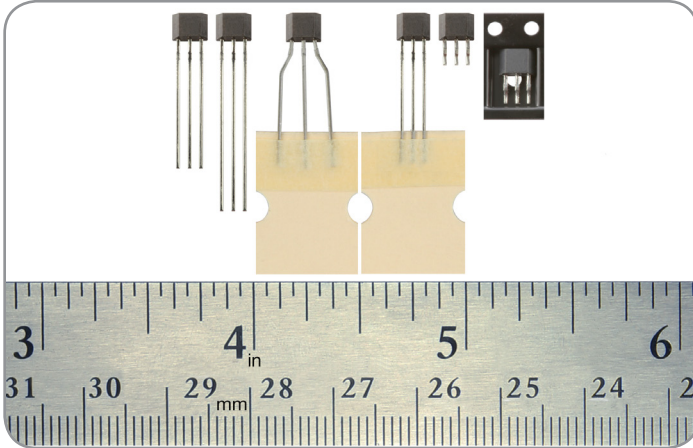


## Bipolar Hall-Effect Digital Position Sensor ICs: SS41, SS41-L, SS41-T2, SS41-T3, SS41-S, SS41-SP

**32312814**

*Issue B*

**Datasheet**



### DESCRIPTION

These small and versatile digital Hall-effect devices are operated by the magnetic field from a permanent magnet or an electromagnet, and are designed to respond to alternating North and South poles. The built-in regulator provides enhanced stability of operation from 4.5 Vdc to 24 Vdc supply voltage range, and internal circuitry is designed to prevent sensor damage in case the supply voltage polarity is accidentally reversed. The open-collector sinking output voltage is easily interfaced with a wide variety of electronic circuits. The SS41 is tested at both 25°C [77°F] and 125°C [257°F]. For design flexibility, these product are available in the following flat TO-92 package styles:

- **SS41:** Straight standard leads, bulk pack
- **SS41-L:** Straight long leads, bulk pack
- **SS41-T2:** Formed leads, ammpack tape-in-box
- **SS41-T3:** Straight standard leads, ammpack tape-in-box
- **SS41-S:** Surface mount, bulk pack
- **SS41-SP:** Surface mount, pocket tape and reel

### FEATURES

- Small, leaded, flat TO-92-style package allows for a compact PCB layout
- Wide operating voltage range of 4.5 Vdc to 24 Vdc allows these sensors to be used in a variety of applications
- Current consumption of only 5 mA max. at 4.5 Vdc for energy efficiency
- Bipolar magnetics for ring magnet applications with alternating North and South poles
- Robust design: Will operate up to 150°C [302°F]
- RoHS-compliant materials meet Directive 2002/95/EC

### POTENTIAL APPLICATIONS

- **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
- **Transportation:** Speed and RPM (revolutions per minute) sensing, tachometer, counter pickup, motor and fan control, electric window lift, convertible roof position
- **Medical:** Motor assemblies, medication dispensing control

### PORTFOLIO

Other bipolar digital position sensor ICs include:

- SS400 Series, SS500 Series (selected catalog listings)
- SS311PT, SS411P
- SS40F, SS40AF
- SS51T
- SS30AT, SS40A, SS50AT

# Bipolar Hall-Effect Digital Position Sensor ICs:

SS41, SS41-L, SS41-T2, SS41-T3, SS41-S, SS41-SP

**Table 2. Performance Specifications**

(At  $V_{\text{supply}} = 4.5 \text{ Vdc}$  to  $24.0 \text{ Vdc}$ ,  $20 \text{ mA}$  load,  $T_A = -40^\circ\text{C}$  to  $150^\circ\text{C}$  [ $-40^\circ\text{F}$  to  $302^\circ\text{F}$ ] except where otherwise specified.)

