

## AMR3013P AMR Angle Sensor

### Features and Benefits

- Anisotropy of magnetoresistance (AMR) Technology
- Compatible with Wide Range of Supply Voltages
- Wide Airgap Tolerance
- Excellent Thermal Stability
- Very Low Hysteresis
- Compact Package



### Applications

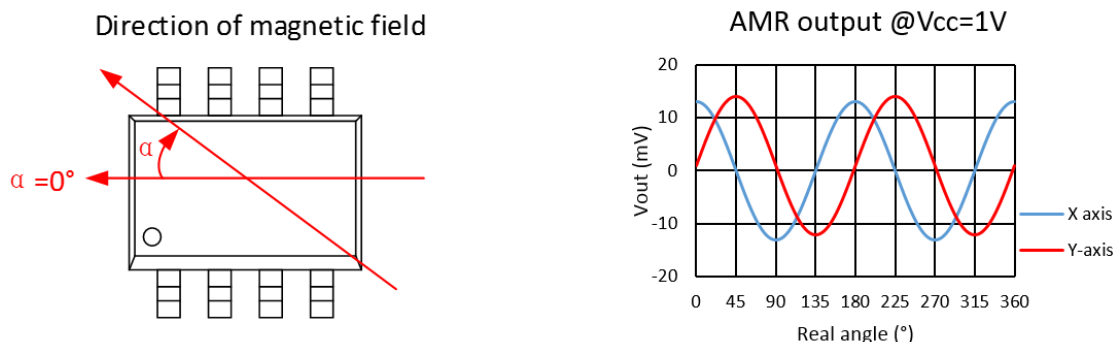
- Rotary Position Sensors
- Rotary Encoders
- Contactless Potentiometers
- Valve Position Sensors
- Knob Position Sensors

### General Description

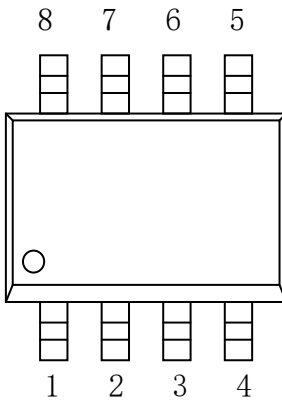
The output voltage of the AMR3013P AMR angle sensor is proportional to the sine or cosine functions of two times of the angle –  $\sin(2\alpha)$  and  $\cos(2\alpha)$  – of a magnetic field applied parallel to the surface of the sensor, which can be provided by a small magnet positioned above the device. The AMR3013P includes two Wheatstone bridges, which can be configured to output sine and cosine functions respectively. Each bridge includes four AMR sensor elements in a push-pull arrangement to produce a peak-to-peak signal at 2.6% of the supply voltage. Additionally, the unique AMR Wheatstone bridge technology accurately compensates the output against changes in ambient temperature. This sensor is assembled in a compact SOP8 package

### Operation

A small magnet, placed above the AMR3013P, can be used to provide a magnetic field in any desired orientation parallel to the plane of the AMR3013P package. The following chart show a typical sensor output as a function of the angle within 0~180° of the applied magnetic field using a 6 mm diameter, 2.5 mm thick magnet and at 1 V supply.



## Pin Out



Pin No.	Pin Name	Pin Function
1	X-	Analog Differential Output2 (direction X)
2	Y-	Analog Differential Output2 (direction Y)
3	VccY	Supply Voltage (direction Y)
4	VccX	Supply Voltage (direction X)
5	X+	Analog Differential Output1 (direction X)
6	Y+	Analog Differential Output1 (direction Y)
7	GNDY	Ground (direction Y)
8	GNDX	Ground (direction X)

## Absolute Maximum Ratings

Parameter	Symbol	Notes	Limit	Unit
Supply Voltage	VCC	TJ=25°C	18	V
Storage Temperature	Tstg	-	-40~150	°C

