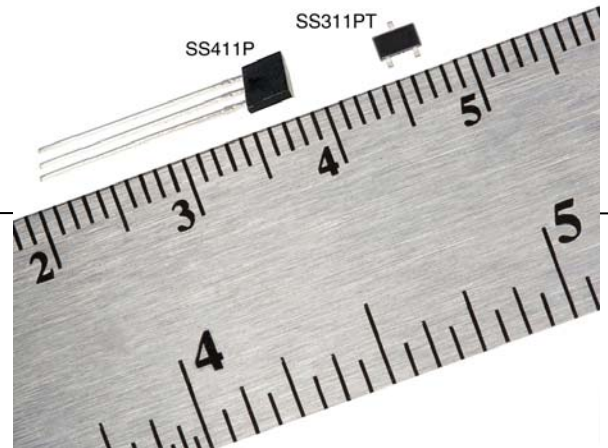


## SS311PT/SS411P

### Bipolar Hall-effect Digital Position Sensors with Built-in Pull-up Resistor



#### DESCRIPTION

The SS311PT/SS411P sensors are small, versatile digital Hall-effect devices that are operated by the magnetic field from a permanent magnet or an electromagnet, designed to respond to alternating North and South poles.

These bipolar sensors have enhanced sensitivity which allows for the use of smaller, often less expensive magnets. The internal pull-up resistor often eliminates the need for external components, further helping to reduce system cost. These economical bipolar sensors are suited for many simple, high-volume, cost-sensitive, rotary sensing applications.

#### FEATURES

- Subminiature, SOT-23 surface mount package (SS311PT) supplied on tape and reel allows for a compact design with automated component placement, helping to reduce manufacturing costs
- Small, leaded, flat TO-92 package (SS411P) often allows for more space on the PCB
- Sensitive, bipolar magnetics respond to alternating North and South poles, making these products suited for speed sensing and RPM measurement
- Built-in pull-up resistor can easily interface with common electronic circuits without adding external components, helping to reduce total system cost
- RoHS-compliant materials meet Directive 002/95/EC

The 2.7 Vdc to 7 Vdc supply voltage range allows this device to be used in low voltage applications. The S311PT's very small size requires less PCB (printed circuit board) space, allowing it to be used in smaller assemblies.

These sensors are available in two package styles: the SS311PT in the subminiature SOT-23 surface mount package and the SS411P in the leaded, flat TO-92-style package.

The SS311PT is available on tape and reel (3000 units per reel); the SS411P is available in a bulk package (1000 units per bag).

#### POTENTIAL APPLICATIONS

Transportation:

- Speed and RPM (revolutions per minute) sensing
- Tachometer, counter pickup
- Motor and fan control
- Brushless dc motor control

Industrial and Commercial:

- Speed and RPM (revolutions per minute) sensing
- Tachometer, counter pickup
- Flow-rate sensing
- Brushless dc (direct current) motor commutation
- Motor and fan control
- Robotics control

# SS311PT/SS411P

**Table 1. SS311PT/SS411P Specifications (At 2.7 Vdc to 7 Vdc supply, 4 mA load,  $T_A = -40\text{ }^\circ\text{C}$  to  $150\text{ }^\circ\text{C}$  [-40 °F to 302 °F])**

| Characteristic         | Condition                                      | Minimum   | Typical | Maximum   | Unit    |
|------------------------|--|-----------|---------|-----------|---------|
| Supply voltage         | -40 °C to 150 °C [-40 °F to 302 °F]            | 2.7       | 5.0     | 7.0       | Vdc     |
| Supply current         | gauss <-140, $V_s = 5\text{ V}$ , 25 °C [77°F] | –         | 5.5     | –         | mA      |
|                        | -40 °C to 150 °C [-40 °F to 302 °F]            | –         | –       | 14        |         |
| Output current         | –  | –         | –       | 4.0       | mA      |
| Vsat                   | gauss >140                                     | –         | –       | 0.4       | V       |
| Output leakage current | gauss <-140                                    | –         | –       | 10        | μA      |
| Output rise time       | 25 °C [77 °F]                                  | –         | –       | 1.5       | μs      |
| Output fall time       |  | –         | –       | 1.5       |         |
| Thermal resistance:    | –  | –         | 303     | –         | °C/W    |
|                        | SS311PT  | –         | 233     | –         |         |
| Operate                | -40 °C to 150 °C [-40 °F to 302 °F]            | -30       | 55      | 140       | gauss   |
| Release                | -40 °C to 150 °C [-40 °F to 302 °F]            | -140      | -55     | 30        | gauss   |
| Differential           | -40 °C to 150 °C [-40 °F to 302 °F]            | 40        | –       | –         | gauss   |
| Operating temperature  | –  | -40 [-40] | –       | 150 [302] | °C [°F] |
| Storage temperature    | –  | -40 [-40] | –       | 150 [302] | °C [°F] |

## NOTICE

Bipolar Hall-effect sensors may have an initial output in either the ON or OFF state if powered up with an applied magnetic field in the differential zone (applied magnetic field >Brp and <Bop). Honeywell recommends allowing 10 μs for output voltage to stabilize after supply voltage has reached 5 Vdc.

