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°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:

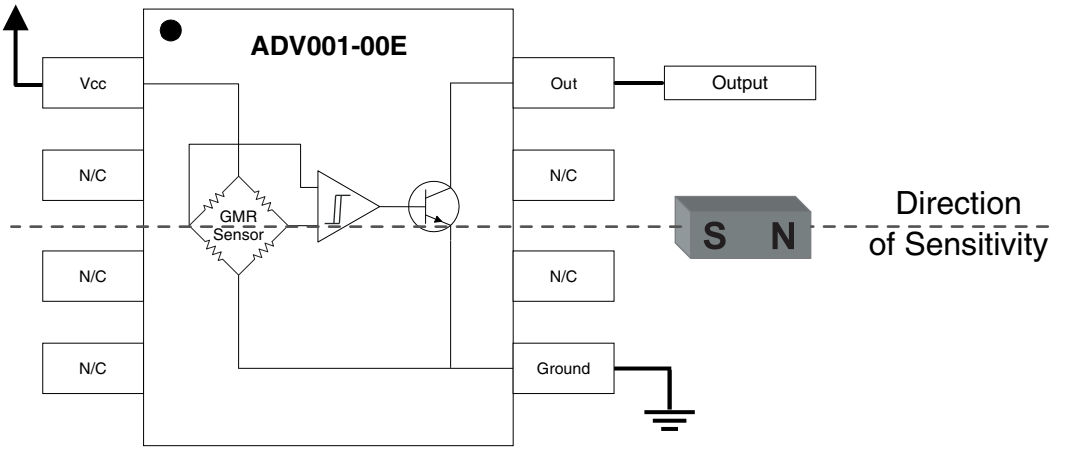
Parameter	Min.	Typ.	Max.	Units
Magnetic Operate Point[1]	−10	−4	0	Oersteds
Magnetic Release Point[1]	0	4	10	Oersteds
Operate/Release Differential	2		12	Oersteds
Off-Axis Field			250	Oersteds
Operating Supply Voltage (V_{CC})	4.5		30	Volts
Quiescent Supply Current (V_{CC} = 12 V)	2.5		4.5	mA
Output Drive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

Notes:

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

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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":

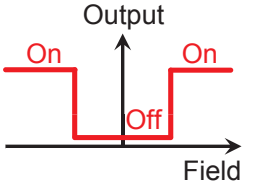


Figure 1a: Typical magnetic switch.

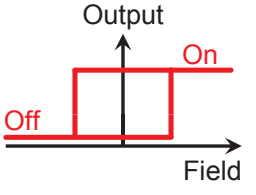


Figure 1b: ADV001 bipolar magnetic sensor.

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The following figures illustrate the sensor's operation:

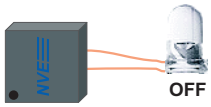


Figure 2a.

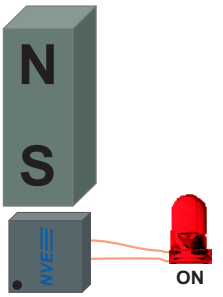


Figure 2b.

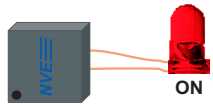


Figure 2c.

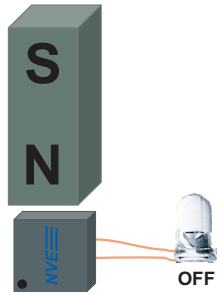


Figure 2d.

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 position 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.

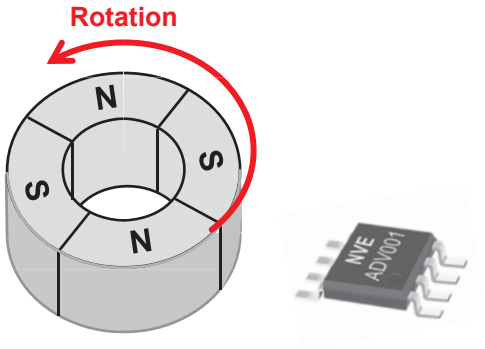


Figure 3a. Ring-magnet encoder.

