

## VF526DT

### Bipolar Latch, Dual Hall-effect Digital Position Sensor with Speed and Direction Outputs



#### DESCRIPTION

The VF526DT Bipolar Latch, Dual Hall-effect Digital Position Sensor has two distinct Hall sensing elements precisely located 1,4 mm [0.055 in] apart on a single integrated circuit chip. The elements are encapsulated in a thermoset molding material.

The two active Hall latches provide speed and direction indication of a magnetic gradient (such as a rotating ring magnet) across the face of the package.

The miniature, 4-pin SOT-89B package surface mounts on PC (Printed Circuit) boards and flexible circuits.

#### FEATURES AND BENEFITS

- Temperature-compensated magnetics and ultra-low offset drift with temperature provides a stable output over a full temperature range of -40 °C to 125 °C [-40 °F to 257 °F].
- Single, miniature 4-pin SOT-89B plastic package supplied on tape and reel for automated assembly, allowing potential savings in PC board space and labor cost.
- Two separate built-in Hall sensors and their associated logic circuitry provide a frequency signal for speed output and a logic level (high or low) signal for direction output, potentially replacing multiple sensors and electronic components.
- Wide operating voltage range of 3.4 Vdc to 24 Vdc increases application flexibility.
- Tested to moisture sensitivity similar to JEDEC J-STD-020B, MSL Level 1, allowing the VF526DT to be used in environments where humidity may be a problem.
- RoHS-compliant materials meet Directive 2002/95/EC.

The VF526DT's built-in temperature compensation is designed to match the temperature coefficient of low-cost magnets, allowing for a reliable, yet cost-effective, sensor-magnet combination.

A unique, regulator circuit provides extremely stable operation with supply voltages from 3.4 Vdc to 24 Vdc. It can directly interface with many electronic components without buffering or compensation circuitry.

#### POTENTIAL APPLICATIONS

##### Transportation

- Anti-pinch electric motor control systems for:
  - power windows
  - power seats (headrest)
  - power sliding doors
  - sunroofs
- Magnetic encoding for electronic steering systems

##### Industrial


- Motion control systems for pulleys and belts
- Garage door openers and sliding doors
- Position and velocity detection in industrial equipment
- Linear displacement sensing (using a magnetic strip of alternating poles)

# VF526DT

**Table 1. Absolute Maximum Ratings<sup>1</sup>**

| Characteristic   | Sym. | Min.      | Max.      | Unit    |
|--|------|-----------|-----------|---------|
| Supply voltage   | Vcc  | -0.5      | 30        | V       |
| Output voltage (OFF)                                   | Vout | -0.5      | 30        | V       |
| Output ON current                                      | Iout | –         | 10        | mA      |
| Storage temperature                                    | Ts   | -65 [-85] | 160 [320] | °C [°F] |
| Operating temperature                                  | T    | -40 [-40] | 150 [302] | °C [°F] |
| ESD:<br>IEC 801-2, Lev 1<br>MIL-STD-883, Method 3015.7 | ESD  | 2<br>4    | –<br>–    | KV      |
| Magnetic flux  |      | no limit  |           | –       |

Note 1: Absolute maximum ratings are the extreme limits that the device will withstand without damage to the device. However, the electrical and mechanical characteristics are not guaranteed as the maximum limits (above recommended operating conditions) are approached, nor will the device necessarily operate at absolute maximum ratings.

