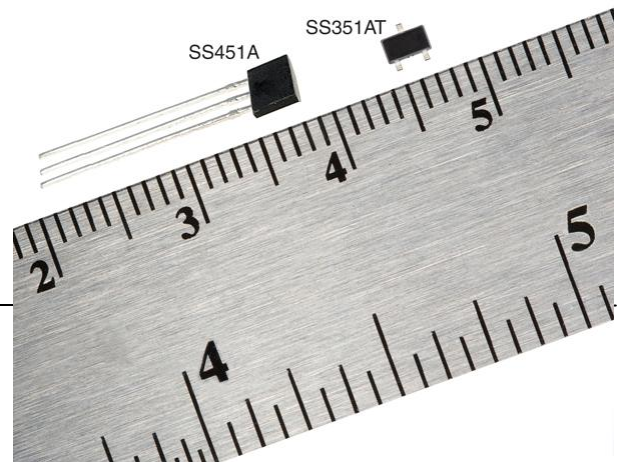


## SS351AT/SS451A

### Omnipolar Hall-effect Digital Position Sensors



#### DESCRIPTION

The SS351AT and SS451A sensors are small, versatile digital Hall-effect devices that are operated by the magnetic field from a permanent magnet or an electromagnet. They are designed to respond to either a North pole or a South pole.

These omnipolar sensors are sensitive and flexible devices designed to meet a wide range of potential applications. The SS351AT and SS451A have a typical operating point of 85 G at 25 °C [77 °F]. Because they can be operated by a North pole or a South pole, they do not require the magnet polarity to be identified, thus making the installation easier and potentially reducing the system cost.

#### FEATURES

- Subminiature package size (SS351AT) supplied on tape and reel allows for a compact design with automated component placement, helping to reduce manufacturing costs
- Simple activation from a North pole or a South pole and sensitive magnetics make this omnipolar product suitable in a variety of potential motion control, lid closure detection, and displacement sensing applications
- Low voltage 3 Vdc capability helps reduce power consumption
- Built-in reverse polarity protection protects the device from potential damage during installation
- Thermally balanced integrated circuit provides for stable operation over a wide temperature range of -40° to 150 °C [-40 °F to 302 °F]
- RoHS-compliant materials meet Directive 2002/95/EC

These sensors are available in two package styles. The SS351AT is available in the subminiature SOT-23 surface mount package; the SS451A is available in the leaded, flat TO-92-style package. The SS351AT's small size requires less PC board space, allowing it to be used in smaller assemblies. Its 3 Vdc capability allows for use in low voltage applications, promoting energy efficiency.

The SS351AT is available on tape and reel (3000 units per reel); the SS451A is available in a bulk package (1000 units per bag).

#### POTENTIAL APPLICATIONS

##### Commercial:

- Speed and RPM (revolutions per minute) sensing in fitness equipment
- Magnetic encoder for building access
- Damper or valve position control in HVAC (heating, ventilation and air conditioning) equipment
- Flow rate sensing in appliances and water softeners
- Printer head position sensing

##### Industrial:

- Flow rate sensing in industrial processes
- Robotic control (cylinder position monitoring)
- Float-based fluid level sensing

##### Medical:

- Displacement sensor in hospital beds and medical equipment
- Medication bin monitor on portable drug carts

# SS351AT/SS451A

**Table 1. SS351AT/SS451A Specifications (At Vs=3.0 Vdc to 24 Vdc, 20 mA load, TA = -40 °C to 150 °C [-40 °F to 257 °F])**

