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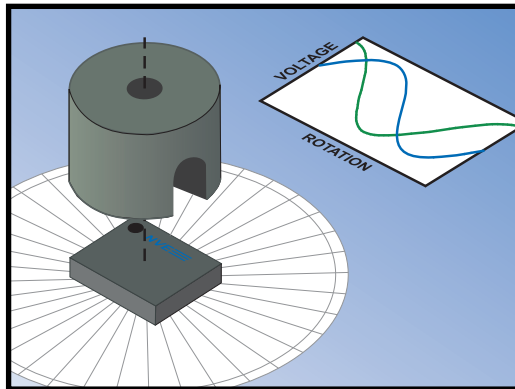
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# AG934-07E AAT101 Full-Bridge Angle Sensor Evaluation Kit



SB-00-065

# Kit Overview

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## Evaluation Kit Features

- AAT101-10E full-bridge angle sensor
- Part # 12426 split-pole Alnico 5 round horseshoe magnet
- Magnet locating fixture

## AAT101-10E Features

- Tunneling Magnetoresistance (TMR) technology
- Full-bridge differential outputs
- 625 k $\Omega$  typical bridge resistance for low power
- 400 mV/V typical output signal
- 1.5% maximum nonsinusoidality error
- Wide sensor-magnet airgap tolerance
- Sine and cosine outputs for direction detection
- Ultraminiature 2.5 mm x 2.5 mm x 0.8 mm TDFN6 package

## AAT-Series Sensor Applications

- Rotary encoders
- Motor shaft position sensors
- Internet-of-Things sensor nodes
- Battery or harvested power

## Available AAT-Series Sensors

Part Number	Configuration	Typ. Output (ea. output; p-p)	Required Field	Typ. Device Resistance
AAT001-10E	Half-bridge	200 mV/V	30 Oe	1.25 M $\Omega$
AAT003-10E	Half-bridge	200 mV/V	30 Oe	40 K $\Omega$
AAT006-10E	Half-bridge	200 mV/V	15 Oe	1.5 M $\Omega$
AAT009-10E	Half-bridge	200 mV/V	30 Oe	6 M $\Omega$
AAT101-10E	Full-bridge	400 mV/V	30 Oe	625 k $\Omega$

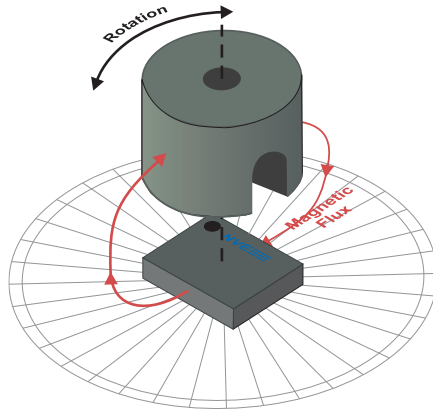
Visit [www.nve.com](http://www.nve.com) for complete product specifications.

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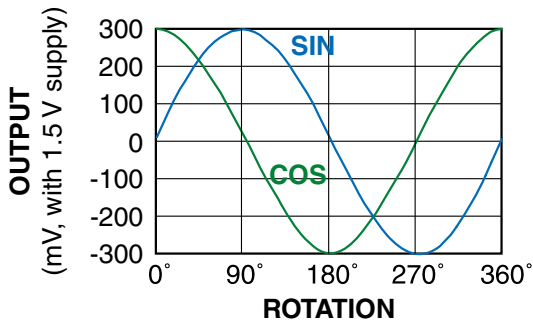
## Quick Start

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- ⇒ Connect  $V_{CC}$  to a power supply (5.5 V maximum) or a battery.
- ⇒ Connect “SIN” and “COS” outputs to meters or differential oscilloscope inputs.
- ⇒ Place the split-pole magnet in the Plexiglas pocket.
- ⇒ Rotate the magnet.



