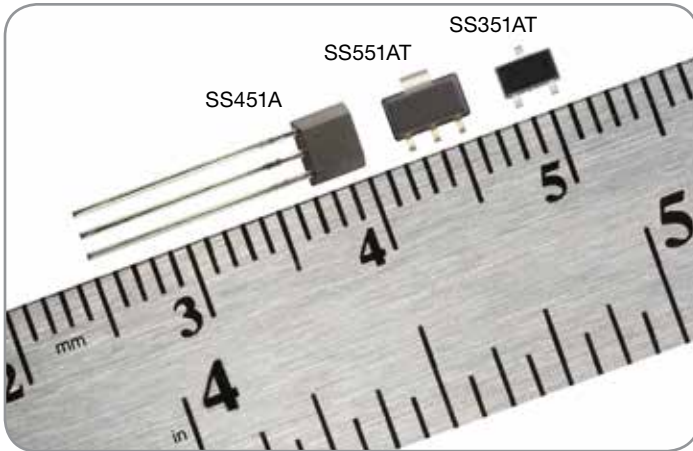


## Omnipolar Digital Hall-effect Sensor ICs: SS351AT, SS451A, SS551AT

005917  
Issue 3

Datasheet



### DESCRIPTION

The SS351AT, SS451A, and SS551AT sensor ICs are small and versatile digital Hall-effect devices 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 products 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. These omnipolar sensors are sensitive and flexible devices designed to meet a wide range of potential applications.

These products are available in three package styles:

- **SS351AT:** Subminiature SOT-23 surface-mount package supplied on tape and reel which allows for compact design with automated component placement.
- **SS451A:** Flat TO-92-style package with straight leads in bulk packaging which allows for a compact PC board layout.
- **SS551AT:** SOT-89B surface-mount package on tape and reel.

### FEATURES

- Simple activation from a North pole or a South pole and sensitive magnetics
- Low voltage 3 Vdc capability
- Built-in reverse polarity protection
- Thermally balanced integrated circuit
- RoHS-compliant materials meet Directive 2002/95/EC

### 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 meters
- Robotic control (cylinder position monitoring)
- Float-based fluid level sensing
- Motion control
- Proximity sensing
- Instrumentation
- Metering

#### Medical

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

### PORTFOLIO

The SS351AT, SS451A, and SS551A are part of Honeywell's family of Omnipolar Digital Hall-effect Sensor ICs, including:

- [SL353HT](#), [SL353LT](#)

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**Table 1. Electrical and Environmental Specifications**

(At  $V_s = 3.0$  Vdc to 24.0 Vdc, 20 mA load,  $T_A = -40$  °C to 150 °C [-40 °F to 302 °F] except where otherwise specified.)