Characteristic	Condition	Min.	Typ.	Max.	Unit
Supply voltage	—	4.5	—	24.0	V
Supply current:	$V_s = 24.0 \text{ V}$ $V_s = 24.0 \text{ V}$	—	—	10.0	mA
output on		—	—	11.3	
output off	—	—	—	20.0	mA
Output current	—	—	—	20.0	mA
$V_{\text{sat}}$	$B_{\text{op}} > 170, 25^\circ\text{C}$ [ $77^\circ\text{F}$ ]	—	—	0.4	V
Output leakage current	$B_{\text{rp}} > 170, 25^\circ\text{C}$ [ $77^\circ\text{F}$ ], $24 \text{ V}$	—	—	10.0	$\mu\text{A}$
Rise time (10% to 90%)	$25^\circ\text{C}$ [ $77^\circ\text{F}$ ]	—	—	1.5	$\mu\text{s}$
Fall time (90% to 10%)	$25^\circ\text{C}$ [ $77^\circ\text{F}$ ]	—	—	1.5	$\mu\text{s}$
Operating temperature	—	$-40$ [ $-40$ ]	—	$150$ [ $302$ ]	$^\circ\text{C}$ [ $^\circ\text{F}$ ]
Storage temperature	—	$-40$ [ $-40$ ]	—	$150$ [ $302$ ]	$^\circ\text{C}$ [ $^\circ\text{F}$ ]
ESD (Human Body Model)	per JEDEC JS-001 kV	-3	—	+3	kV
Soldering temperature and time	PC board wave soldering process: $250^\circ\text{C}$ to $260^\circ\text{C}$ [ $482^\circ\text{F}$ to $500^\circ\text{F}$ ] for 3 s max.				

**Table 3. Magnetic Characteristics**

Characteristic	Temperature					
	$-40^\circ\text{C}$ [ $-40^\circ\text{F}$ ]	$0^\circ\text{C}$ [ $32^\circ\text{F}$ ]	$25^\circ\text{C}$ [ $77^\circ\text{F}$ ]	$85^\circ\text{C}$ [ $185^\circ\text{F}$ ]	$125^\circ\text{C}$ [ $257^\circ\text{F}$ ]	$150^\circ\text{C}$ [ $302^\circ\text{F}$ ]
Operate maximum	200 G	150 G	150 G	150 G	200 G	250 G
Release minimum	-160 G	-160 G	-140 G	-150 G	-200 G	-250 G
Differential minimum	40 G	50 G	50 G	50 G	60 G	60 G

## 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  $> B_{\text{rp}}$  and  $< B_{\text{op}}$ ). Honeywell recommends allowing 10  $\mu\text{s}$  after supply voltage has reached 5 V 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.



**Table 3. Absolute Maximum Specifications**

Characteristic	Min.	Typ.	Max.	Unit
Supply voltage	-50.0	—	50.0	V
Applied output voltage	-0.5	—	50.0	V
Output current	—	—	20	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 rated voltage and/or currents are exceeded, nor will the device necessarily operate at absolute maximum ratings.

# Bipolar Hall-Effect Digital Position Sensor ICs:

SS41, SS41-L, SS41-T2, SS41-T3, SS41-S, SS41-SP

Figure 1. Operate/Release Point vs Temperature

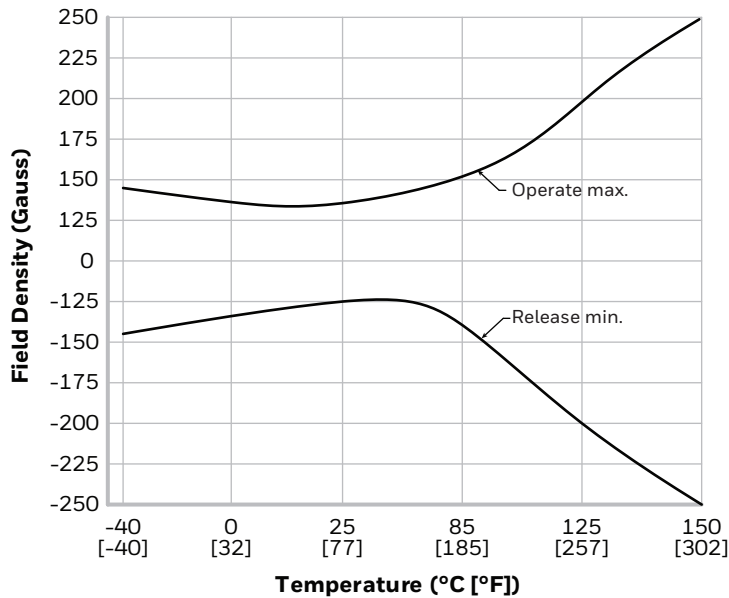


Figure 2. Typical Supply Current (Device Off) at 25°C

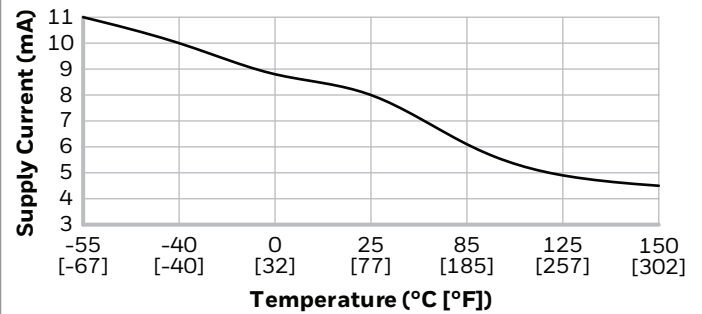


Figure 3. Maximum Supply Current Versus Temperature (Device Off)

