



High Performance Low Power Hall-Effect Sensor

MHA100KN

FEATURES

- Low power CMOS process
- Wide operation voltage range: 1.65~5.5V
- Ultra-low power consumption, <math><5\mu\text{A}@1.8\text{V}</math>
- Good RF noise immunity
- Omnipolar operation
- Dual output, Unipolar Hall switch for N and S
- -40°C to +85°C operation
- RoHS compliant
- DFN4 package with 1.0mmx1.4mmx0.37mm

APPLICATIONS

- TWS headset
- Smart meter
- Cover switch

DESCRIPTION

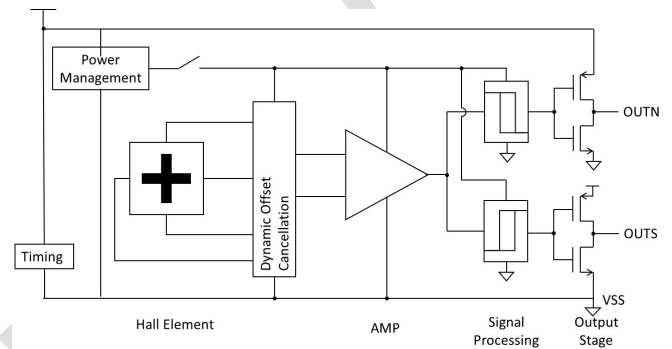


Figure 1: Signal Path

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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})		27	37	47	Gauss
Magnetic Releasing Point (B _{RP})		20	30	40	Gauss
Hysteresis Window (B _{HYS})		2	7		Gauss

ORDERING GUIDE

MHA100KN

Package type

Code	Type
N	DFN package

Performance Grade

Code	Temp
K	-40 ~ 85°C

PIN DESCRIPTION

Pin NO.	Pin Name	Description
1	VDD	Power supplier
2	VSS	Connected to Ground
3	OUT2	S pole detection output
4	OUT1	N pole detection output

Caution: Electro Static Discharge (ESD) sensitive device.

PACKAGE ILLUSTRATION

DFN4 package with 1.0mmx1.4mmx0.37mm size.

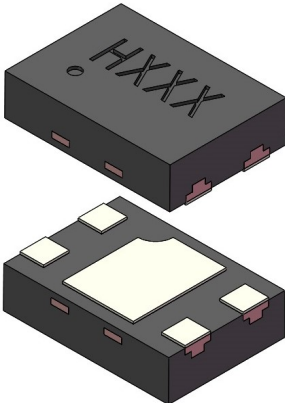


Figure 2: Package illustration

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.

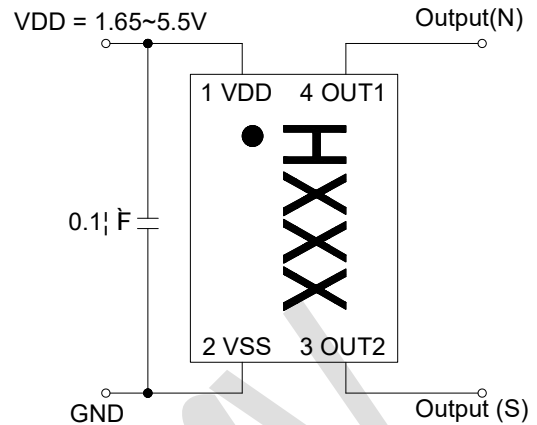
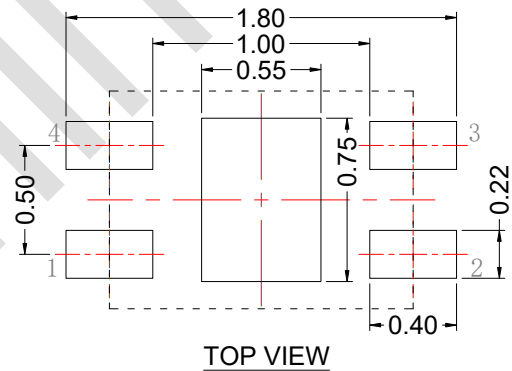


Figure 3: Connection diagram

LAND PATTERN

1. The device routing should be symmetric.
2. Recommended land pattern of PCB is shown in Figure 3.
3. Thickness of stencil should be 0.1mm.

Unit: mm



TOP VIEW

Figure 4: Recommended land pattern

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.

