

ADV001 Latching Bipolar Digital Switches

Features:

- Latching bipolar operation (south field ON, north field OFF)
- Extremely low operate points for high sensitivity and wide airgaps
- Digital switch output
- MSOP8 and TDFN6 packages

Description:

The ADV001 is a GMR Digital Switch™ product using a unique bipolar output GMR material. This material allows a sensor with a negative (south pole) operate point and a positive (north pole) release point.

The sensor can provide two travel limits with a single sensor, or be used with alternating north / south pole magnetic encoders.

The sensor is extremely sensitive with typical operate/release points of ± 4 oersteds. Operate points are also extremely stable over a temperature range of -40°C to $+125^{\circ}\text{C}$. The high sensitivity and excellent temperature stability give the ADV001 better airgap performance and switching precision than other products. The output is on/off current-sinking. The IC is available in an MSOP8 (part number ADV001-00E) or 2.5 mm x 2.5 mm TDFN6 package (part number ADV001-10E).

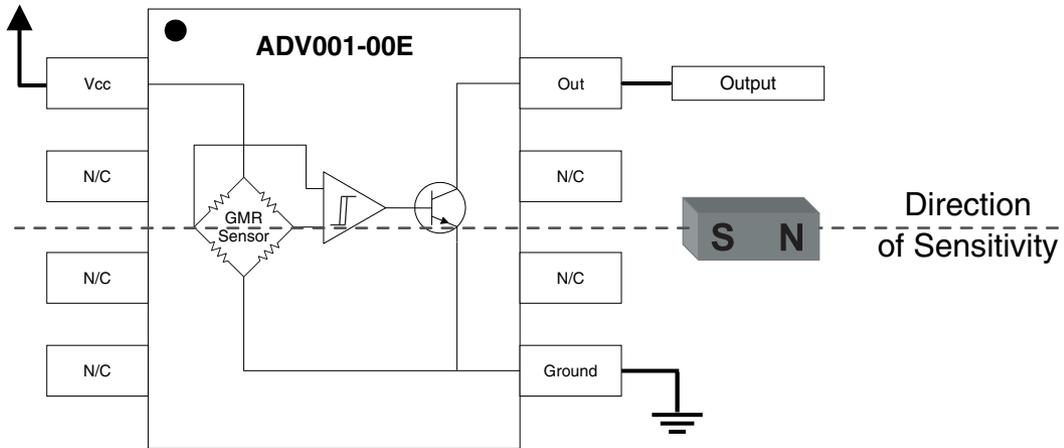
The following specifications are valid over all operating voltage and temperature ranges:

| Parameter | Min. | Typ. | Max. | Units |
|--|------|------|------|--------------------|
| Magnetic Operate Point ¹ | -10 | -4 | 0 | Oersteds |
| Magnetic Release Point ¹ | 0 | 4 | 10 | Oersteds |
| Operate/Release Differential | 2 | | 12 | Oersteds |
| Off-Axis Field | | | 250 | Oersteds |
| Operating Supply Voltage (V_{CC}) | 4.5 | | 30 | Volts |
| Quiescent Supply Current ($V_{CC} = 12\text{ V}$) | 2.5 | | 4.5 | mA |
| Output Drive Current | 0 | | 20 | mA |
| V_{OL} ($V_{CC} \geq 5\text{ V}$; 20 mA output sink current ²) | | | 0.4 | Volts |
| Frequency Response | 100 | | | KHz |
| Temperature Range of Operation | -40 | | 125 | $^{\circ}\text{C}$ |

Notes:

1. V_{OL} at $V_{CC} = 4.5\text{ V}$ may exceed 0.4 V.
2. 1 Oe (Oersted) = 1 Gauss in air = 0.1 mT.

Functional Block Diagram and Pinout



Operation

The magnetic field should be applied in the plane of the IC package in the direction of sensitivity (the cross-axis direction). The output is open collector, so an external pull-up resistor is required. The output is configured for pull-down when “ON.”

