



# High Performance Low Power Hall-Effect Sensor

## MHA160N/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
- SOT553 package with 1.20mmx1.6mmx0.5mm

### DESCRIPTION

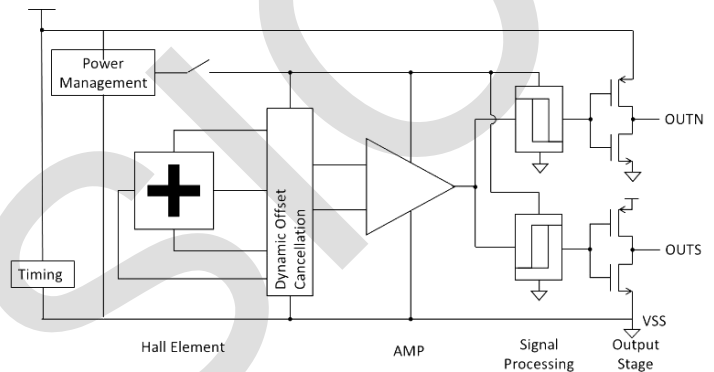


Figure 1 : Signal Path

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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.

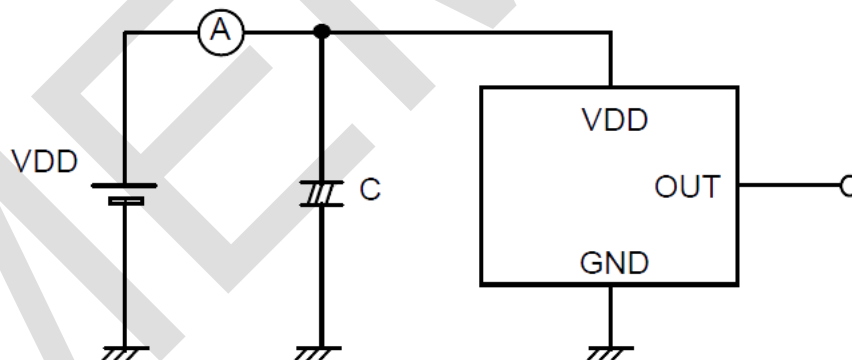


Figure 2 : Connection diagram

## PIN DEFINITION

### MHA160N

Pin NO.	Pin name	Description
1	NC	
2	GND	Ground
3	NC	Power supply
4	VDD	Power supply
5	OUT N	Output, N pole detection

### MHA160S

Pin NO.	Pin name	Description
1	NC	
2	GND	Ground
3	NC	Power supply
4	VDD	Power supply
5	OUT S	Output, S pole detection

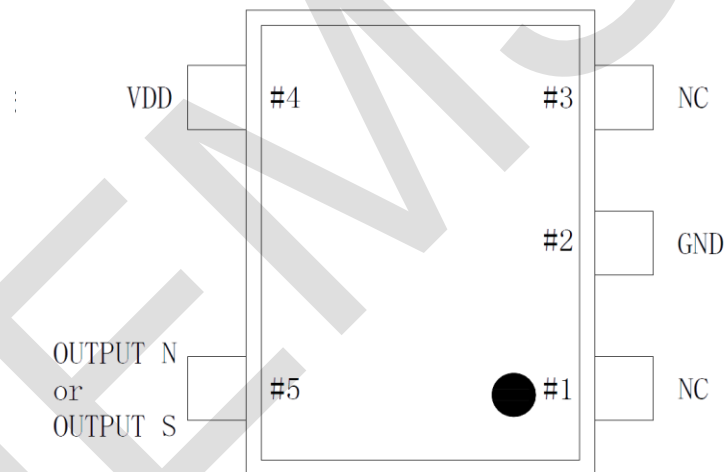


Figure 3: Pin definition (top view)