| Characteristic  | Condition  | Min.                          | Typ.                         | Max.                           | Unit    |
|---|--|-------------------------------|------------------------------|--------------------------------|---------|
| Supply voltage:<br>SS351AT<br>SS351AT<br>SS451A, SS551AT  | -40 °C to 125 °C [-40 °F to 257 °F]<br>150 °C [302 °F]<br>—  | 3.0<br>3.0<br>3.0             | —<br>—<br>—                  | 24.0<br>12.0<br>24.0           | Vdc     |
| Supply current:<br>SS351AT, SS551AT<br>SS451A<br>SS351AT, SS451A, SS551AT<br>SS351AT, SS451A, SS551AT                       | $V_{supply} = 5$ Vdc at 25 °C [77 °F]<br>$V_{supply} = 5$ Vdc at 25 °C [77 °F]<br>$V_{supply} = 3$ Vdc at 25 °C [77 °F]<br>—   | —<br>—<br>—<br>—              | 4.5<br>4.0<br>3.5<br>—       | 6.0<br>6.0<br>5.0<br>9.0       | mA      |
| Output current  | —  | —                             | —                            | 20.0                           | mA      |
| $V_{sat}$   | at 20 mA, Gauss > Bop positive of<br>Gauss < Bop negative  | —                             | —                            | 0.4                            | V       |
| Output leakage current  | Gauss > Bop positive of Gauss <<br>Bop negative  | —                             | —                            | 10.0                           | μA      |
| Output switching time; rse/fall time  | 25 °C [77 °F]  | —                             | —                            | 1.5                            | μs      |
| Thermal resistance:<br>SS351AT<br>SS451A<br>SS551AT   | —<br>—<br>—  | —<br>—<br>—                   | —<br>303<br>233              | —<br>—<br>—                    | °C/W    |
| Magnetic characteristics:<br>Operate (Bop)<br>positive<br>negative<br>Release (Brp)<br>positive<br>negative<br>Differential | —<br>—<br>—<br>—<br>—<br>—   | 35<br>-135<br>10<br>-120<br>5 | 85<br>-85<br>40<br>-40<br>45 | 135<br>-35<br>120<br>-10<br>80 | Gauss   |
| Operating temperature   | —  | -40 [-40]                     | —                            | 150 [302]                      | °C [°F] |
| Storage temperature:  | —  | -40 [-40]                     | —                            | 150 [302]                      | °C [°F] |
| Soldering temperatures and times:<br>SS351AT<br>SS451A<br>SS551AT   | infrared reflow process: peak temperature 245 °C [473 °F] for 10 s max.<br>wave soldering process: 250 °C to 260 °C [482 °F to 500 °F] for 3 s max.<br>infrared reflow process: peak temperature 245 °C [473 °F] for 10 s max. |                               |                              |                                |         |

## NOTICE

These Hall-effect sensor ICs 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 after supply voltage has reached 3 V (SS451A, SS551AT) or 5 V (SS351AT) for the output voltage to stabilize.

## NOTICE

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 limits, the switch must be placed in a uniform magnetic field.



**CAUTION**  
ELECTROSTATIC  
SENSITIVE  
DEVICES

DO NOT OPEN OR HANDLE  
EXCEPT AT A  
STATIC FREE WORKSTATION



**ESD SENSITIVITY:  
CLASS 2**

**Table 2. Absolute Maximum Specifications**

| Characteristic         | Min.  | Typ. | Max.     | Unit  |
|------------------------|-------|------|----------|-------|
| Supply voltage         | -28.0 | —    | 28.0     | V     |
| Applied output voltage | -0.5  | —    | 28.0     | V     |
| Output current         | —     | —    | 20.0     | mA    |
| Magnetic flux          | —     | —    | no limit | Gauss |

## NOTICE

Absolute maximum ratings are the extreme limits the device will momentarily withstand without damage to the device. Electrical and mechanical characteristics are not guaranteed if the specified voltage and/or currents are exceeded, nor will the device necessarily operate at absolute maximum ratings.

# Omnipolar Digital Hall-effect Sensor ICs: SS351AT, SS451A, SS551AT

Figure 1. Typical Magnetic Performance vs Temperature ( $V_{supply} = 12\text{ Vdc}$ )