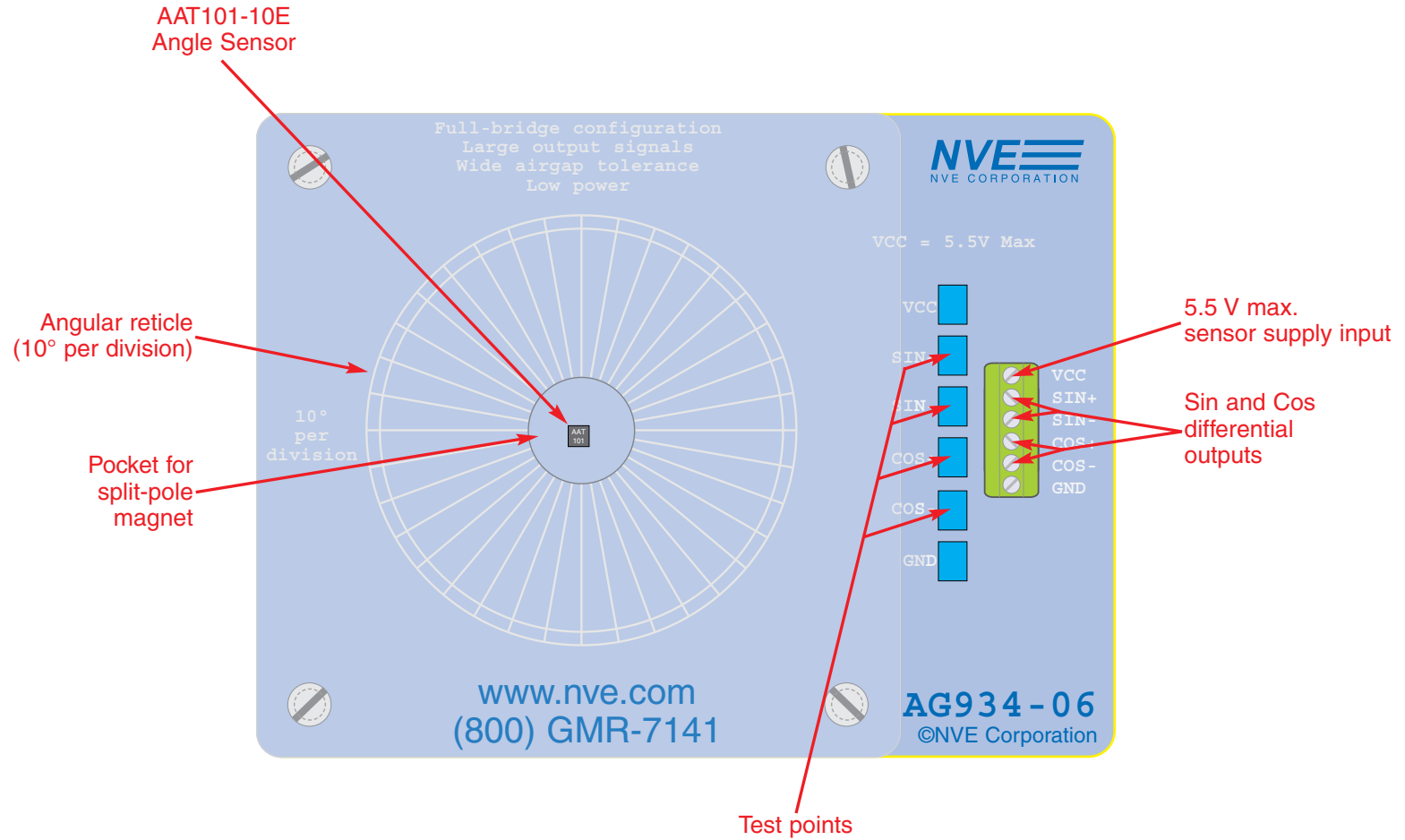
- ⇒ The outputs should be similar to this graph:



The output is insensitive to magnet spacing over a wide range. Signal is lost if the magnet is too far away; if the magnet is too close the outputs will be non-sinusoidal. A relatively large magnet-sensor airgap is possible with the magnet provided with the kit, although smaller magnets will require a smaller gap.