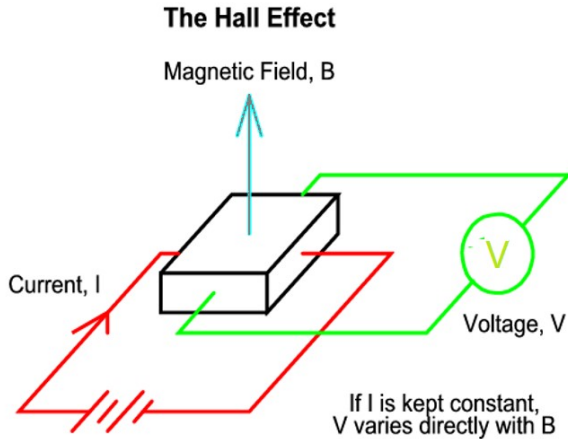


Figure 5: Hall Effect

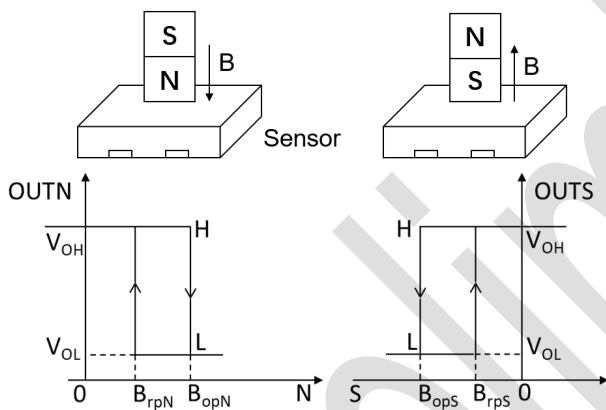


Figure 6: Output signals of OUTN and OUTS pins

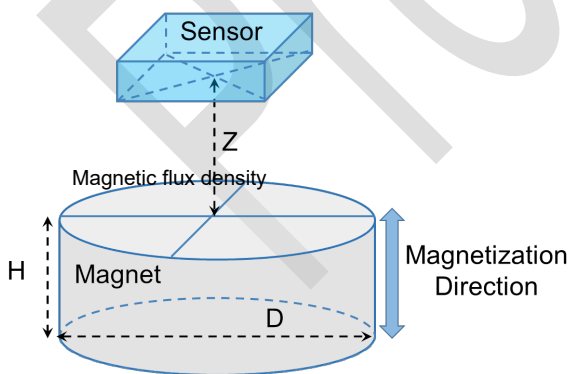


Figure 7: Sensor and magnet

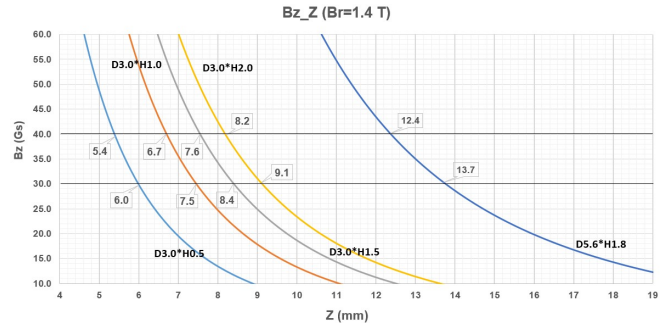


Figure 8: Field by magnet (different size and distance)

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.

