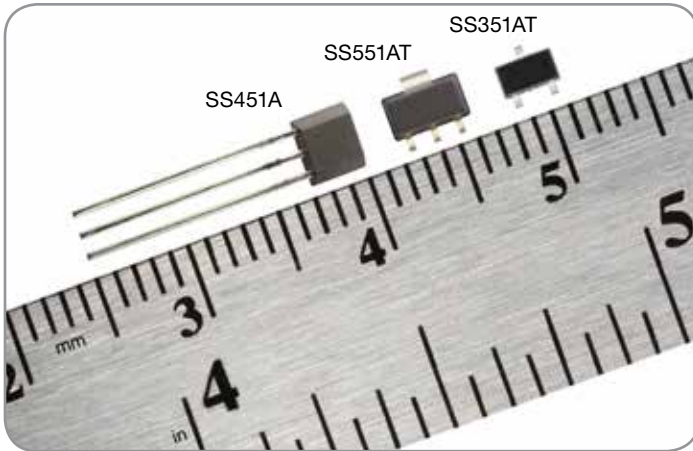


Omnipolar Digital Hall-effect Sensor ICs: SS351AT, SS451A, SS551AT

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

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

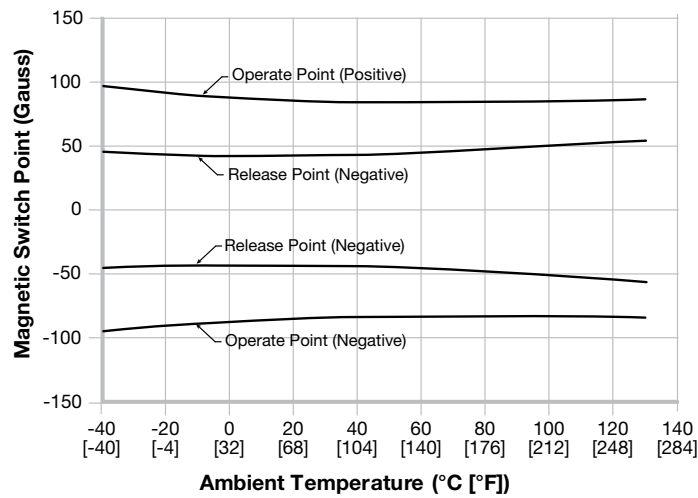


Figure 2. Current Sinking Output Block Diagram

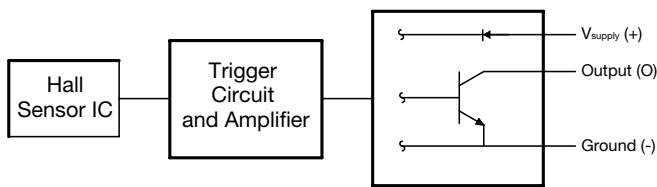