### 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.

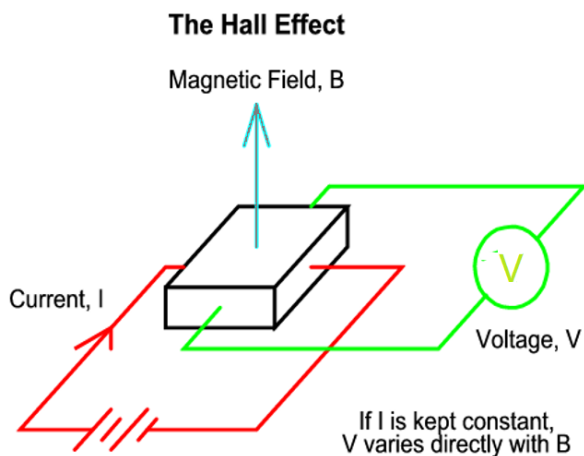


Figure 4: Hall Effect

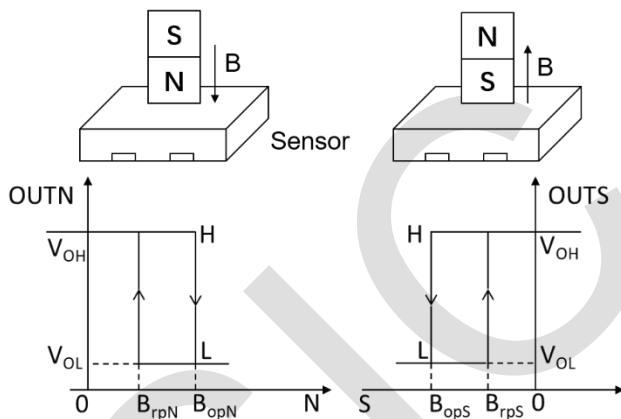


Figure 5: Output signals of OUT pins

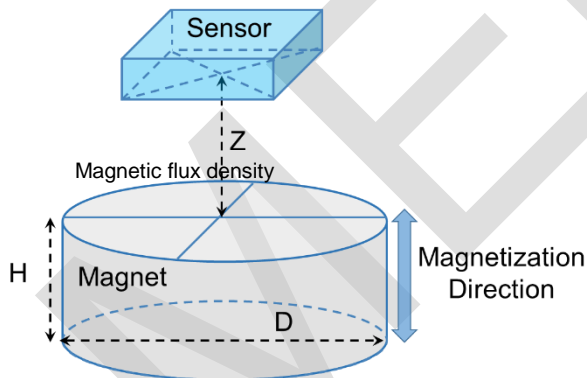


Figure 6: Sensor and magnet

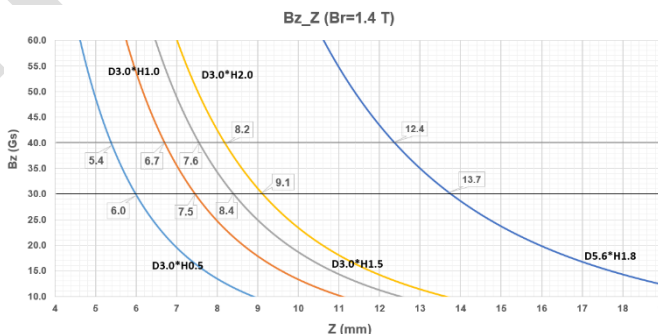


Figure 7: Field by magnet (different size and distance)

## 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.

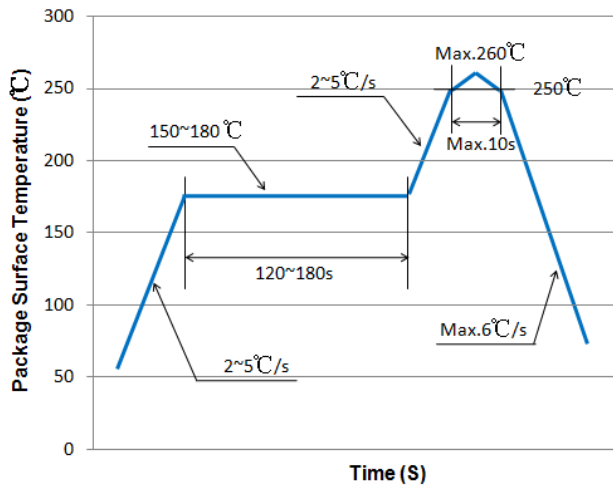


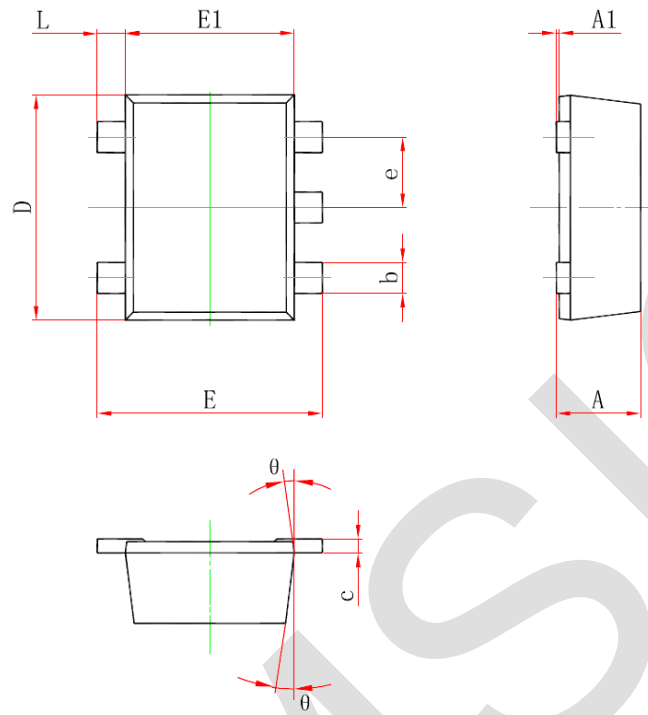
Figure 8: Recommended solder reflow profile

## MANUAL SOLDERING

1. Soldering/repairing MHA160N/S manually via solder iron or heater gun is not recommended.
2. Avoid bending or torquing the PCB after the sensor is assembled.