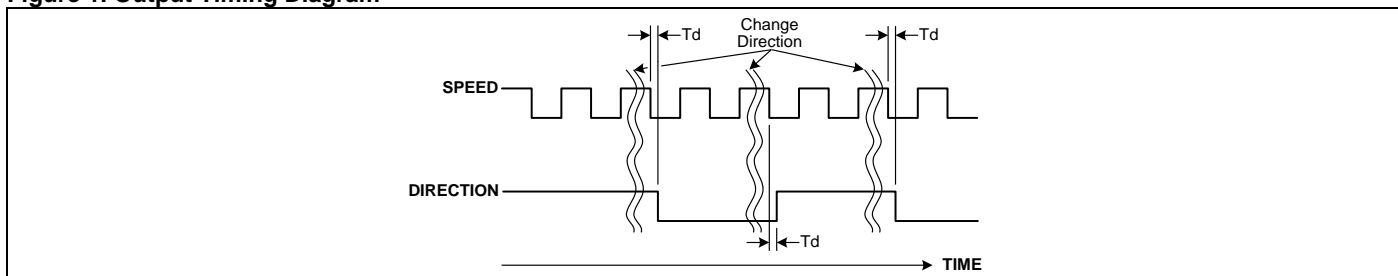


**ESD SENSITIVITY:  
CLASS 3**

**Table 2. Specifications**

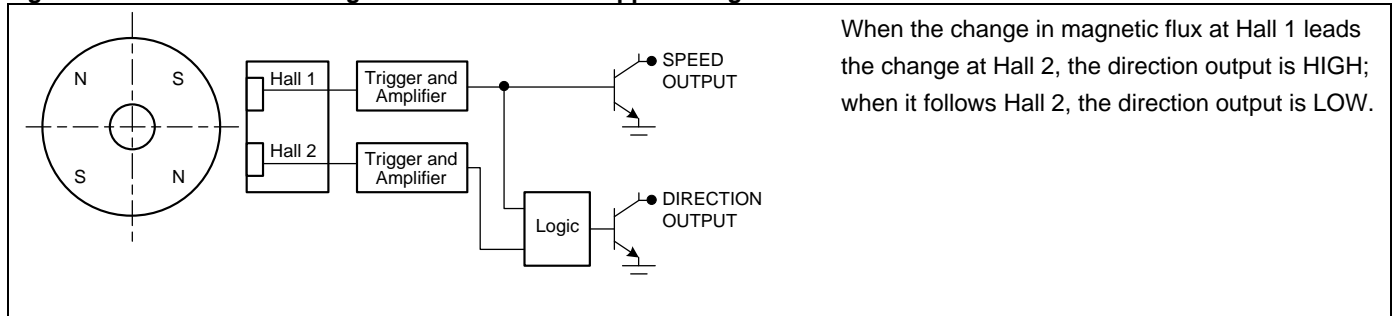
| Characteristic                | Sym.  | Condition  | Min.      | Typ.      | Max.      | Unit      |
|-------------------------------|-------|--|-----------|-----------|-----------|-----------|
| Magnetic actuation type       |       | bipolar latch  |           |           |           |           |
| Output type                   |       | dual open collector, sinking<br>(speed and direction)      |           |           |           |           |
| Supply voltage                | Vcc   | –  | 3.4       | –         | 24        | Vdc       |
| Operating temperature         | Temp  | Vcc = 3.4 V to 24 V  | -40 [-40] | –         | 125 [257] | °C [°F]   |
| Supply current (OFF)          | Ioff  | Vcc = 24 V, -40 °C < T < 125 °C,<br>Vout = 24 V, B<MIN REL | –         | –         | 12        | mA        |
| Supply current (ON)           | Ion   | Vcc = 24 V, -40 °C < T < 125 °C,<br>Isink = 5 mA, B<MAX OP | –         | –         | 14        | mA        |
| Load current                  | Isink | Vcc = 24 V, -40 °C < T < 125 °C,<br>Isink = 5 mA, B<MAX OP | –         | –         | 5         | mA        |
| Output saturation             | Vsat  | Vcc = 24 V, -40 °C < T < 125 °C,<br>Isink = 5 mA, B<MAX OP | –         | –         | 0.4       | V         |
| Circuit speed to direct delay | Td    | Vcc = 12 V, RL = 1.6 kOhm, CL = 20 pF                      | –         | –         | 5         | µs        |
| Rise time                     | Tr    | Vcc = 12 V, RL = 1.6 kOhm, CL = 20 pF                      | –         | –         | 1.5       | µs        |
| Fall time                     | Tf    | Vcc = 12 V, RL = 1.6 kOhm, CL = 20 pF                      | –         | –         | 1.5       | µs        |
| Frequency                     | Top   | Vcc = 12 V, RL = 1.6 kOhm, CL = 20 pF                      | <1        | –         | >1000     | Hz        |
| Operate point                 | Bop   | T = 25 °C<br>-40 °C < T < 125 °C                           | –<br>60   | 130<br>–  | –<br>200  | Gaus<br>s |
| Release point                 | Brel  | T = 25 °C<br>-40 °C < T < 125 °C                           | –<br>-60  | -130<br>– | –<br>-200 | Gaus<br>s |
| Differential (OP-REL)         | Diff  | T = 25 °C<br>-40 °C < T < 125 °C                           | –<br>200  | 260<br>–  | –<br>320  | Gaus<br>s |
| Symmetry ([OP +REL]/2)        | Sym   | T = 25 °C<br>-40 °C < T < 125 °C                           | –<br>-65  | 0<br>–    | –<br>65   | Gaus<br>s |
| Package style                 |       | SOT-89B  |           |           |           |           |
| Moisture sensitivity test     |       | similar to JEDEC J-STD-020B, MSL Level 1                   |           |           |           |           |
| Package quantity              |       | available in 1000/tape and reel                            |           |           |           |           |