Figure 3. SS351AT Rated Supply Voltage

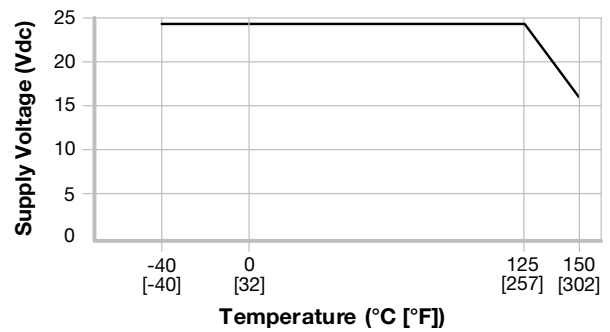
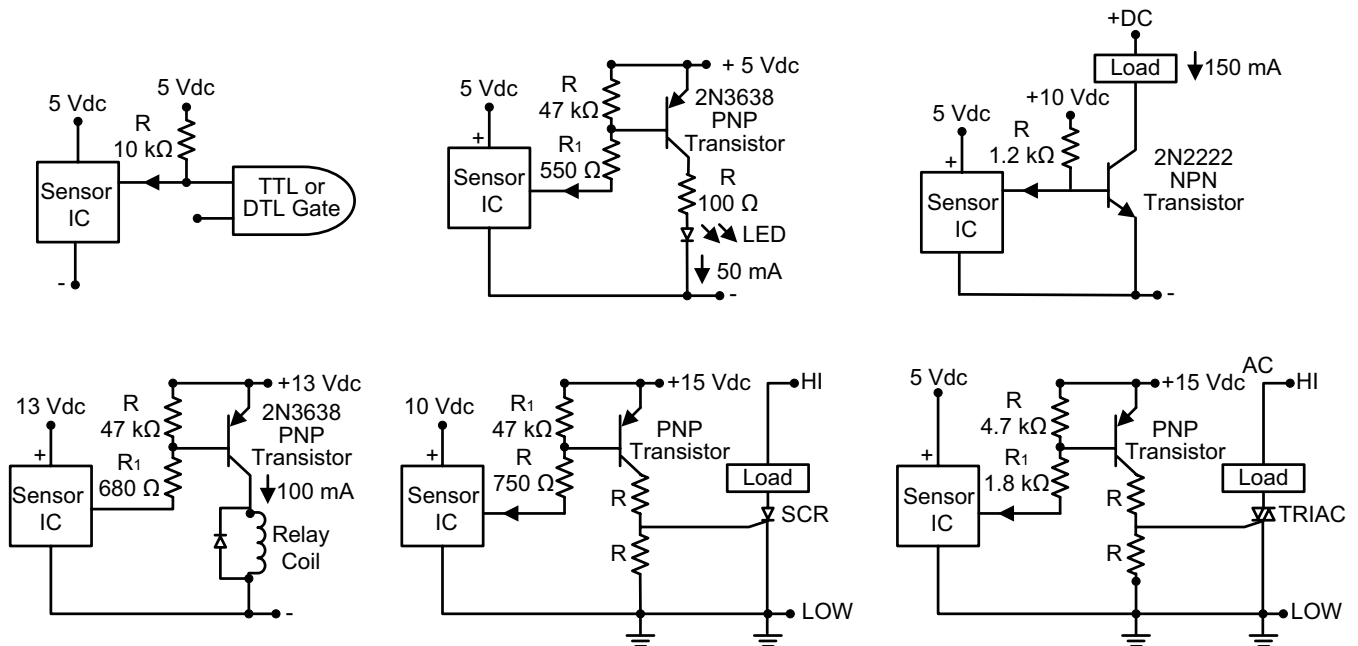


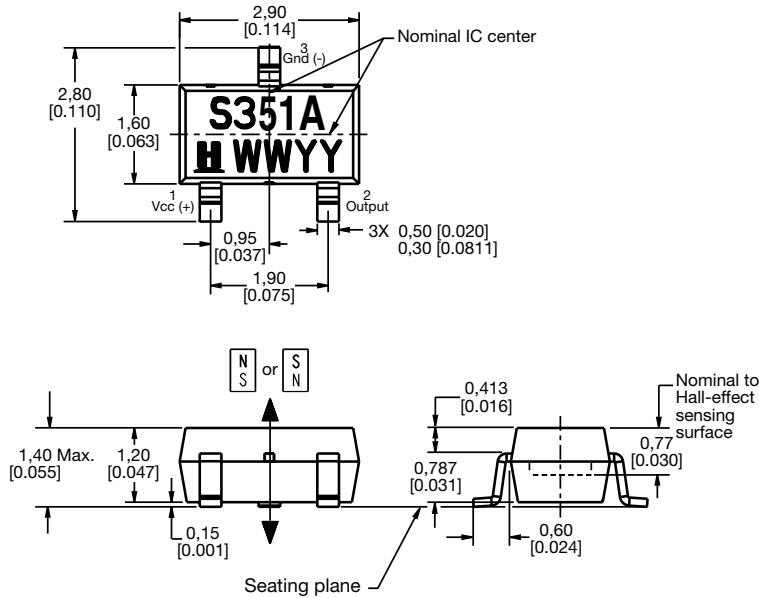
Figure 4. Wiring Diagrams



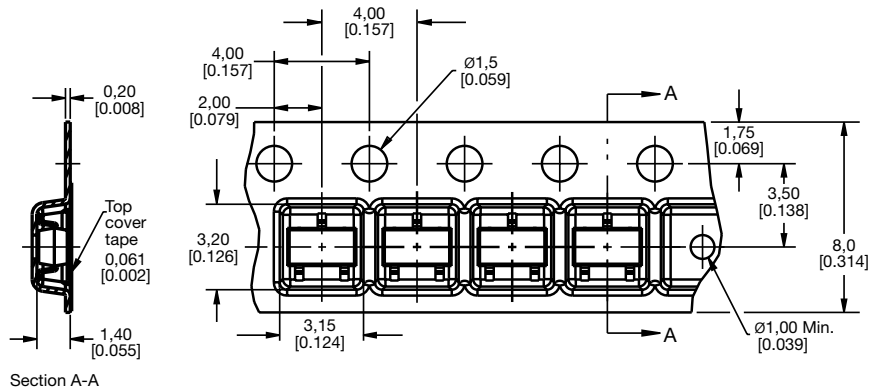
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Figure 5. SS351AT Sensor IC, Tape and Reel Mounting Dimensions (For reference only. mm/[in].)