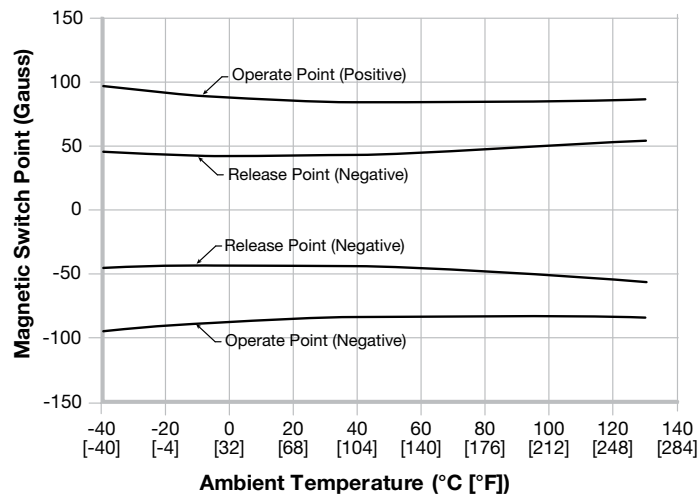


Figure 2. Current Sinking Output Block Diagram

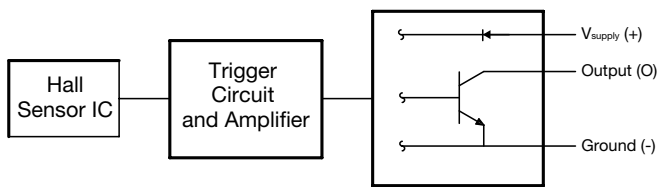


Figure 3. SS351AT Rated Supply Voltage

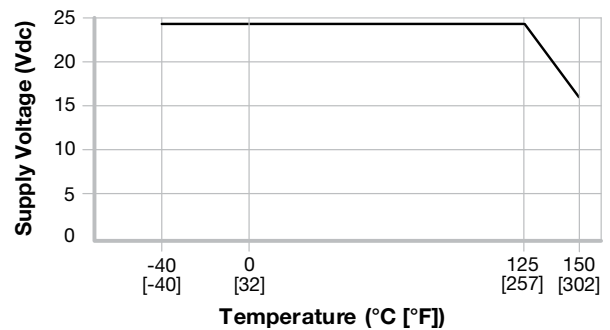
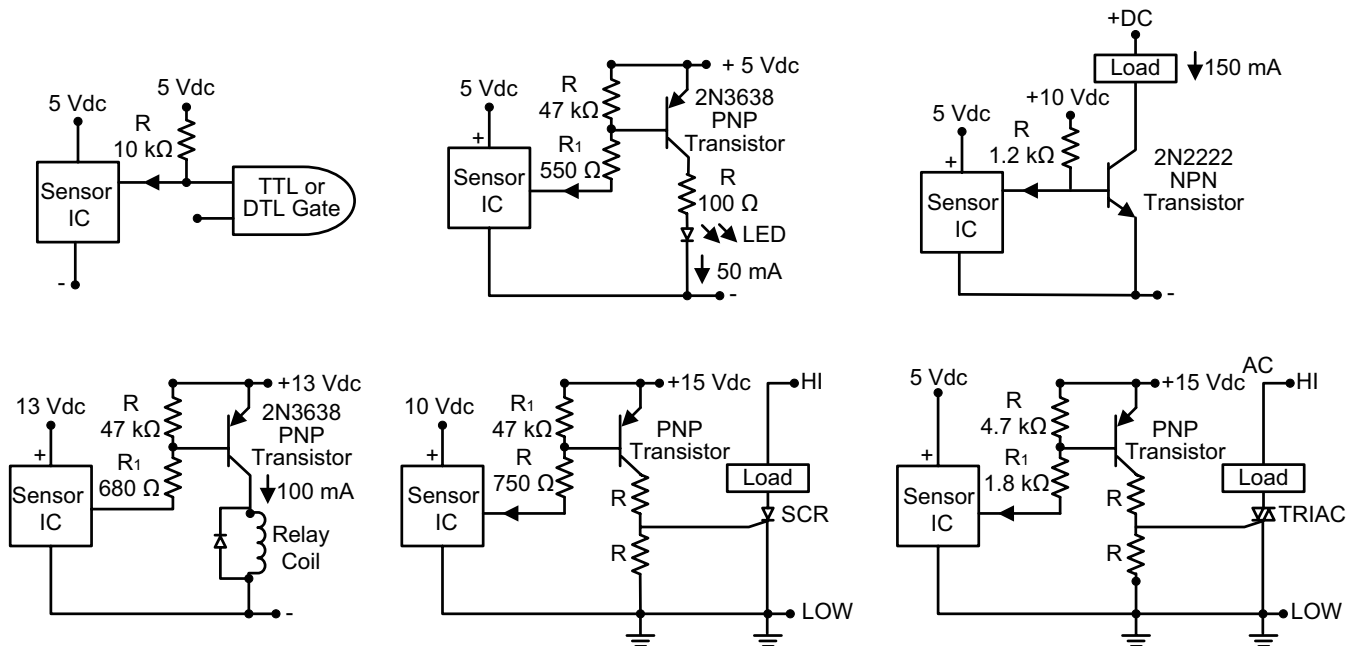