The charts below show the response of the ADV001 bipolar sensor compared to typical sensors, which are “omnipolar”:

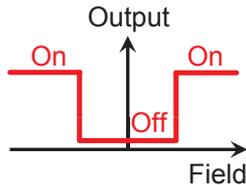


Figure 1a: Typical magnetic switch.

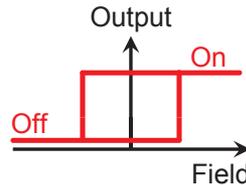
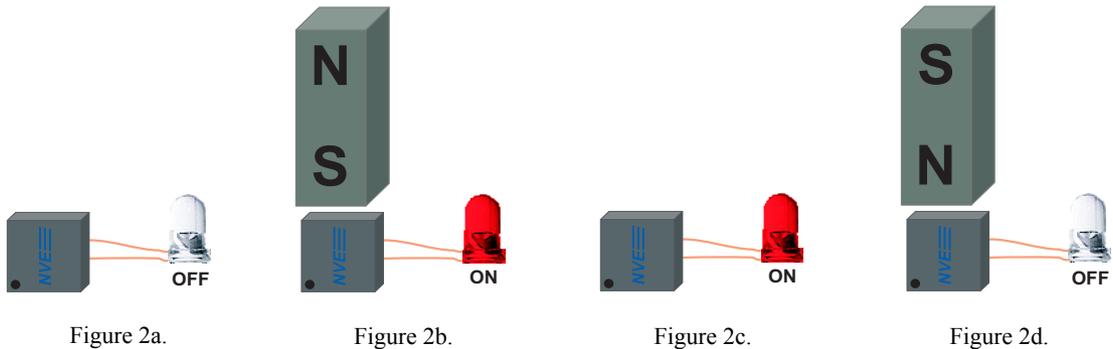


Figure 1b: ADV001 bipolar magnetic sensor.

The following figures illustrate the sensor's operation:



A south magnetic field on the pin 8 side of the part (or a north field on the pin 1 side) turns the sensor on (Figure 2b). The output remains latched on (Figure 2c) until an opposite field is applied (Figure 2d).

Typical Applications

Ring-magnet encoder

As illustrated in Fig. 3a, ADV001 sensors are ideal to detect the alternating north and south poles of a ring-magnet. Because of their extraordinary sensitivity, the sensors can be positioned a large distance from the ring magnet.

Linear actuator with two travel limits

ADV001 sensors can provide two travel limits with a single sensor, by positioning a north magnet pole at one limit, and a south pole at the other as illustrated below. The sensor output toggles at each limit, and can be used to set the direction of a reciprocating linear actuator as shown in Fig. 3b.

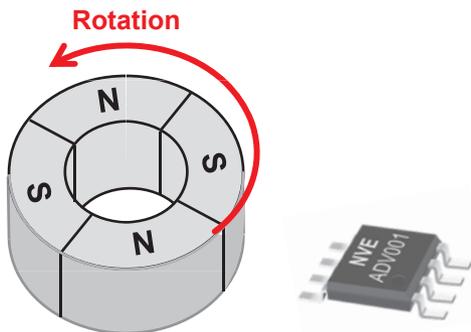


Figure 3a. Ring-magnet encoder.