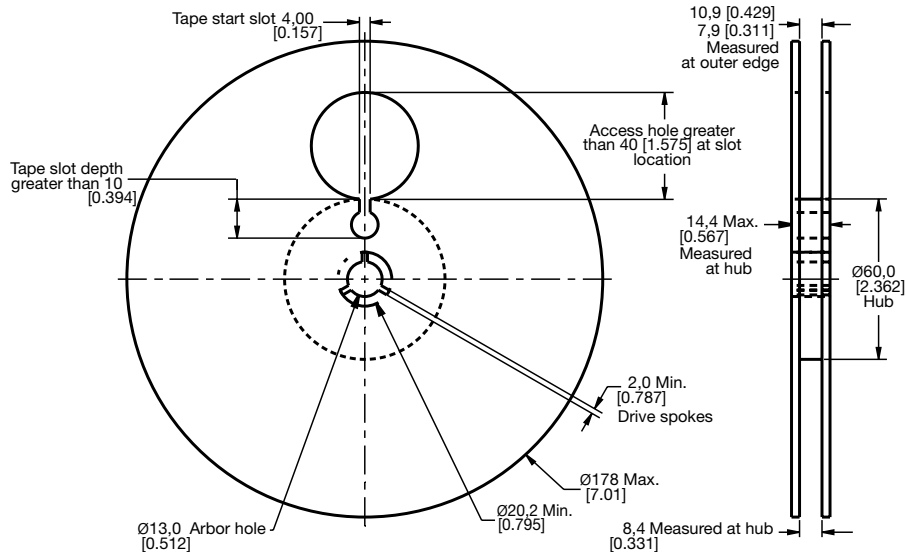
Sensor IC



Tape



Reel



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Figure 7 (continued). SS551AT Reel Mounting Dimensions

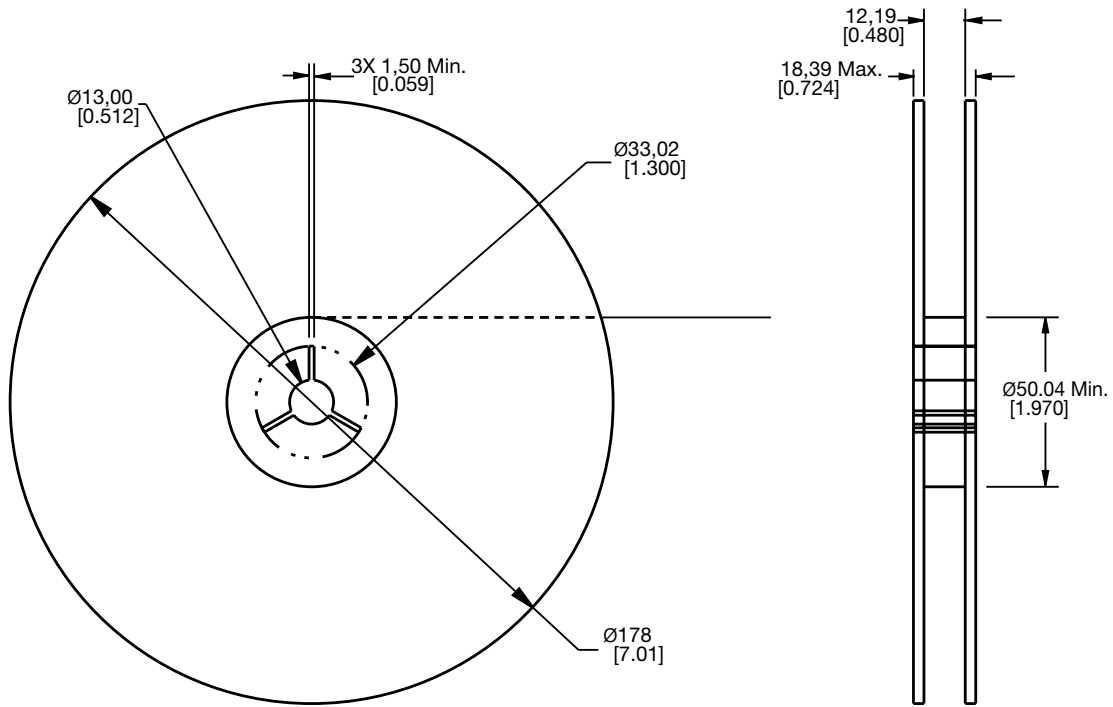





Table 3. Order Guide

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)	

⚠ 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.

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.

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