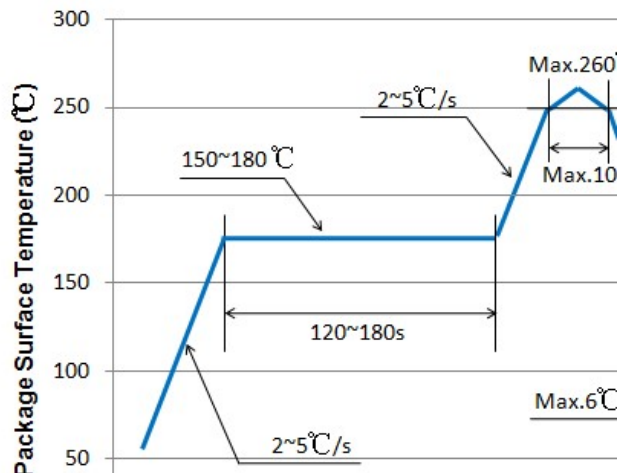


Figure 9: Recommended solder reflow profile

MANUAL SOLDERING

1. Soldering/repairing MHA100 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

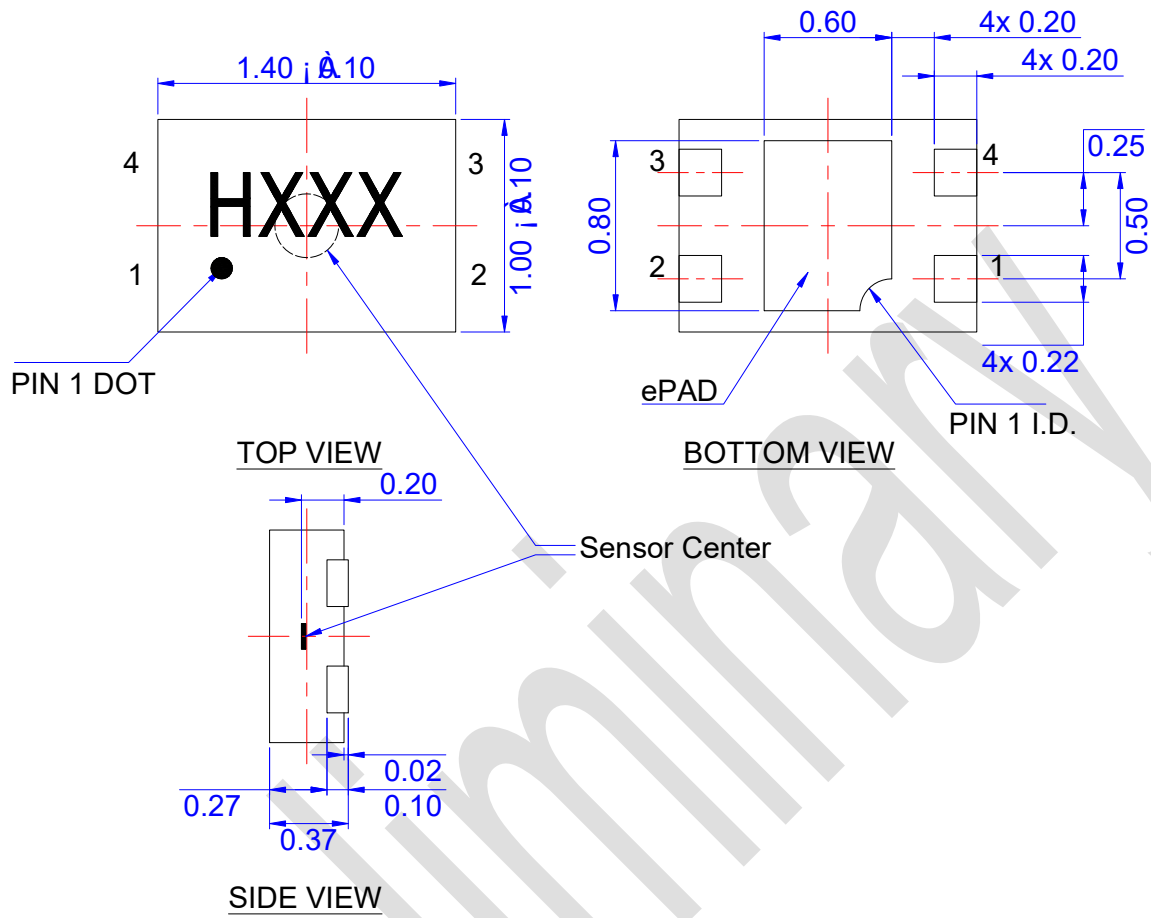


Figure 10: Mechanical package outline dimensions

Notes:

- a) Sensitive area located at the center of package within 0.3mm diameter circle.
- b) ePAD can be tied to the VSS or Floating.
- c) Unless otherwise specified, Tolerances is ± 0.05 mm.

TAPE AND REEL PACKING

Products are put into carrier tape according to marking direction. The quantity for each full reel is 4000pcs per reel with 7" lock reel. Please refer to Figure 6

Details for tape and reel packing as below:

- a) MHA100 tape and reel carriers are in accordance with ANSI/EIA-481
- b) Product pin 1 orientation: Upper Left
- c) Tape and reels are NOT designed to be baked at high temperatures
- d) Each tape and reel is typically dry packed in a moisture barrier bag (MSL1).

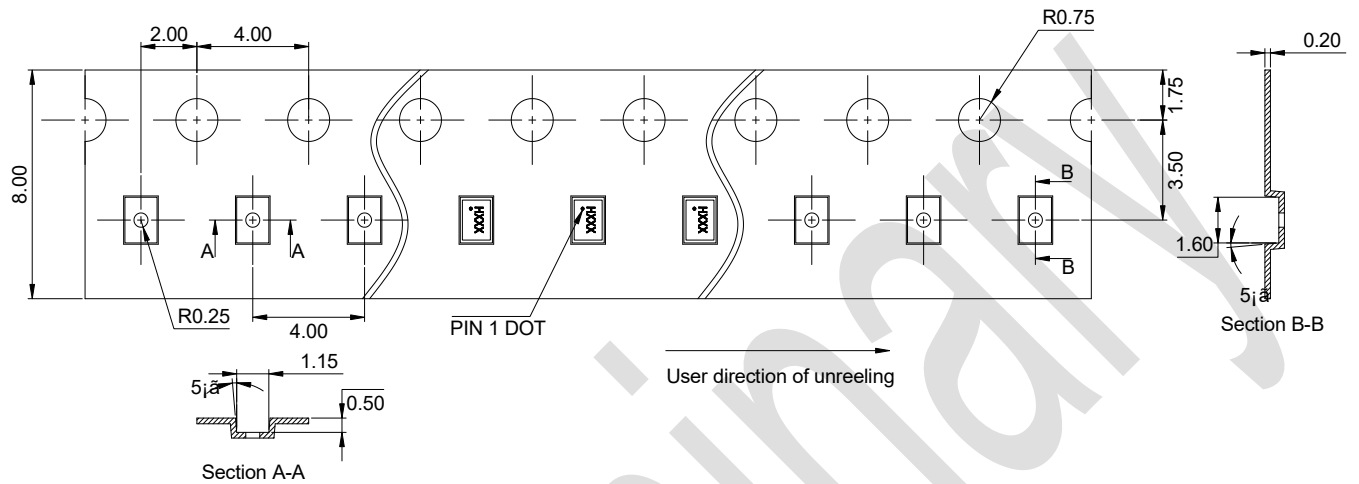


Figure 11: Carrier tape dimension and device orientation