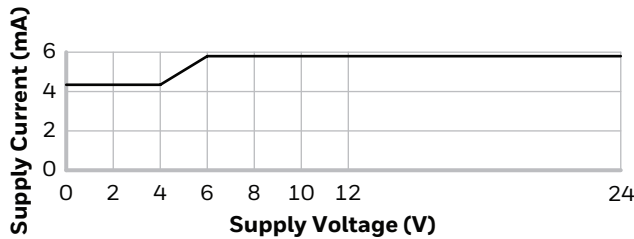


Figure 4. Current Sinking Output Block Diagram

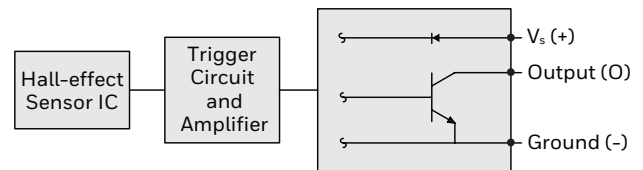
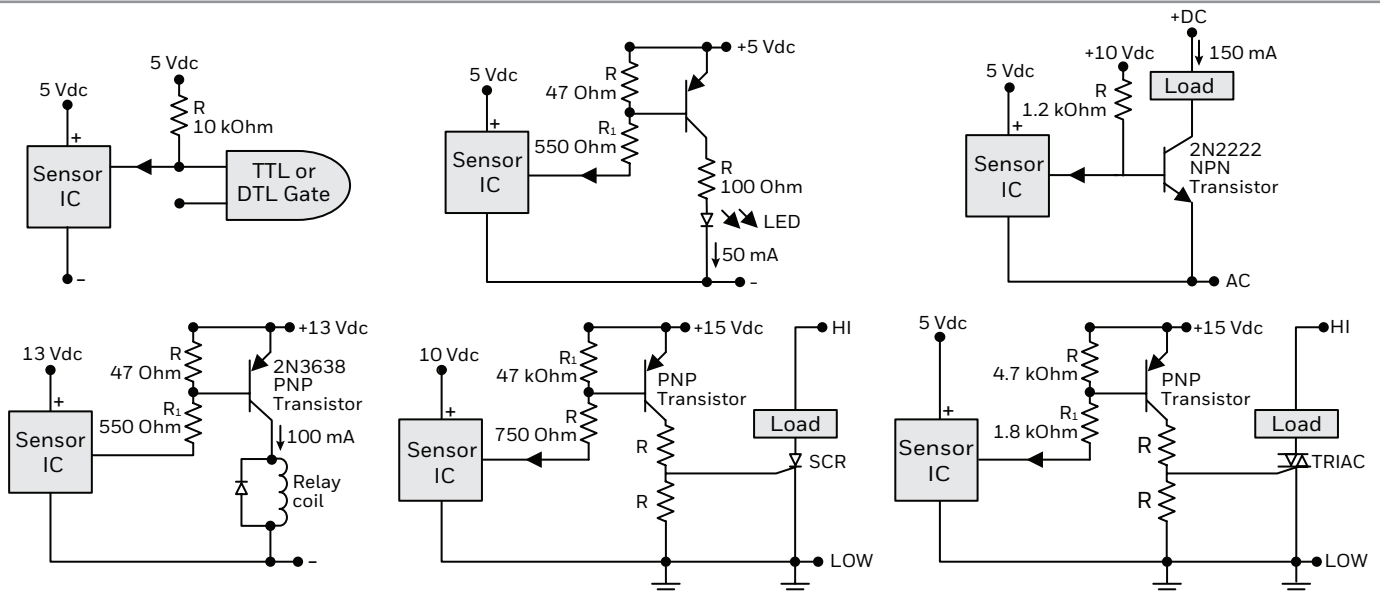
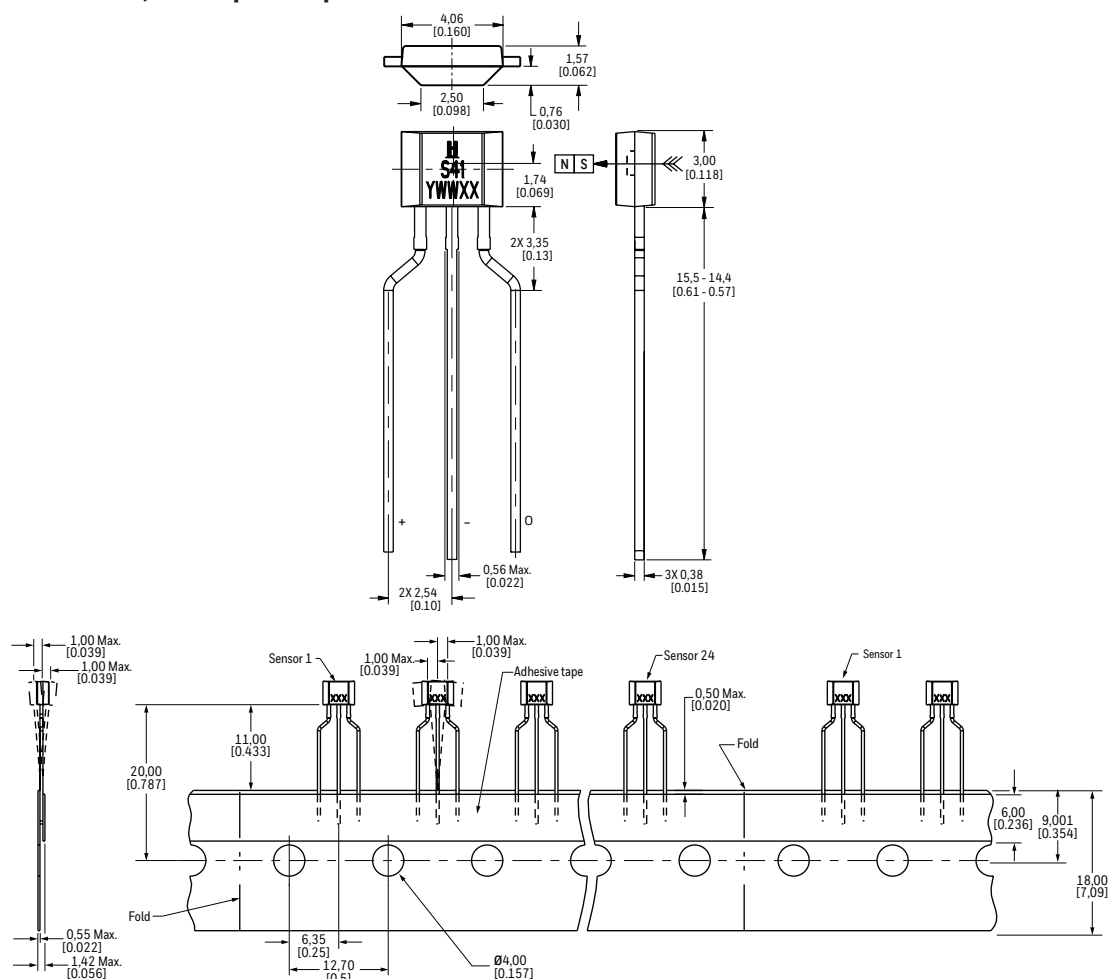


