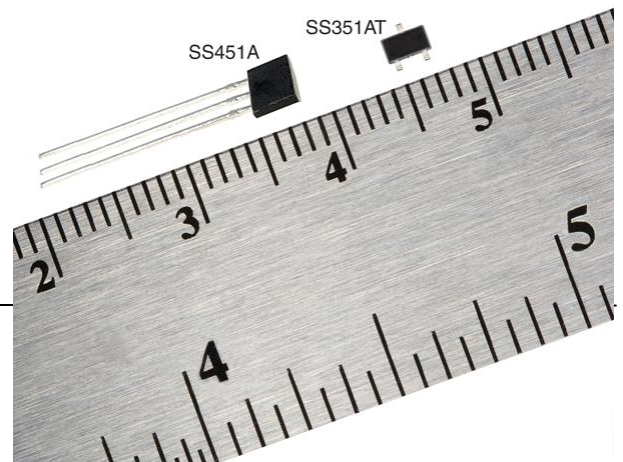


SS351AT/SS451A

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 ¹ :					
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] Vsupply = 3 V at 25 °C [77 °F]	– – –	4.5 3.5 –	6 5 9	mA
Output Current	–	–	–	20.0	mA
Vsat	at 20 mA, gauss > Bop positive or gauss < Bop negative	–	–	0.4	V
Output leakage current	gauss > Bop+ or < Bop-	–	–	10	µA
Output switching time: rise fall	Vsupply = 12 V at 25 °C [77 °F], RL = 1.6 KOhm, CL = 20 pF	– –	– –	1.5 1.5	µs
Thermal resistance:					
SS451A	–	–	233	–	°C/W
SS351AT	–	–	303	–	
SS351AT/SS451A: Operate positive Operate negative	–	35 -135	85 -85	135 -35	gauss
SS351AT/SS451A: Release positive Release negative	–	10 -120	50 -50	120 -10	gauss
SS351AT/SS451A 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 Ratings¹

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

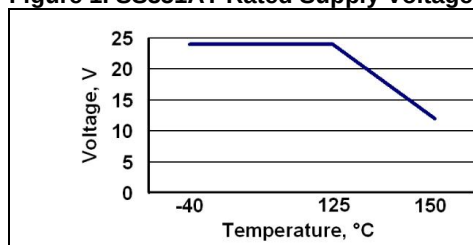


Figure 2. Current Sinking Output Block Diagram

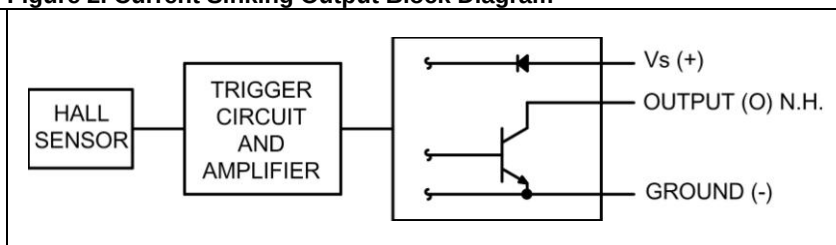


Figure 2 is a line graph titled "Typical Operating Point Temperature Performance vs. Temperature". The Y-axis is labeled "Magnetic Switch Point (Gauss)" and ranges from -150 to 150 in increments of 50. The X-axis is labeled "Temperature (°C)" and ranges from -40 to 140 in increments of 20. A label "Vcc = 12 V" is present in the upper left quadrant. There are four curves plotted, each labeled with a box:

- Operate Point (Pos)**: This curve starts at approximately 95 Gauss at -40°C, decreases slightly to about 85 Gauss at 20°C, and then increases to about 100 Gauss at 140°C.
- Release Point (Pos)**: This curve starts at approximately 45 Gauss at -40°C, decreases slightly to about 35 Gauss at 20°C, and then increases to about 55 Gauss at 140°C.
- Release Point (Neg)**: This curve starts at approximately -45 Gauss at -40°C, decreases slightly to about -55 Gauss at 20°C, and then increases to about -35 Gauss at 140°C.
- Operate Point (Neg)**: This curve starts at approximately -95 Gauss at -40°C, decreases slightly to about -85 Gauss at 20°C, and then increases to about -100 Gauss at 140°C.

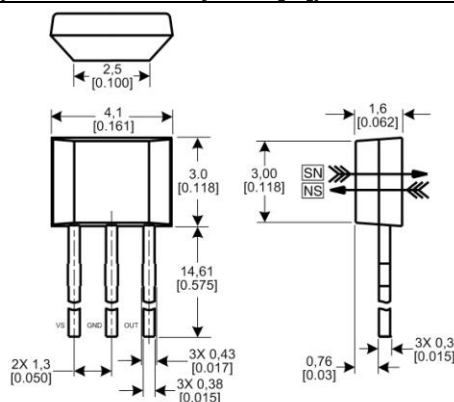
Figure 9 shows three views of the measuring tape and reel dimensions:

- Top View:** Shows the overall dimensions of the tape. Key dimensions include:
 - Total width: 2.90 [0.114]
 - Distance from top edge to first hole: 2.80 [0.110]
 - Distance between holes: 1.60 [0.063]
 - Distance from bottom edge to last hole: 1.90 [0.075]
 - Hole diameter: 0.95 [0.037]
 - Distance from centerline to output side: 1.90 [0.075]
 - Output side distance: 0.95 [0.037]
 - Ground (-) connection point.
- Side View:** Shows the profile of the tape. Key dimensions include:
 - Thickness: 0.20 [0.008]
 - Radius: R0.061 [0.002]
 - Top cover tape thickness: 0.061 [0.002]
 - Distance from centerline to output side: 1.40 [0.055]
- Bottom View:** Shows the underside of the tape. Key dimensions include:
 - Distance from centerline to output side: 1.45 [0.057]
 - Distance from centerline to output side: 0.60 [0.024]

The figure also includes a detailed view of the reel dimensions, showing a circular reel with a central hub and a winding path. Key dimensions include:

- Reel outer diameter: 178 DIA. [7.00]
- Reel inner diameter: 13.00 DIA. [0.511]
- Reel thickness: 10.2 DIA. [0.795]
- Reel radius: 40.00 [1.57]
- Reel height: 10.00 [0.39]
- Reel width: 10.9 [0.430]
- Reel depth: 14.4 [0.567]
- Reel diameter: 60.0 DIA. [2.362]
- Reel length: 8.40 MEASURED [0.331]

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.

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! WARNING

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