Figure 4. Wiring Diagrams





# Omnipolar Digital Hall-effect Sensor ICs: SS351AT, SS451A, SS551AT

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

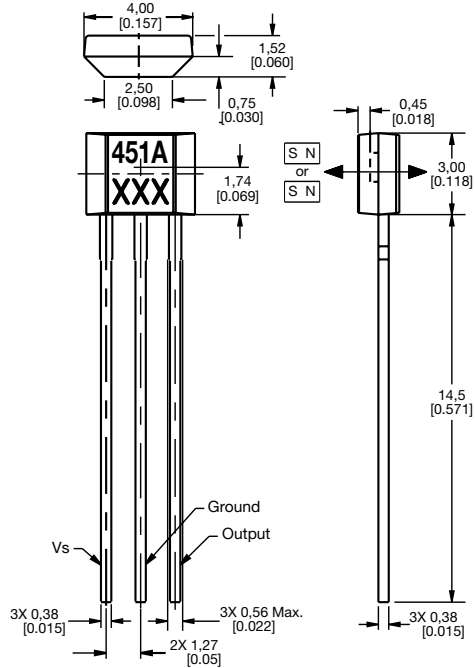
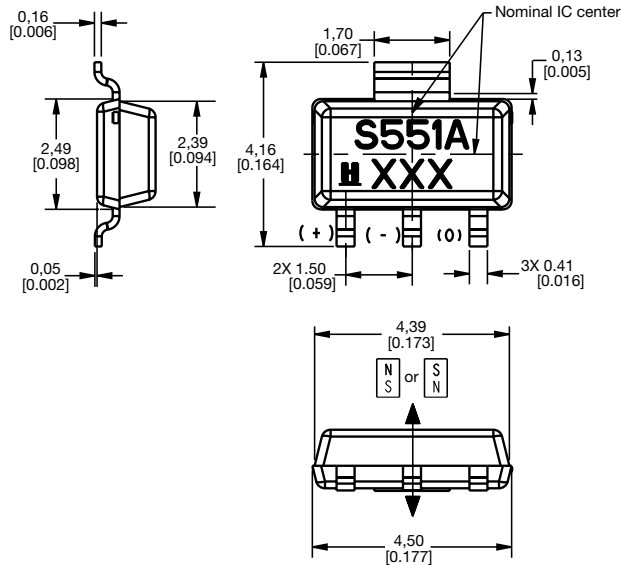
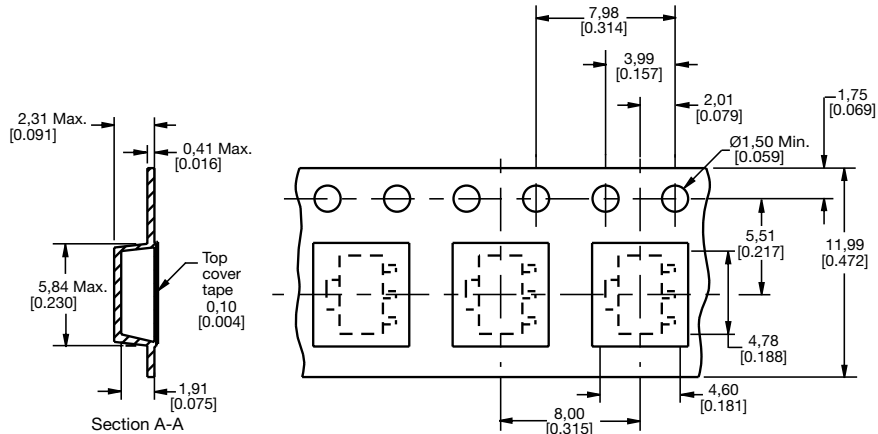