**Figure 1. Output Timing Diagram**

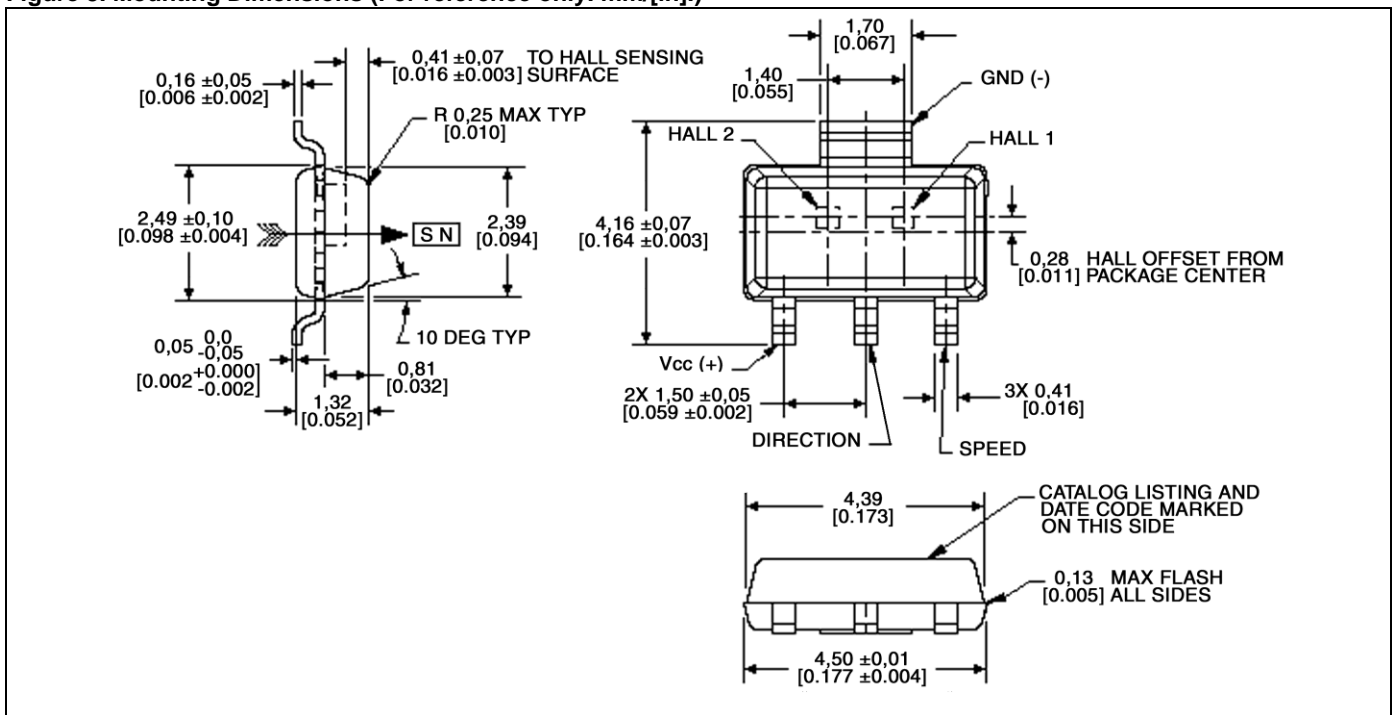


# Bipolar Latch, Dual Hall-effect Digital Position Sensor with Speed and Direction Outputs

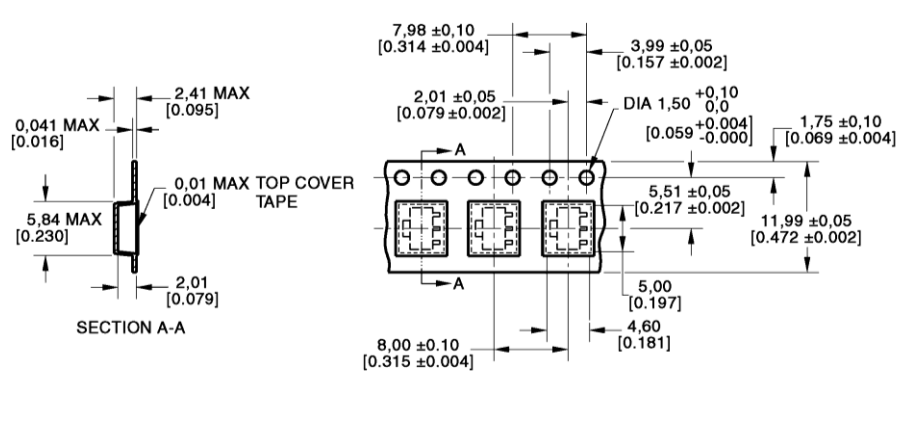
**Figure 2. Sensor Function Diagram with Customer-Supplied Magnet**



**Figure 3. Mounting Dimensions (For reference only. mm/[in.])**



**Tape**



**Solder Pad**

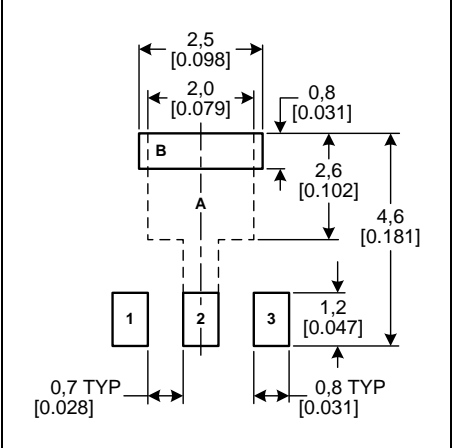
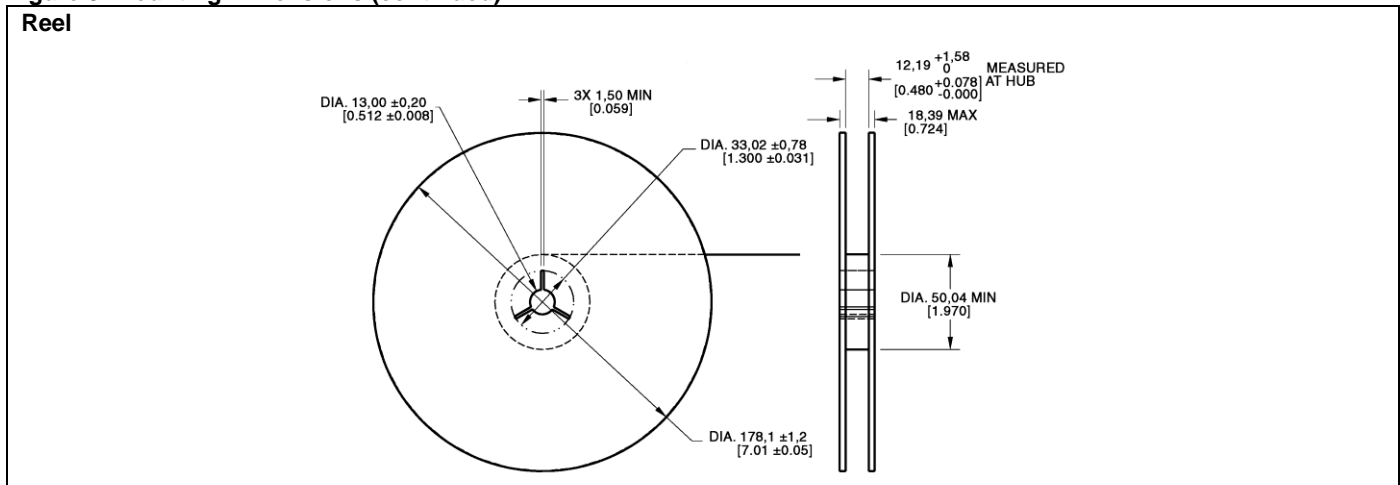


Figure 3. Mounting Dimensions (continued)



Order Guide

| Catalog Listing | Description  |
|-----------------|--|
| VF526DT         | Bipolar latch, dual hall-effect digital position sensor with speed and direction outputs, on tape and reel (1000 pcs per reel) |

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- Complete installation, operation, and maintenance information is provided in the instructions supplied with each product.

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