**Table 2. SS311PT/SS411P Absolute Maximum Ratings<sup>1</sup>**

| Characteristic         | Minimum | Typical | Maximum  | Unit  |
|------------------------|---------|---------|----------|-------|
| Supply voltage         | -0.5    | –       | 7.0      | Vdc   |
| Applied output voltage | -0.5    | –       | 7.0      | Vdc   |
| Output current         | –       | –       | 8.0      | mA    |
| Magnetic flux          | –       | –       | no limit | gauss |

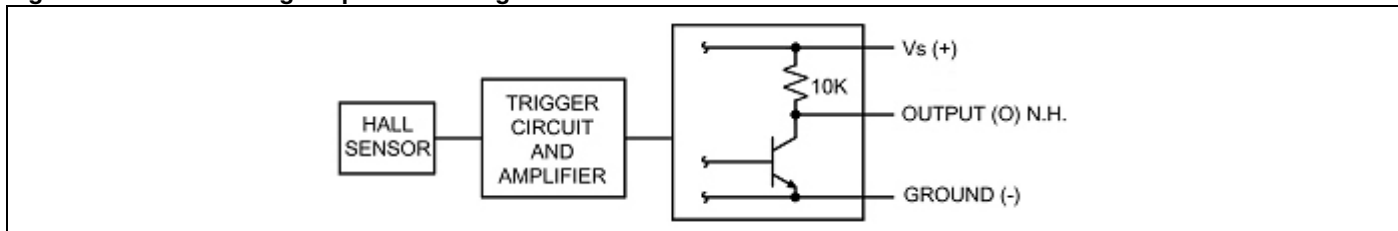
**Note 1:** The magnetic field strength (gauss) required to cause the switch to change state (operate and release) will be as specified in the magnetic characteristics. To test the switch against the specified magnetic characteristics, the switch must be placed in a uniform magnetic field.

## NOTICE

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.



**Figure 1. Current Sinking Output Block Diagram**



# Bipolar Hall-Effect Digital Position Sensors

Figure 2. SS311PT Mounting/Tape and Reel Dimensions (For reference only. mm/[in])