| Characteristic                                          | Condition                                                        | Minimum     | Typical         | Maximum     | Unit    |
|---------------------------------------------------------|------------------------------------------------------------------|-------------|-----------------|-------------|---------|
| Supply voltage <sup>1</sup> :                           |                                                                  |             |                 |             |         |
| SS451A                                                  | -40 °C to 150 °C [-40 °F to 302 °F]                              | 3           | –               | 24          | Vdc     |
| SS351AT                                                 | -40 °C to 125 °C [-40 °F to 257 °F]                              | 3           | –               | 24          |         |
| SS351AT                                                 | 150 °C [302 °F]                                                  | 3           | –               | 12          |         |
| Supply current                                          | Vsupply = 5 V at 25 °C [77 °F]<br>Vsupply = 3 V at 25 °C [77 °F] | –<br>–<br>– | 4.5<br>3.5<br>– | 6<br>5<br>9 | mA      |
| Output Current                                          | –                                                                | –           | –               | 20.0        | mA      |
| Vsat                                                    | at 20 mA, gauss > Bop positive<br>or gauss < Bop negative        | –           | –               | 0.4         | V       |
| Output leakage current                                  | gauss > Bop+ or < Bop-                                           | –           | –               | 10          | µA      |
| Output switching time:<br>rise<br>fall                  | Vsupply = 12 V at 25 °C [77 °F],<br>RL = 1.6 KOhm, CL = 20 pF    | –<br>–      | –<br>–          | 1.5<br>1.5  | µs      |
| Thermal resistance:                                     |                                                                  |             |                 |             |         |
| SS451A                                                  | –                                                                | –           | 233             | –           | °C/W    |
| SS351AT                                                 | –                                                                | –           | 303             | –           |         |
| SS351AT/SS451A:<br>Operate positive<br>Operate negative | –                                                                | 35<br>-135  | 85<br>-85       | 135<br>-35  | gauss   |
| SS351AT/SS451A:<br>Release positive<br>Release negative | –                                                                | 10<br>-120  | 50<br>-50       | 120<br>-10  | gauss   |
| SS351AT/SS451A<br>Differential                          | –                                                                | 5           | 35              | 80          | gauss   |
| Operating temperature                                   | –                                                                | -40 [-40]   | –               | 150 [302]   | °C [°F] |
| Storage temperature                                     | –                                                                | -40 [-40]   | –               | 150 [302]   | °C [°F] |

**Note 1:** See Figure 1.

**Table 2. SS351AT/SS451A Absolute Maximum Ratings<sup>1</sup>**

| Characteristic         | Minimum | Typical | Maximum  | Unit  |
|------------------------|---------|---------|----------|-------|
| Supply voltage         | -28.0   | –       | 28.0     | V     |
| Applied output voltage | -0.5    | –       | 28.0     | V     |
| Output current         | –       | –       | 20       | mA    |
| Magnetic flux          | –       | –       | no limit | gauss |

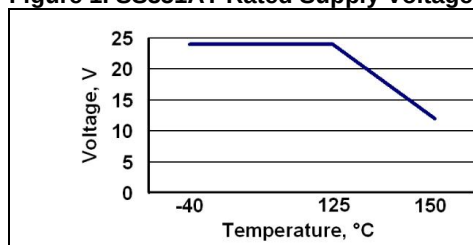
**Note 1:** The magnetic field strength (gauss) required to cause the switch to change state (operate and release) will be as specified in the magnetic characteristics. To test the switch against the specified magnetic characteristics, the switch must be placed in a uniform magnetic field.

## NOTICE

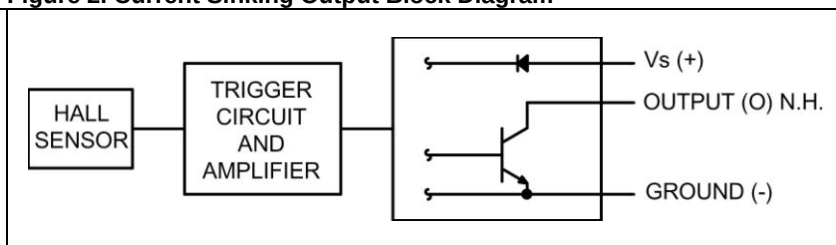
Absolute maximum ratings are the extreme limits that the device will withstand without damage to the device. However, the electrical and mechanical characteristics are not guaranteed as the maximum limits (above recommended operating conditions) are approached, nor will the device necessarily operate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



