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, <5uA@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

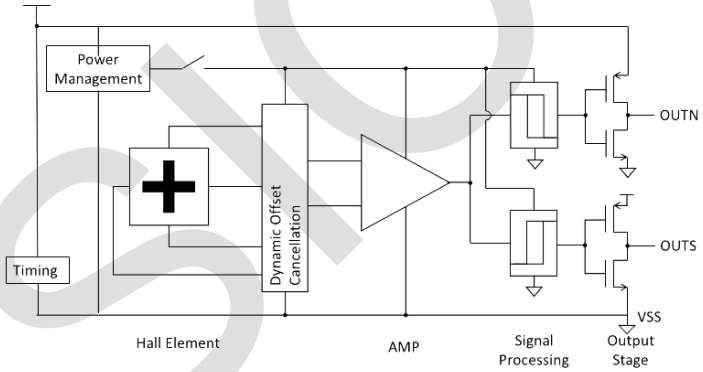


Figure 1： Signal Path

SPECIFICATIONS (Measurements @ 25 °C, unless otherwise noted; V_{DD}=1.8V unless otherwise specified)

Parameter	Conditions	Min	Typ	Max	Units
Supply Voltage (V_{DD})		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_{awake})			50	100	μs
Period (T_{period})			50	100	ms
Duty Cycle			0.05		%
Output High (V_{OH})	I_{OUT}=+0.5mA	V_{DD}-0.3	V_{DD}-0.1	V_{DD}+0.1	V
Output Low (V_{OL})	I_{OUT}=-0.5mA	-0.3	0.1	0.3	V
Output Current		-0.5		0.5	mA
Magnetic Opening Point (B_{OP})		15	25	35	Gauss
Magnetic Releasing Point (B_{RP})		10	20	30	Gauss
Hysteresis Window (B_{HYS})		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.

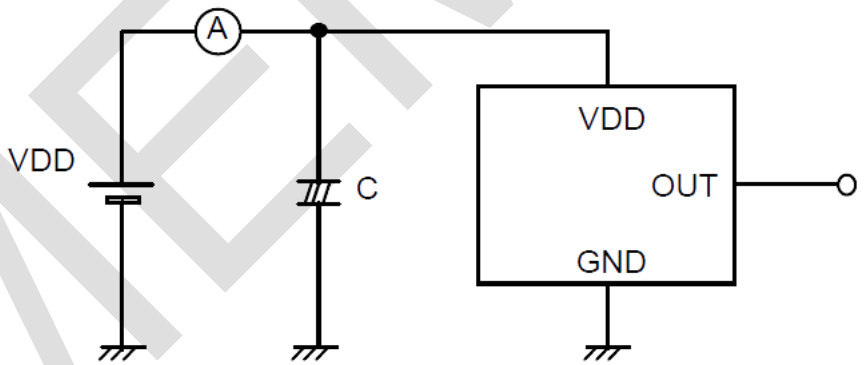


Figure 2： Connection diagram

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

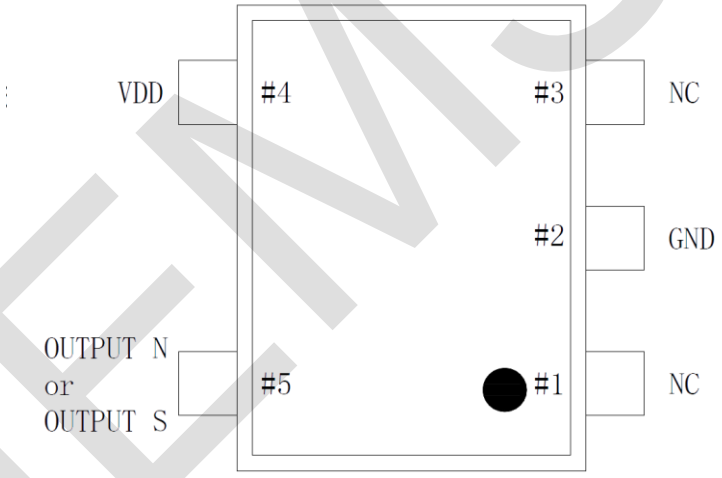


Figure 3：Pin definition (top view)

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.