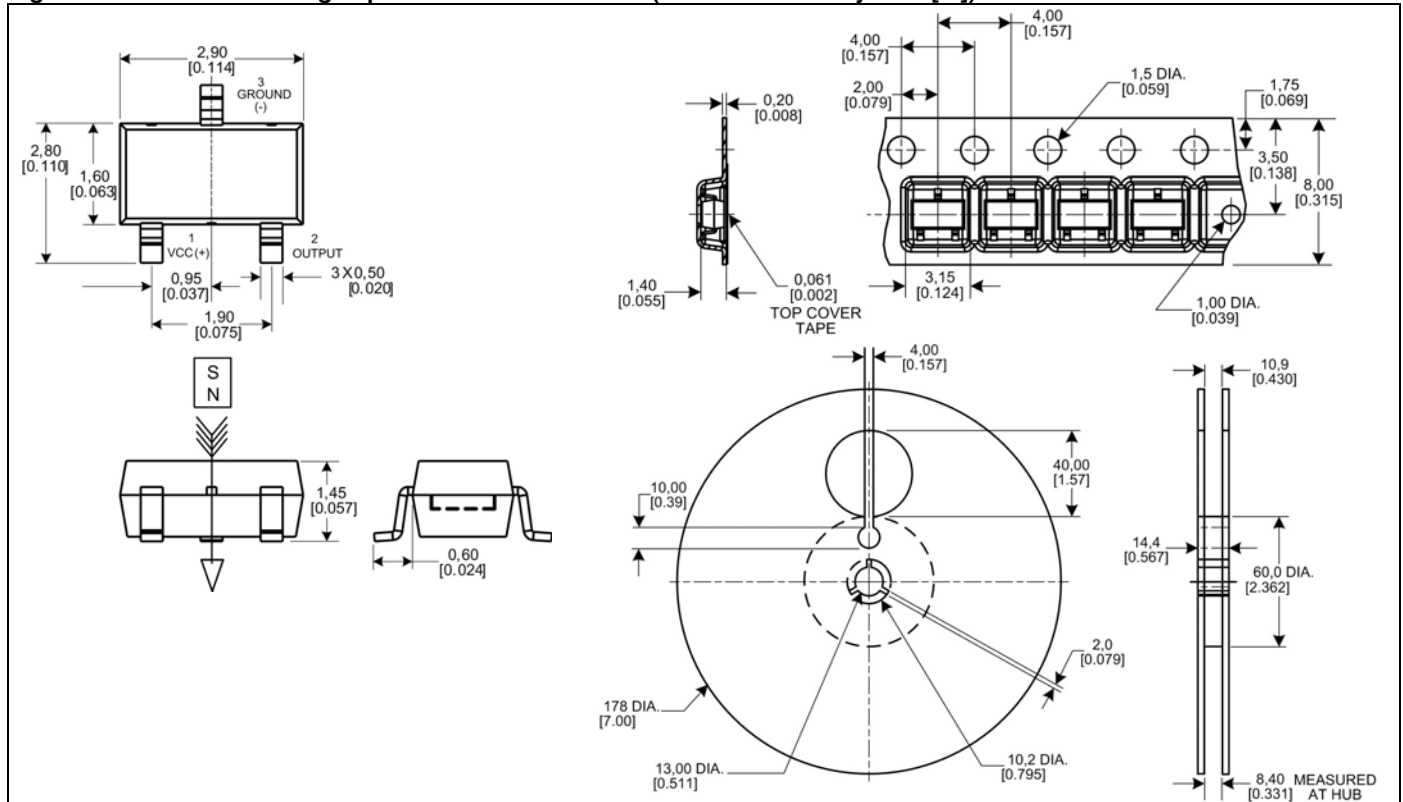
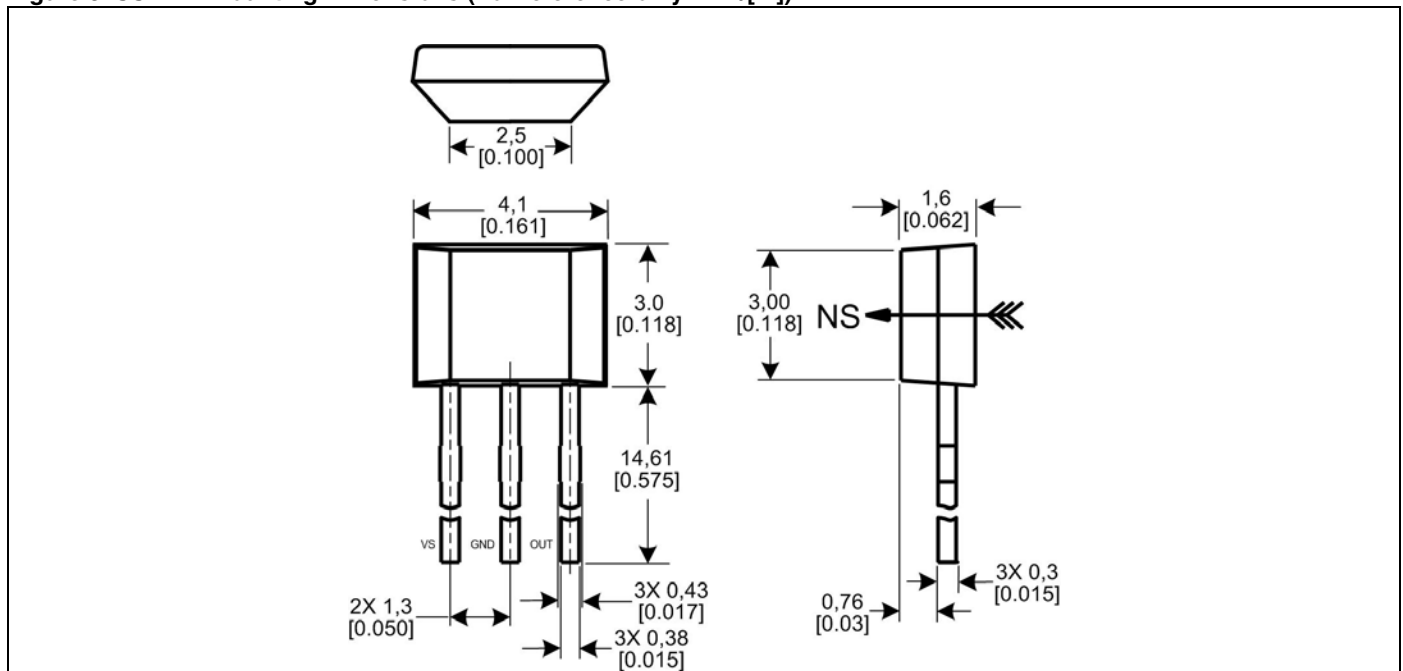


Figure 3. SS411P Mounting Dimensions (For reference only. mm/[in])



## Order Guide

| Catalog Listing | Description   |
|-----------------|---|
| SS311PT         | Bipolar Hall-effect digital position sensor with built-in pull-up resistor, SOT-23 package, tape and reel packaging (3000 units per reel) |
| SS411P          | Bipolar Hall-effect digital position sensor with built-in pull-up resistor, flat TO-92 package, bulk packaging (1000 units per bag)       |

### WARNING

#### MISUSE OF DOCUMENTATION

- The information presented in this product sheet is for reference only. Do not use this document as a product installation guide.
- Complete installation, operation, and maintenance information is provided in the instructions supplied with each product.

**Failure to comply with these instructions could result in death or serious injury.**

#### WARRANTY/REMEDY

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Honeywell's standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgement or consult your local sales office for specific warranty details. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, at its option, without charge those items it finds defective. **The foregoing is buyer's sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose. In no event shall Honeywell be liable for consequential, special, or indirect damages.**

While we provide application assistance personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

### WARNING

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DO NOT USE these products as safety or emergency stop devices or in any other application where failure of the product could result in personal injury.

**Failure to comply with these instructions could result in death or serious injury.**

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