Figure 5. Wiring Diagrams



SS41, SS41-L, SS41-T2, SS41-T3, SS41-S, SS41-SP

### SS41: Straight Standard Leads, Bulk Pack



## SS41, SS41-L, SS41-T2, SS41-T3, SS41-S, SS41-SP

### SS41-T3: Straight Standard Leads, Ammopack Tape-in-Box

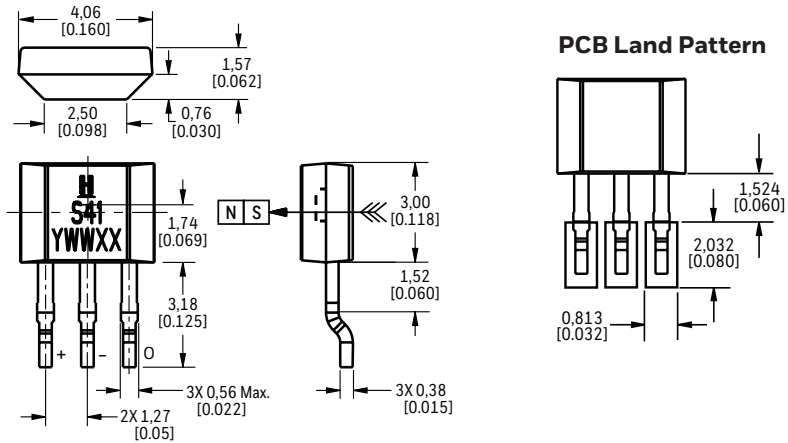


# Bipolar Hall-Effect Digital Position Sensor ICs:

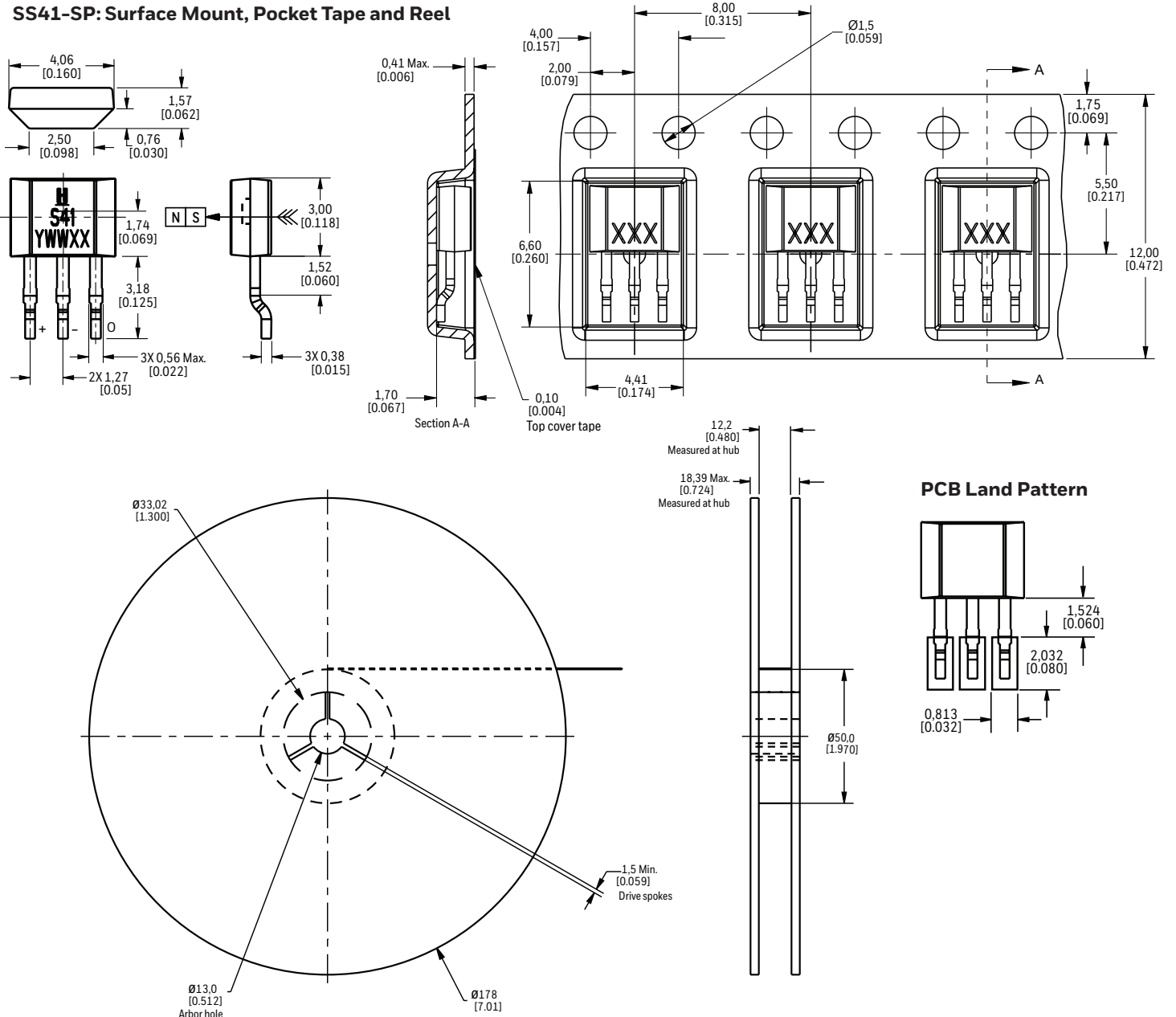
SS41, SS41-L, SS41-T2, SS41-T3, SS41-S, SS41-SP

