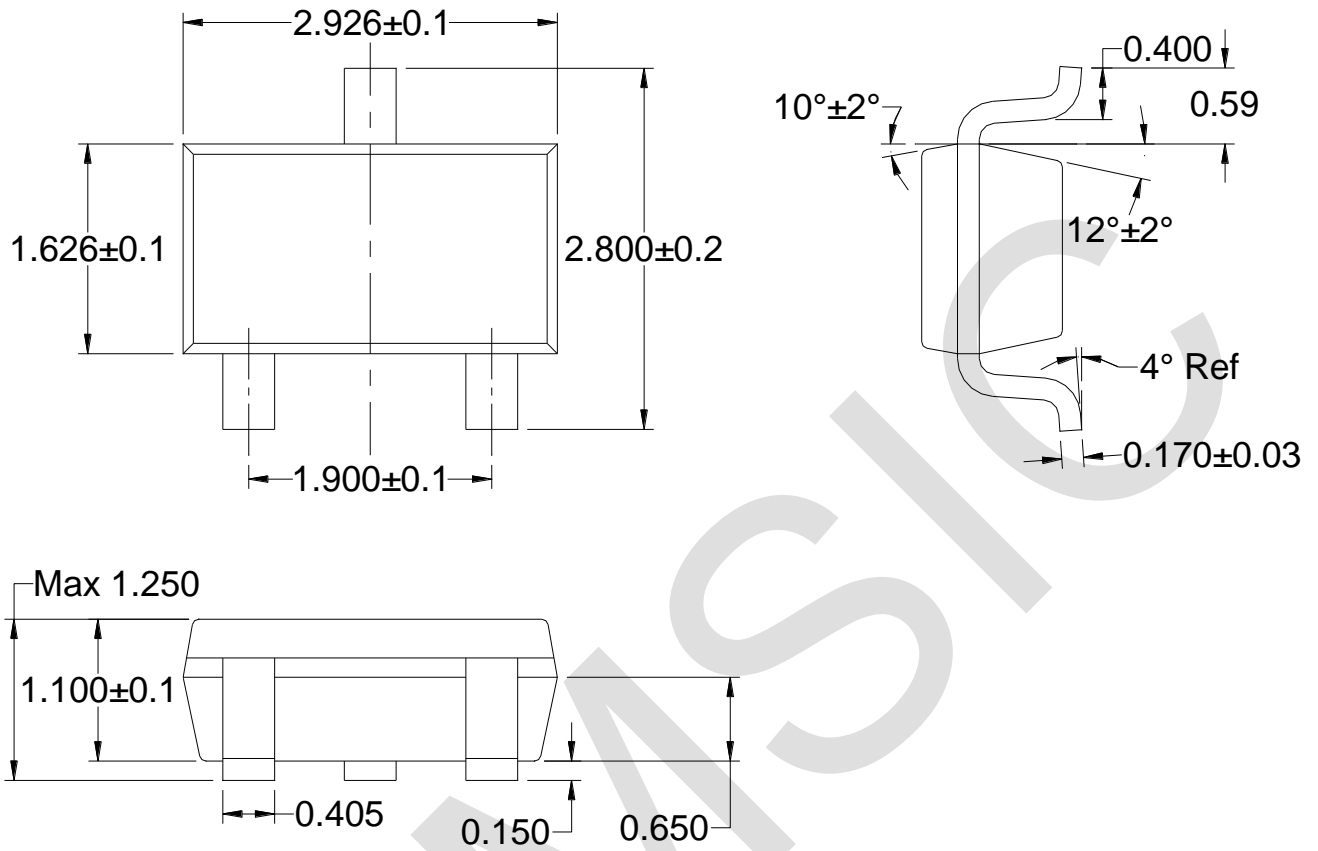


Figure 9: Mechanical package outline dimensions

## Notes:

- a) Sensitive area located at the center of package within 0.3mm diameter circle.
- b) Unless otherwise specified, Tolerances is  $\pm 0.05$ mm.

## TAPE AND REEL PACKING

Products are put into carrier tape according to package type. The quantity for each full reel is 3000pcs per reel with 7" lock reel. Please refer to below Figure

Details for tape and reel packing as below:

- MHA150N and MHA150S tape and reel carriers are in accordance with ANSI/EIA-481
- Tape and reels are NOT designed to be baked at high temperatures
- Each tape and reel is typically dry packed in a moisture barrier bag (MSL1).

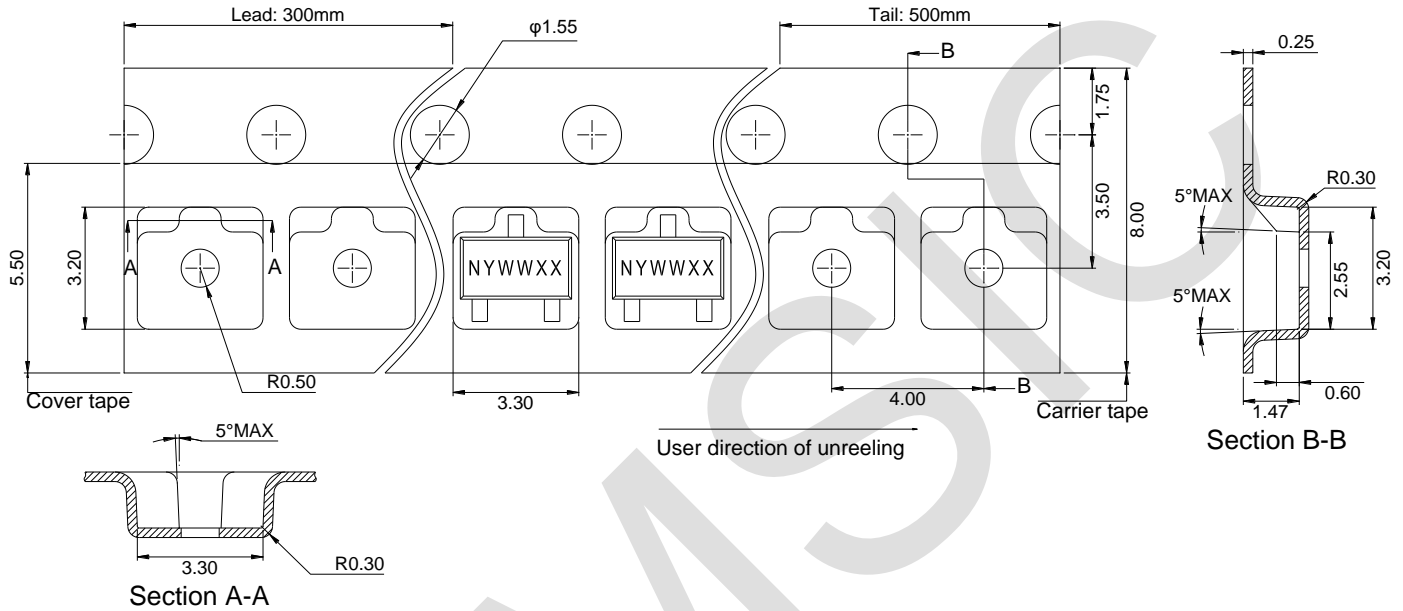


Figure10: Carrier tape dimension and device orientation