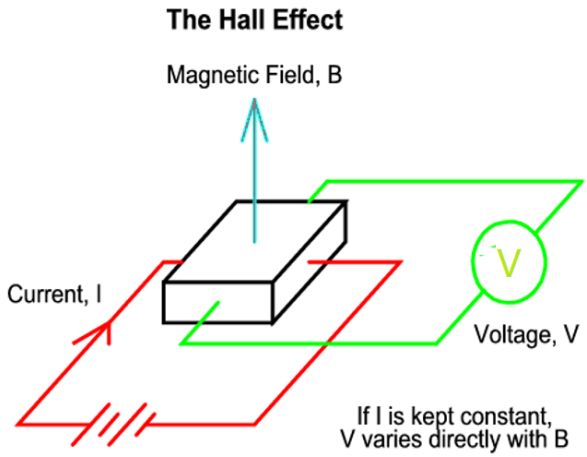


Figure 4: Hall Effect

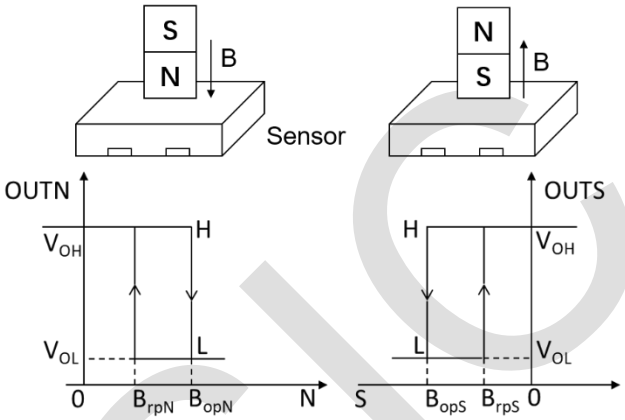


Figure 5: Output signals of OUT pins

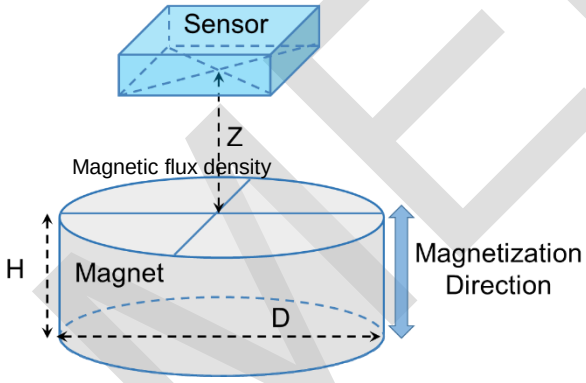


Figure 6: Sensor and magnet

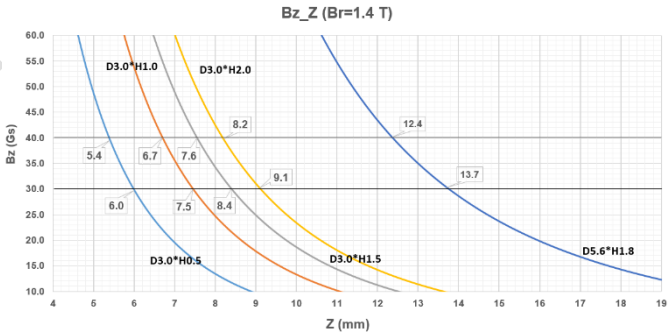


Figure 7: Field by magnet (different size and distance)