Figure 6. Mounting and Dimensional Drawings (continued)

## SS41-S: Surface Mount, Bulk Pack



## SS41-SP: Surface Mount, Pocket Tape and Reel

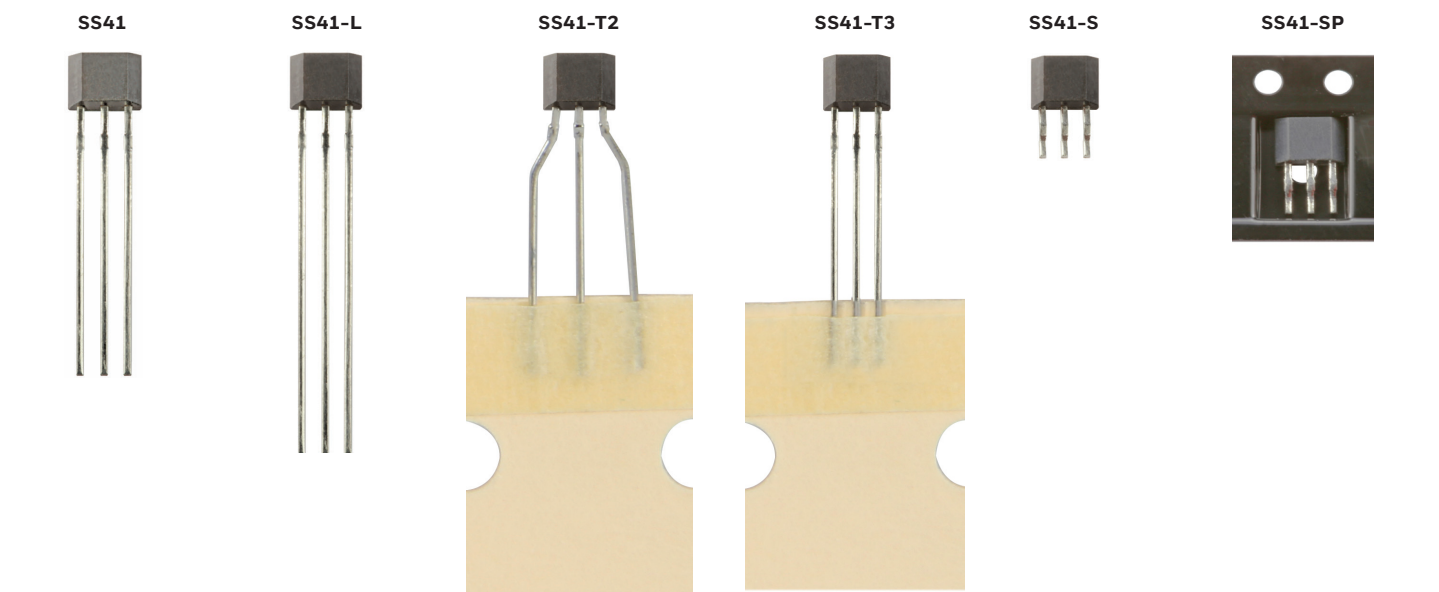


# Bipolar Hall-Effect Digital Position Sensor ICs:

SS41, SS41-L, SS41-T2, SS41-T3, SS41-S, SS41-SP

Table 4. Order Guide

Catalog Listing	Description
SS41	Bipolar, flat TO-92-style, straight standard leads, bulk pack, 1000 units/bag
SS41-L	Bipolar, flat TO-92-style, straight long leads, bulk pack, 1000 units/bag
SS41-T2	Bipolar, flat TO-92-style, formed leads, ammopack tape-in-box, 5000 units/box
SS41-T3	Bipolar, flat TO-92-style, straight standard leads, ammopack tape-in-box, 5000 units/box
SS41-S	Bipolar, flat TO-92-style, surface mount, pocket tape and reel, bulk pack, 1000 units/bag
SS41-SP	Bipolar, flat TO-92-style, surface mount, pocket tape and reel, 1000 units/reel



## ADDITIONAL INFORMATION

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

- Product Line Guide
- Product Range Guide
- Selection Guides
- Application-specific 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.**

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