**Figure 1. SS351AT Rated Supply Voltage**



**Figure 2. Current Sinking Output Block Diagram**



# Omnipolar Hall-Effect Digital Position Sensors

Figure 3. Typical SS351AT/SS451A Magnetic Performance vs Temperature

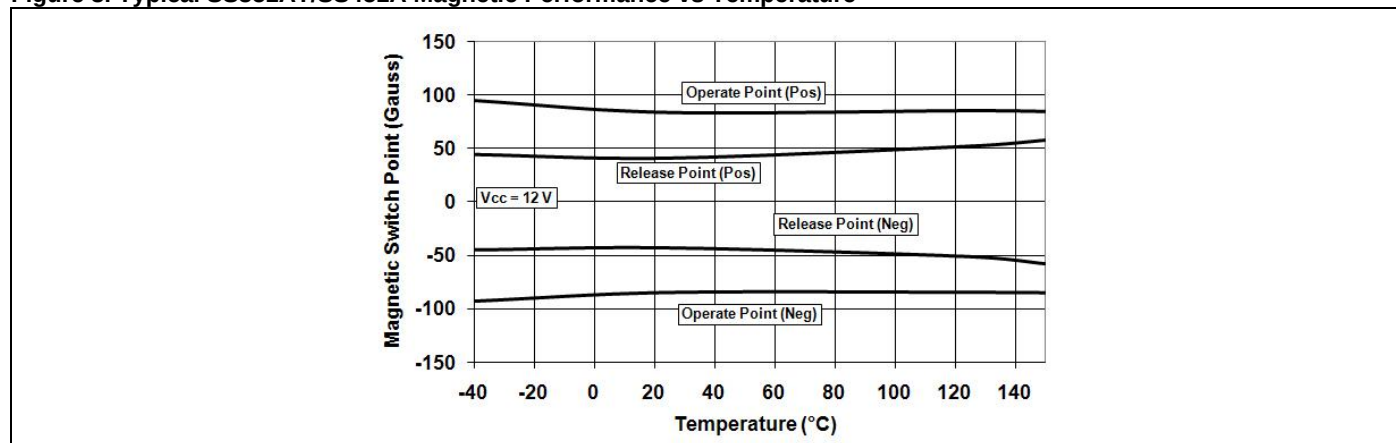


Figure 4. Wiring Diagrams

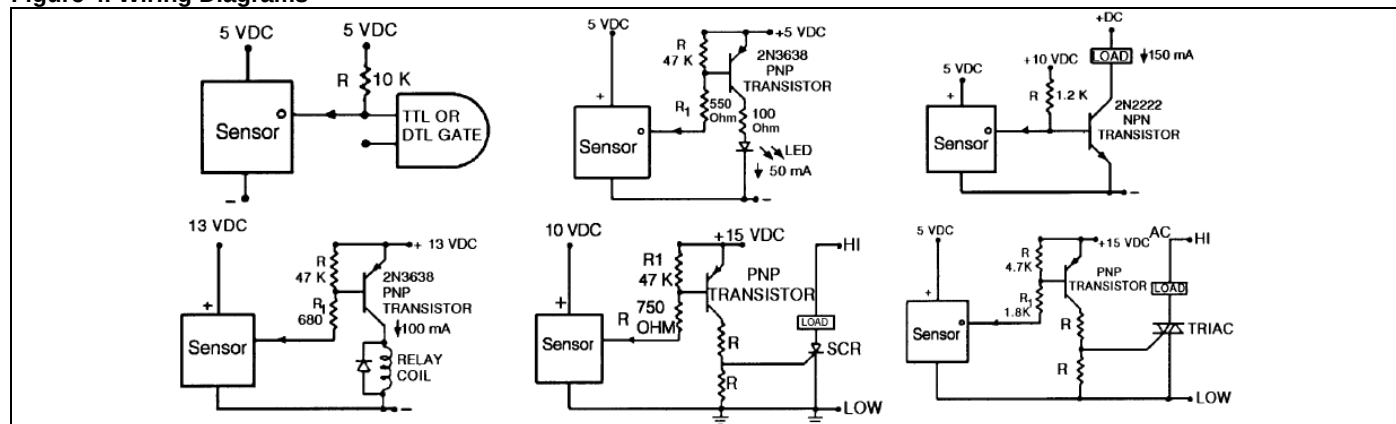
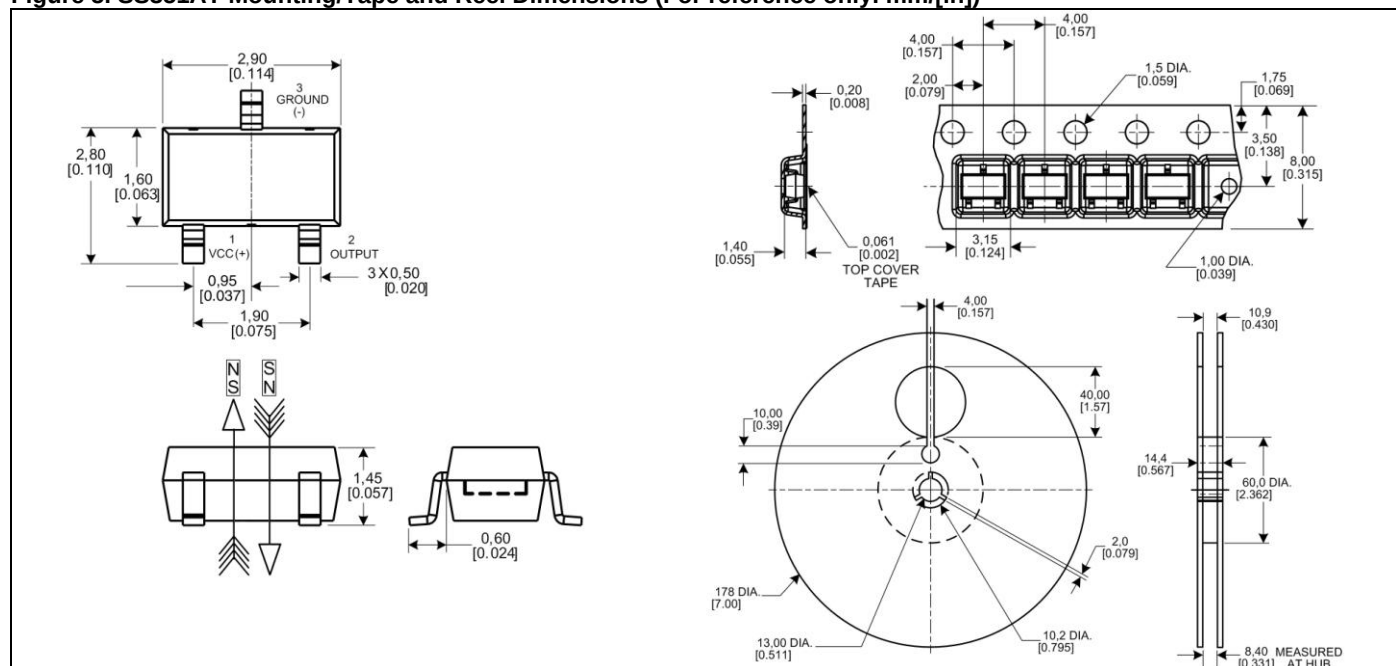
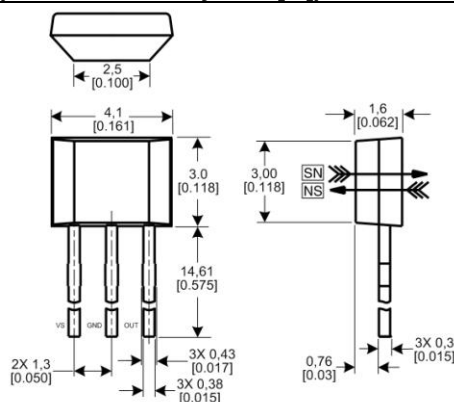


Figure 5. SS351AT Mounting/Tape and Reel Dimensions (For reference only. mm/[in])



**Figure 6. SS451A Mounting Dimensions (For reference only. mm/[in])**



## Order Guide

| Catalog Listing | Description                                                                                                   |
|-----------------|---------------------------------------------------------------------------------------------------------------|
| SS351AT         | Omnipolar, Hall-effect digital position sensor, SOT-23 package, tape and reel packaging (3000 units per reel) |
| SS451A          | Omnipolar, Hall-effect digital position sensor, flat TO-92 package, bulk packaging (1000 units per bag)       |

## ! WARNING

### PERSONAL INJURY

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.**

## WARRANTY/REMEDY

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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

### 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.**

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