SOLDER REFLOW PROFILE

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

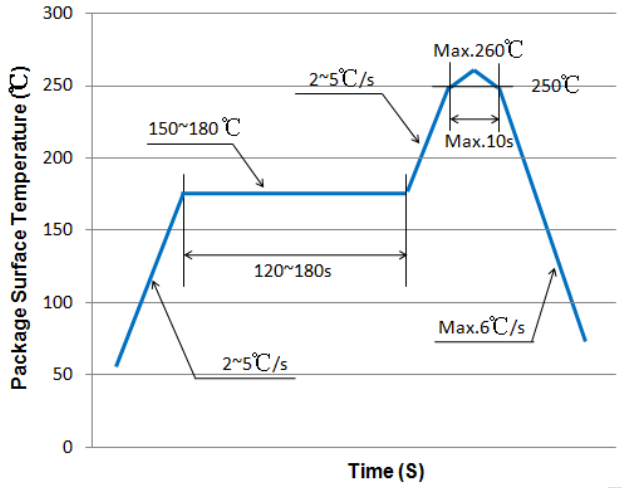


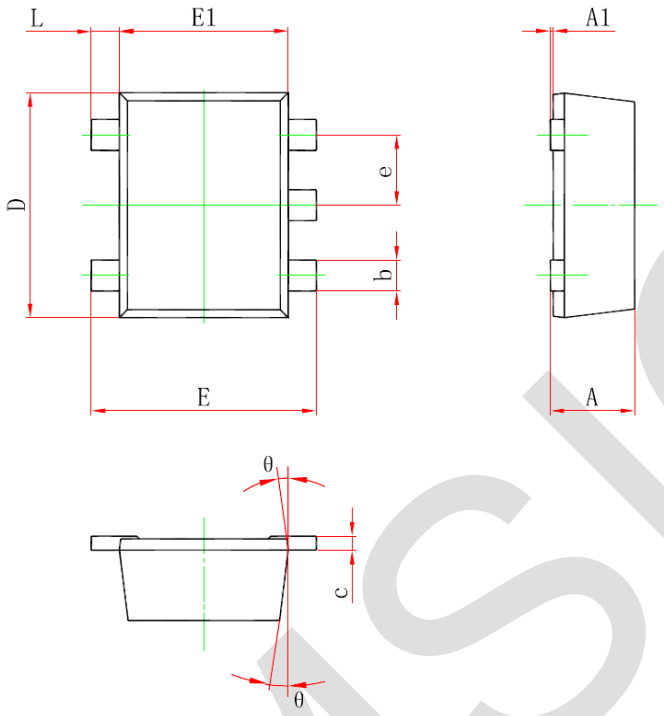
Figure 8: Recommended solder reflow profile

MANUAL SOLDERING

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

PACKAGE OUTLINE DIMENSION

Unit: mm

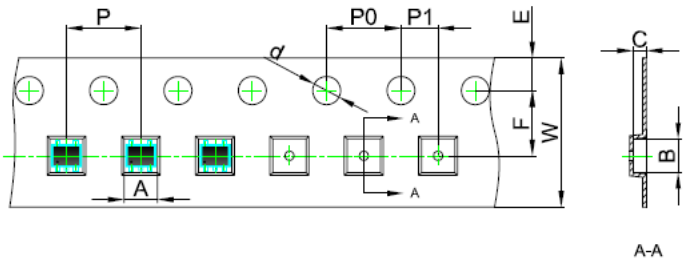


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.525	0.600	0.021	0.024
A1	0.000	0.050	0.000	0.002
e	0.450	0.550	0.018	0.022
c	0.090	0.160	0.004	0.006
D	1.500	1.700	0.059	0.067
b	0.170	0.270	0.007	0.011
E1	1.100	1.300	0.043	0.051
E	1.500	1.700	0.059	0.067
L	0.100	0.300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

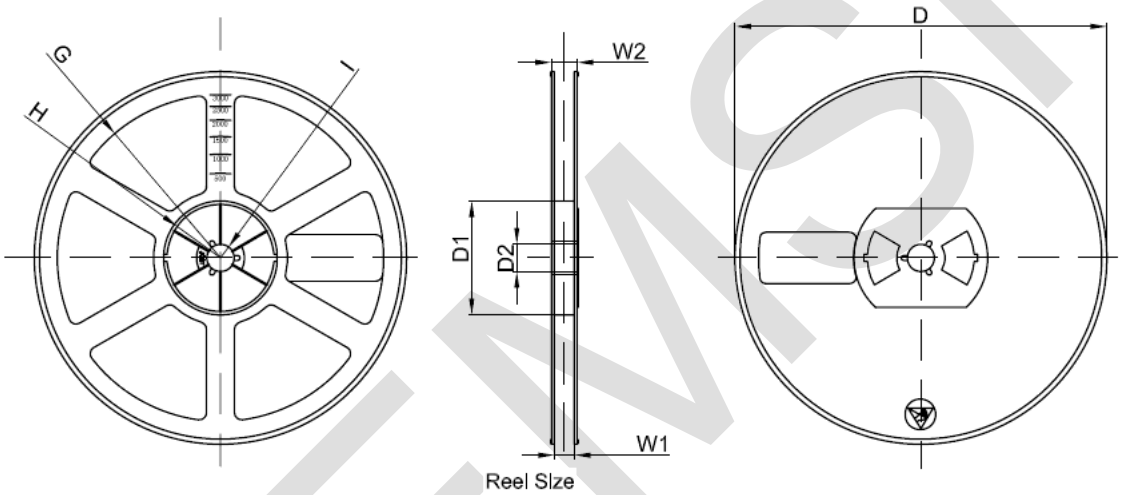
Figure 9: Mechanical package outline dimensions

Notes：
a) Sensitive area located at the center of package within 0.3mm diameter circle.
b) Unless otherwise specified, Tolerances is ±0.05mm.

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



Dimensions are in millimeter								
Reel Option	D	D1	D2	G	H	I	W1	W2
7"Dia	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