SS30AT/SS40A/SS50AT
Bipolar Hall-effect Magnetic Position Sensors

DESCRIPTION
The SS30AT/SS40A/SS50AT Series sensors are versatile, bipolar, Hall-effect sensors. These sensitive magnetic sensors offer reverse polarity protection and deliver stable output over a -40 °C to 125 °C [-40 °F to 257 °F] temperature range. Operation from any dc supply voltage from 4.5 Vdc to 24.0 Vdc is acceptable.

The SS30AT/SS40A/SS50AT Series sensors build upon Honeywell’s popular magnetic position sensors and offer several advantages. These sensors have been designed with the latest technologies to provide reliable, cost-effective solutions to many commercial, computer, medical, and/or consumer applications requiring motor control and RPM sensing.

These products are available in three package styles to suit a variety of applications. The SS40A in the leaded, flat TO-92 style package can be supplied in bulk (1000 pieces per bag) or on tape in an “Ammopack” (fan-fold) format. The SS30AT in the subminiature SOT-23 surface-mount package, and the SS50AT in the small SOT-89B surface-mount package, are both supplied on tape and reel for use in automated pick-and-place equipment.

The surface mount versions are mounted directly on the electrical traces on a printed circuit board (PCB). They are attached by an automatic solder reflow operation which requires no hole, so it may help reduce the cost of the PCB.

FEATURES/BENEFITS
- Subminiature package size (SS30AT) often allows for use in applications with tight PCB space where a compact design is needed
- Small package size (SS40A, SS40AT) allows for more space on PCB
- Sensitive bipolar magnetics respond to alternating north and south poles, often making these products well-suited for speed sensing and RPM measurement
- Robust design with built-in reverse voltage protection simplifies installation and protects device from damage when mounted on PCB
- Thermally balanced integrated circuit provides for stable operation over a full temperature range
- RoHS-compliant materials meet Directive 2002/95/EC

POTENTIAL APPLICATIONS
Transportation:
- Speed and RPM (revolutions per minute) sensing
- Tachometer, counter pickup
- Motor and fan control
- Electric vehicle control
- Convertible roof position

Industrial:
- 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
SS30AT/SS40A/SS50AT

ABSOLUTE MAXIMUM RATINGS*

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage</td>
<td>-28</td>
<td>--</td>
<td>28</td>
<td>V</td>
</tr>
<tr>
<td>Applied output voltage</td>
<td>-0.5</td>
<td>--</td>
<td>28</td>
<td>V</td>
</tr>
<tr>
<td>Output current</td>
<td>--</td>
<td>--</td>
<td>20</td>
<td>mA</td>
</tr>
<tr>
<td>Magnetic flux</td>
<td>--</td>
<td>--</td>
<td>No limit</td>
<td>Gauss</td>
</tr>
</tbody>
</table>

*Absolute maximum ratings are the extreme limits 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.

ELECTRICAL CHARACTERISTICS

At Vs = 4.5 V to 24 V with 20 mA load with Ta = -40 °C to 125 °C [-40 °F to 257 °F] unless otherwise noted.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Cond.</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage</td>
<td>--</td>
<td>4.5</td>
<td>--</td>
<td>24.0</td>
<td>V</td>
</tr>
<tr>
<td>Supply current</td>
<td>25 °C [77 °F]</td>
<td>--</td>
<td>6.8</td>
<td>10.0</td>
<td>mA</td>
</tr>
<tr>
<td>Supply current</td>
<td>25 °C [77 °F], Vs = 4.5 V</td>
<td>--</td>
<td>4.4</td>
<td>7.06</td>
<td>mA</td>
</tr>
<tr>
<td>Output current</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>11.3</td>
<td>mA</td>
</tr>
<tr>
<td>Vsat @ 15 mA</td>
<td>Gauss &gt;170</td>
<td>--</td>
<td>--</td>
<td>0.4</td>
<td>V</td>
</tr>
<tr>
<td>Output leakage</td>
<td>Gauss &lt;170</td>
<td>--</td>
<td>--</td>
<td>10.0</td>
<td>µA</td>
</tr>
<tr>
<td>Rise time</td>
<td>25 °C [77 °F]</td>
<td>--</td>
<td>0.5</td>
<td>1.5</td>
<td>µs</td>
</tr>
<tr>
<td>Fall time</td>
<td>25 °C [77 °F]</td>
<td>--</td>
<td>0.2</td>
<td>1.5</td>
<td>µs</td>
</tr>
<tr>
<td>Response time</td>
<td>25 °C [77 °F]</td>
<td>--</td>
<td>4.0</td>
<td>5.0</td>
<td>µs</td>
</tr>
<tr>
<td>Operate</td>
<td>25 °C [77 °F]</td>
<td>--</td>
<td>45</td>
<td>110</td>
<td>Gauss</td>
</tr>
<tr>
<td>Operate</td>
<td>0 °C to 85 °C [32 °F to 185 °F]</td>
<td>--</td>
<td>50</td>
<td>130</td>
<td>Gauss</td>
</tr>
<tr>
<td>Operate</td>
<td>--</td>
<td>--</td>
<td>55</td>
<td>170</td>
<td>Gauss</td>
</tr>
<tr>
<td>Release</td>
<td>25 °C [77 °F]</td>
<td>-110</td>
<td>-45</td>
<td>--</td>
<td>Gauss</td>
</tr>
<tr>
<td>Release</td>
<td>-40 °C to 85 °C [-40 °F to 185 °F]</td>
<td>-130</td>
<td>-50</td>
<td>--</td>
<td>Gauss</td>
</tr>
<tr>
<td>Release</td>
<td>--</td>
<td>-170</td>
<td>-55</td>
<td>--</td>
<td>Gauss</td>
</tr>
<tr>
<td>Differential</td>
<td>--</td>
<td>50</td>
<td>--</td>
<td>--</td>
<td>Gauss</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>-40 °C to 125 °C [-40 °F to 257 °F]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-55 °C to 165 °C [-67 °F to 329 °F]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