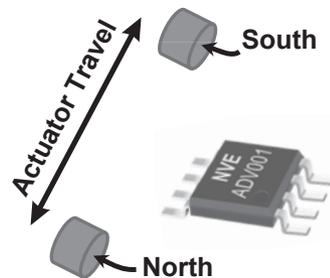
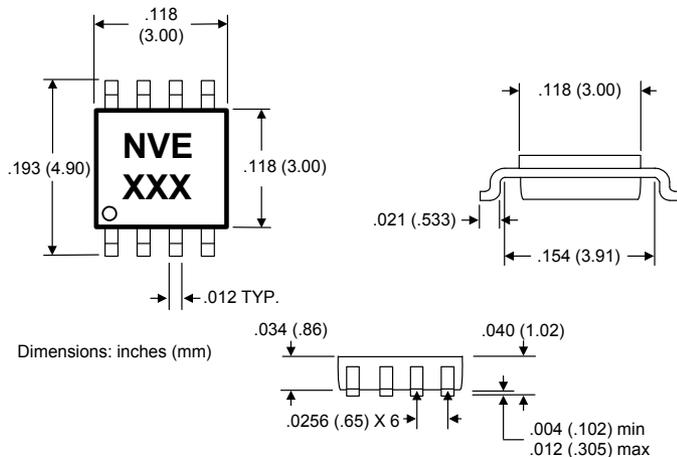


Figure 3b. Linear actuator with two travel limits.

Package Drawings and Specifications

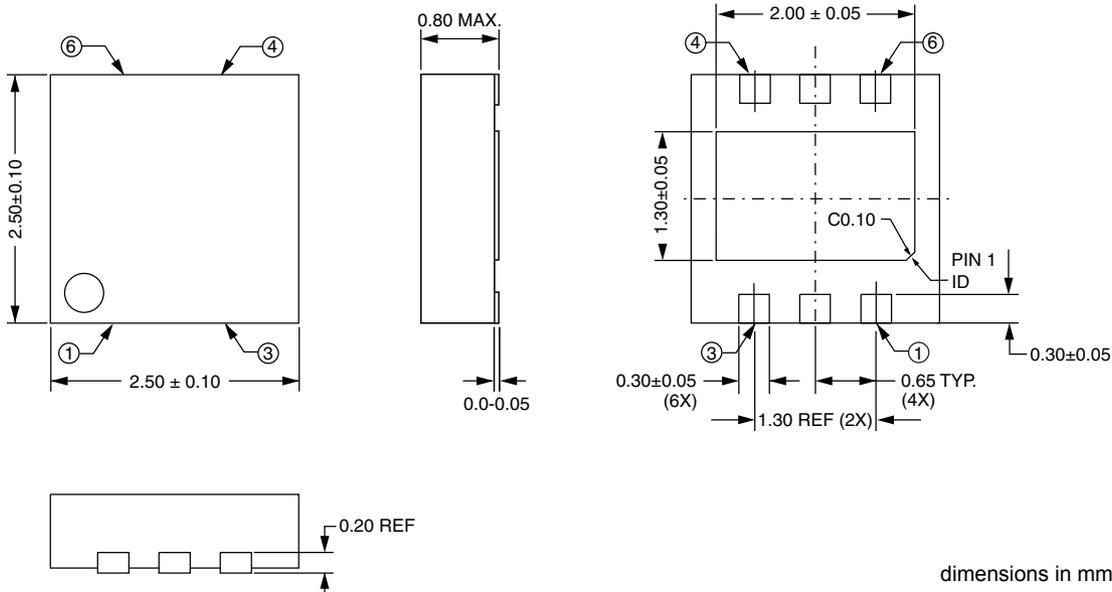
MSOP8 (ADV001-00E)



Notes:

1. The MSOP8 package has thermal power dissipation of 320°C/Watt in free air.
2. Thermal performance is improved when the package is soldered to a circuit board.

2.5 mm x 2.5 mm TDFN6 (ADV001-10E)



Notes:

1. The TDFN6 package has thermal power dissipation of 320°C/Watt in free air.
2. Thermal performance is improved when the package is soldered to a circuit board.

| Pinout | Package | |
|-----------------|-----------------------|-----------------------|
| | MSOP8 (ADV001-00E) | TDFN6 (ADV001-10E) |
| V _{CC} | Pin 1 | Pin 1 |
| Ground | Pin 5 | Pin 4 |
| Out | Pin 8 | Pin 6 |

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SB-00-016
March 2016

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