Figure 7. SS551AT Sensor IC and Tape Mounting Dimensions (For reference only. mm/[in.] )

## Sensor IC



## Tape



# Omnipolar Digital Hall-effect Sensor ICs: SS351AT, SS451A, SS551AT

Figure 7 (continued). SS551AT Reel Mounting Dimensions

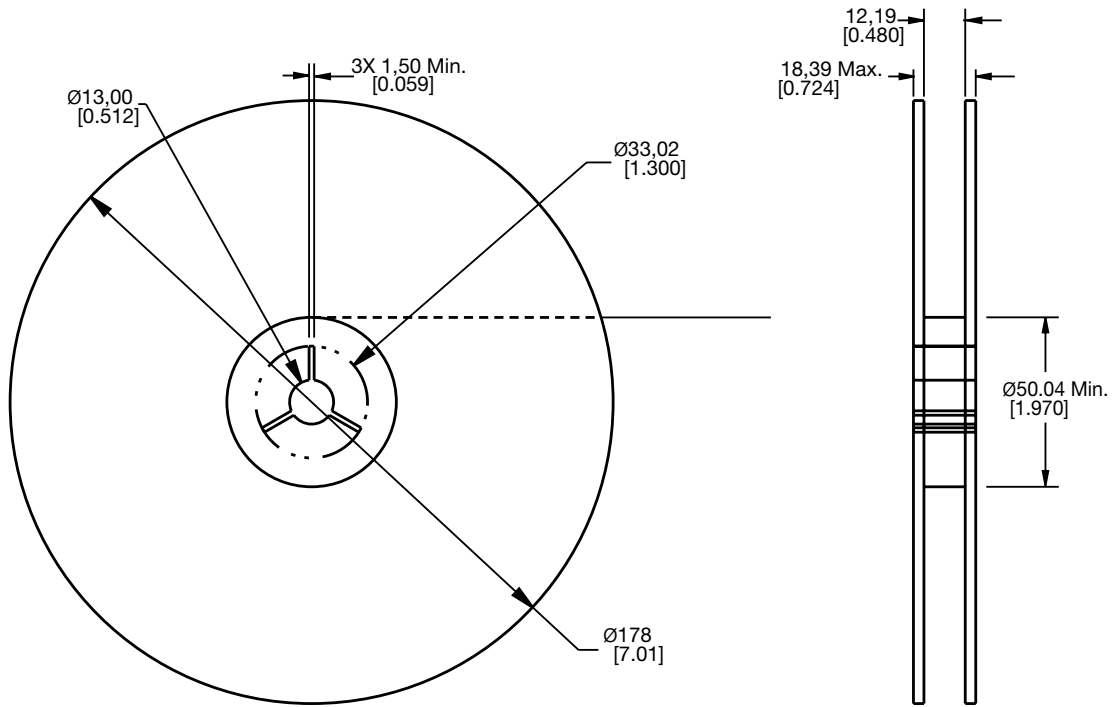





Table 3. Order Guide

| Catalog Listing | Description   |   |
|-----------------|---|---|
| SS351AT         | Omnipolar digital Hall-effect sensor IC, SOT-23 package, tape and reel packaging (3000 units per reel)  |  |
| SS451A          | Omnipolar digital Hall-effect sensor IC flat TO-92-style package, bulk packaging (1000 units per bag)   |  |
| SS551AT         | Omnipolar digital Hall-effect sensor IC, SOT-89B package, tape and reel packaging (1000 units per reel) |  |

## ADDITIONAL INFORMATION

The following associated literature is available on the Honeywell web site at [sensing.honeywell.com](http://sensing.honeywell.com):

- Product Range Guide
- Product Line Guide
- Product Installation Instructions
- Technical Information

### **⚠ 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.**

### **⚠ WARNING** **MISUSE OF DOCUMENTATION**

- The information presented in this datasheet 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.**

## Find out more

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