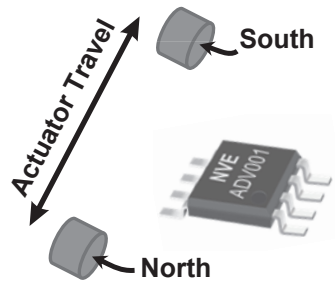
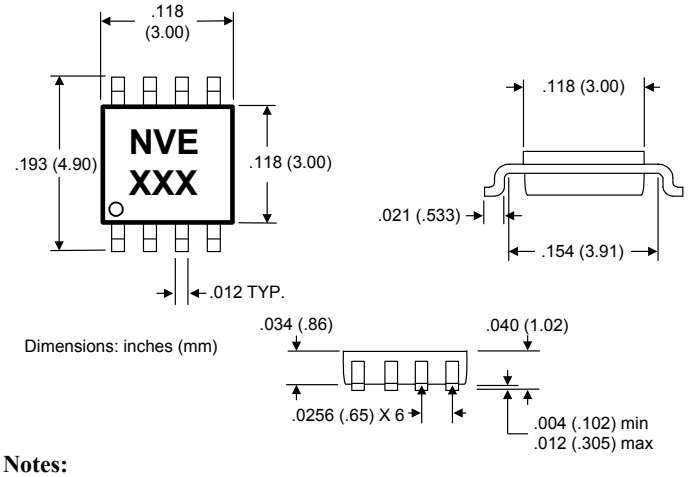


Figure 3b. Linear actuator with two travel limits.

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Package Drawings and Specifications

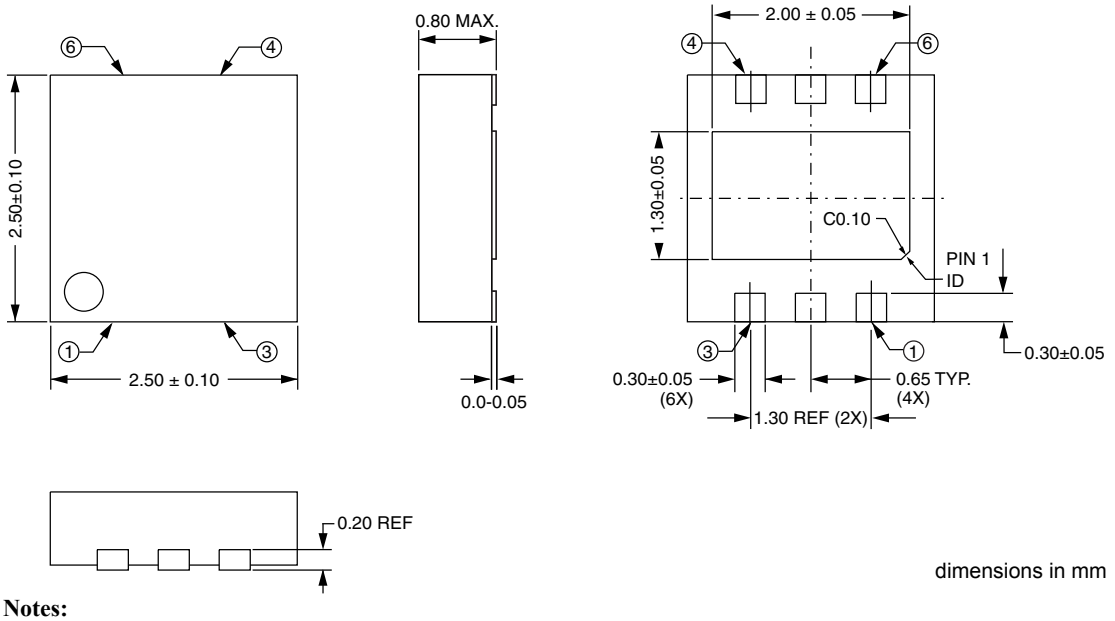
MSOP8 (ADV001-00E)



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)



dimensions in mm

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.

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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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