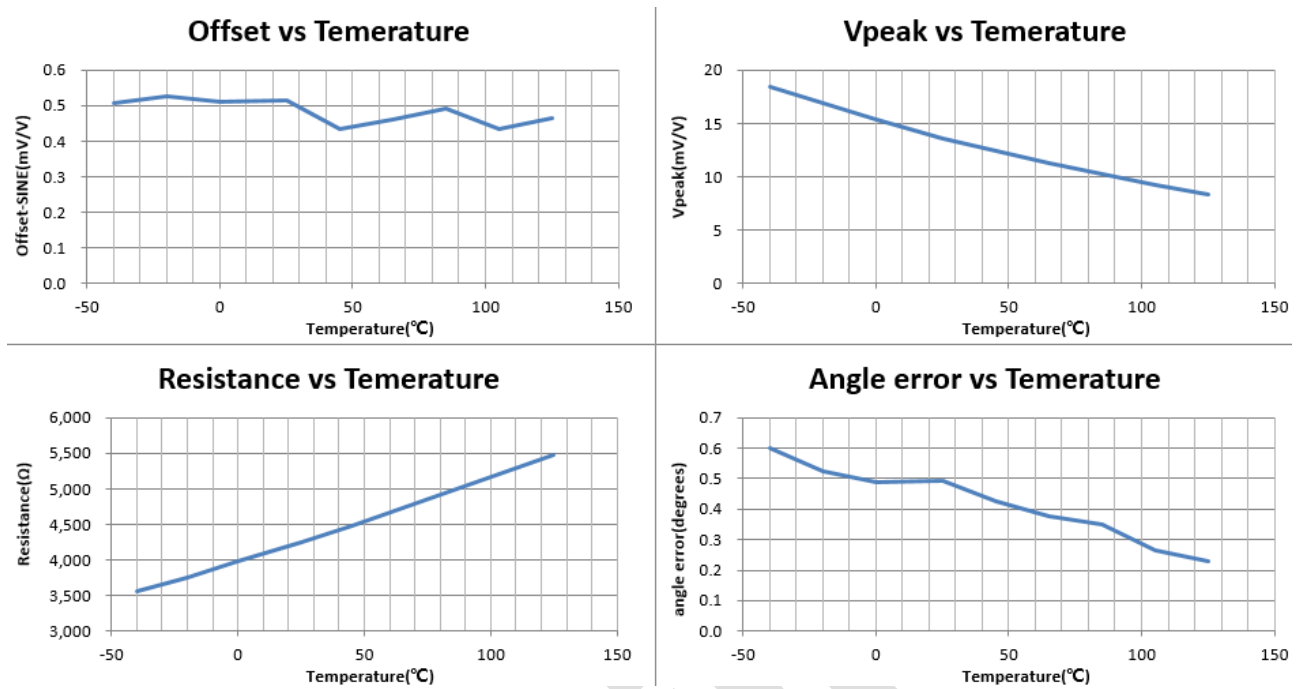
## Specification (Differential Output)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Supply Voltage	VCC	Operating	-	5	18	V
Resistance of Single Bridge	Rbridge	TJ=25°C, H=0 Oe	-	4200	-	Ohm
TC of Resistance	TCR	TJ=-40°C~125°C	-	2700	-	PPM/°C
Offset Voltage	Voffset	TJ=25°C	-2	-	2	mV/V
TC of Offset Voltage	TCO	TJ=-40°C~125°C	-	0.04	-	mV/V/°C
Peak Voltage	Vpeak	TJ=25°C	-	13	-	mV/V
TC of Peak Voltage	TCVpeak	TJ=-40°C~125°C	-	-4500	-	PPM/°C
Angular Inaccuracy	$\Delta\alpha$	0~180°, TJ=25°C H=200 Oe	-	+/-0.1	-	°
Operating Temperature	TA	Operating	-40	-	125	°C
Amplitude Synchronism	k	0~180°, TJ=25°C H=200 Oe	-	99.8	-	%

Notes:

- (1) 1 Oe (Oersted) = 1 Gauss in air = 0.1 millitesla = 79.8 A/m.
- (2) Offset voltage=(Vo(max)-Vo(min))/2
- (3) Peak voltage=|Vo(max)-offset|, Periodicity of Vpeak: sin(2α) and cos(2α), respectively.