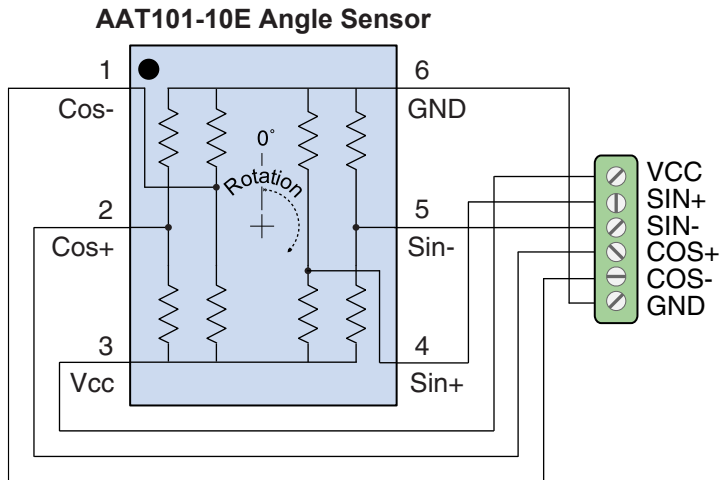
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# Evaluation Board Layout



# PCB Assembly

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**AG934-07E Evaluation Kit schematic.**

The AAT101-10E angle sensor is a low power, full-bridge, high-output magnetic sensor element for position measurements based on a rotating magnetic field.

The PCB assembly provides connections to each of the six sensor pins via test points or screw terminals. The sensor can be powered with up to 5.5 V. Output sensitivity increases proportionately to the sensor supply voltage, as does current consumption.

Sensor outputs can be connected to meters, high-impedance oscilloscope inputs, or high input impedance external circuitry.

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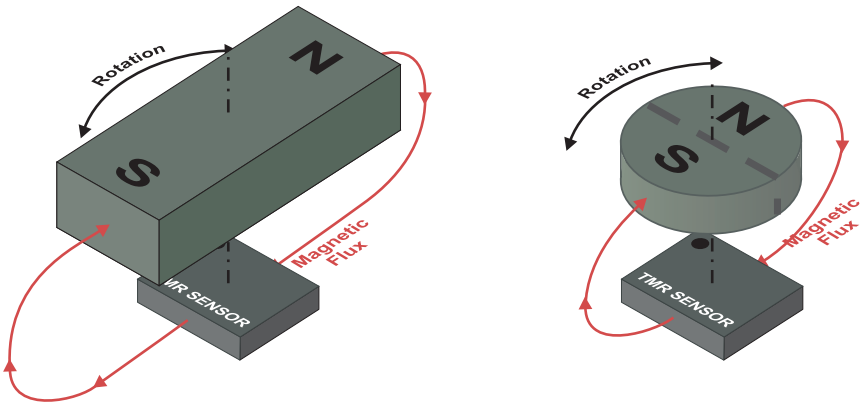


# Principles of Operation

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The heart of AAT101 sensors is eight unique Tunneling Magnetoresistance (TMR) elements. Each of the eight sensor elements contains two magnetic layers: a “pinned,” or fixed direction layer; and a movable-direction, or “free” layer. The elements are configured as two four-element full bridges. The two bridges are 90° out of phase to provide quadrature outputs. TMR technology enables low power and miniaturization, making the sensors ideal for battery operation.

In a typical configuration, an external magnet provides a saturating magnetic field in the plane of the sensor, as illustrated below for a bar magnet and a radially-magnetized disk magnet:



As the field rotates, half of the elements increase in resistance and half decrease. This ensures that each bridge resistance, the total device resistance, and the output impedances remain constant with rotation.

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Manual No.: SB-00-065