## PACKAGE OUTLINE DIMENSION

Unit: mm



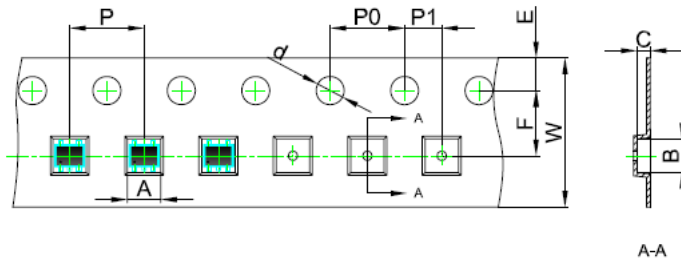
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.525	0.600	0.021	0.024
A1	0.000	0.050	0.000	0.002
e	0.450	0.550	0.018	0.022
c	0.090	0.160	0.004	0.006
D	1.500	1.700	0.059	0.067
b	0.170	0.270	0.007	0.011
E1	1.100	1.300	0.043	0.051
E	1.500	1.700	0.059	0.067
L	0.100	0.300	0.004	0.012
theta	7 °REF.		7 °REF.	

Figure 9: Mechanical package outline dimensions

Notes:

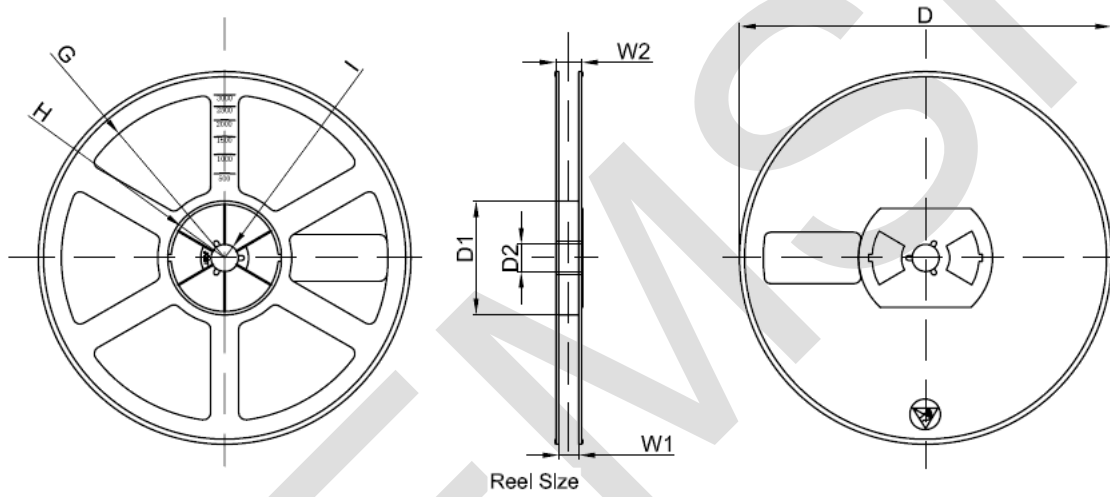
- a) Sensitive area located at the center of package within 0.3mm diameter circle.
- b) Unless otherwise specified, Tolerances is  $\pm 0.05\text{mm}$ .

# TAPE AND REEL



Dimensions are in millimeter

Pkg type	A	B	C	d	E	F	P0	P	P1	W
SOT-553	1,78	1,78	0,69	Ø1,50	1,75	3,50	4,00	4,00	2,00	8,00
(Tolerance)	+/-0.1	+/-0.1	+/-0.1	+/-0.1	+/-0.1	+/-0.1	+/-0.1	+/-0.1	+/-0.1	+/-0.1



Reel Size

Dimensions are in millimeter

Reel Option	D	D1	D2	G	H	I	W1	W2
7"D1a	Ø178.00	54.40	13.00	R78.00	R25.60	R6.50	9.50	12.30
Tolerance	+/-2	+/-1	+/-1	+/-1	+/-1	+/-1	+/-1	+/-1

REEL	Reel Size	Box	Box Size(mm)	Carton	Carton Size(mm)	G.W.(kg)
3000 pcs	7 inch	45,000 pcs	203×203×195	180,000 pcs	438×438×220	

Figure 10: Tape and reel