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 >Bp and <Bop). Honeywell recommends allowing 10 µs for output voltage to stabilize after supply voltage has reached 5 V.
Bipolar Hall-Effect Magnetic Position Sensors

WIRING DIAGRAMS

5 VDC

- 10 K

Sensor

5 VDC

+ 47 K

2N3636 PNP TRANSISTOR 100 mA

Sensor

13 VDC

+ 13 VDC

2N3636 PNP TRANSISTOR 100 mA

RELAY COIL

10 VDC

+ 15 VDC

PNP TRANSISTOR

+ 750 Ohm

- 50 mA

LED

- 10 VDC

1.2 K

5 VDC

- 4.7 K

PNP TRANSISTOR

- 1.8 K

5 VDC

- 15 VDC

PNP TRANSISTOR 100 mA

TRIAC

LOW

FIGURE 1: SS30AT/SS40A/SS50AT OPERATE AND RELEASE POINTS

MAGNETIC CHARACTERISTICS vs TEMPERATURE

-200 -150 -100 -50 0 50 100 150 200

GAUSS

-40° -20° 0° 20° 40° 60° 80° 100° 120°

TEMPERATURE IN °C

MAX OP

TYP OP

TYP REL

MIN REL

FIGURE 2. CURRENT SINKING OUTPUT BLOCK DIAGRAM

HALT SENSOR

TRIGGER CIRCUIT AND AMPLIFIER

Vh (+)

OUTPUT (O)

N H

GROUND (-)
SS30AT/SS40A/SS50AT

SS40A SERIES MOUNTING DIMENSIONS (for reference only) mm/[in]

TAPE DIMENSIONS FOR STYLE T2

SS30AT SERIES MOUNTING DIMENSIONS (for reference only) mm/[in]

TAPE DIMENSIONS FOR STYLE T3
Bipolar Hall-Effect Magnetic Position Sensors

SS50AT SERIES MOUNTING DIMENSIONS (for reference only) mm/[in]

Order Guide:

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SS40A</td>
<td>Bipolar, Hall-effect sensor, radial lead IC package</td>
</tr>
<tr>
<td>SS40A-F</td>
<td>Bipolar, Hall-effect sensor, radial lead IC package with formed leads on 2.54 mm [0.100 in] centers</td>
</tr>
<tr>
<td>SS40A-T2</td>
<td>Bipolar, Hall-effect sensor, radial lead IC package tape-in-box (ammpack) version with formed leads</td>
</tr>
<tr>
<td>SS40A-T3</td>
<td>Bipolar, Hall-effect sensor, radial lead IC package tape-in-box (ammpack) version with straight leads</td>
</tr>
<tr>
<td>SS30AT</td>
<td>Bipolar, Hall-effect sensor, SOT-23 style surface-mount package, on tape and reel</td>
</tr>
<tr>
<td>SS50AT</td>
<td>Bipolar, Hall-effect sensor, SOT-89B style surface-mount package, on tape and reel</td>
</tr>
</tbody>
</table>
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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SALES AND SERVICE
Honeywell serves its customers through a worldwide network of sales offices, representatives and distributors. For application assistance, current specifications, pricing or name of the nearest Authorized Distributor, contact your local sales office or:

E-mail: info.sc@honeywell.com

Internet: www.honeywell.com/sensing

Phone and Fax:
Asia Pacific  +65 6355-2828
             +65 6445-3033 Fax
Europe       +44 (0) 1698 481481
             +44 (0) 1698 481676 Fax
Latin America+1-305-805-8188
             +1-305-883-8257 Fax
USA/Canada   +1-800-537-6945
             +1-815-235-6847
             +1-815-235-6545 Fax