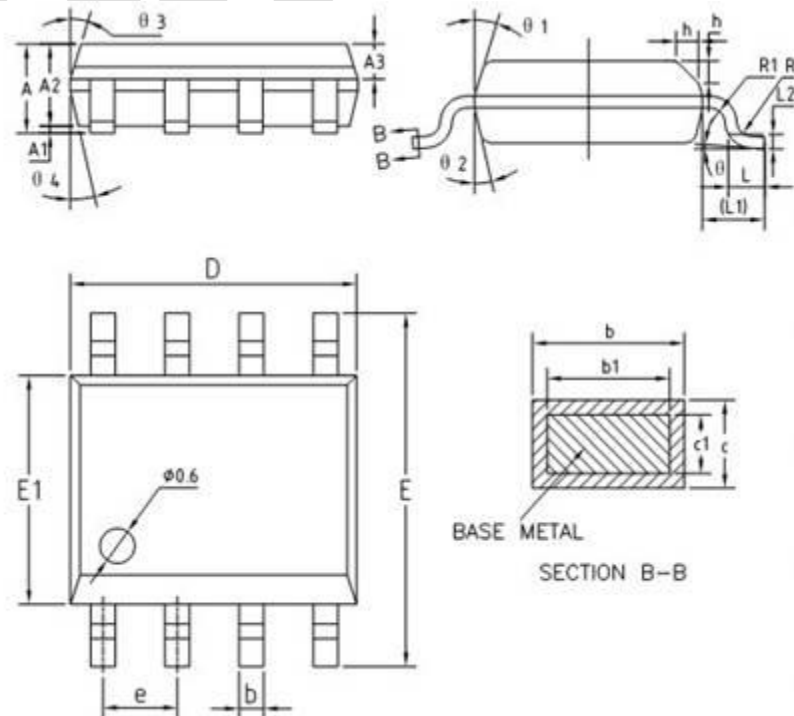
**Characteristic Curves**



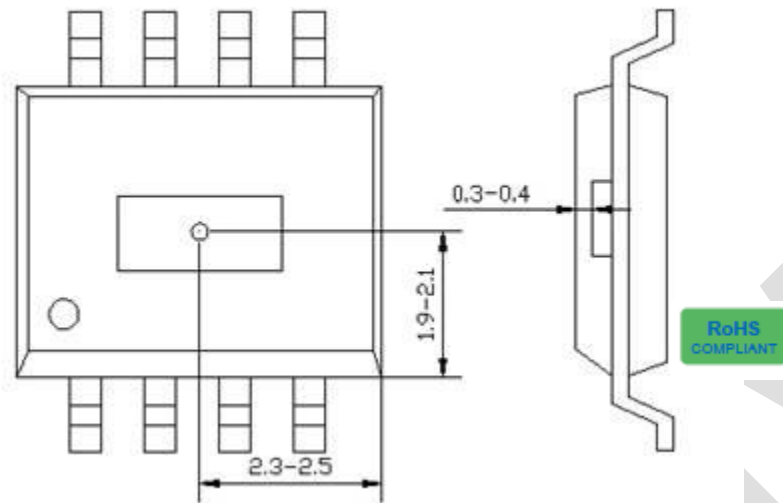
**Package Information**

COMMON DIMENSIONS  
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	1.35	1.55	1.75
A1	0.10	0.15	0.25
A2	1.25	1.40	1.65
A3	0.50	0.60	0.70
b	0.38	-	0.51
b1	0.37	0.42	0.47
c	0.18	-	0.29
c1	0.17	0.20	0.23
D	4.80	4.90	5.00
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e	1.17	1.27	1.37
L	0.45	0.60	0.80
L1	-	1.04REF	-
L2	-	0.25B5C	-
R	0.07	-	-
R1	0.07	-	-
h	0.30	0.40	0.50
θ	0°	-	8°
θ 1	15°	17°	19°
θ 2	11°	13°	15°
θ 3	15°	17°	19°
θ 4	11°	13°	15°



**AMR Sensor Position**



Top view and side view (unit: mm)



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