

# Bipolar, Latching, or Unipolar Digital Hall-effect Sensor ICs:

## SS400 Series, SS500 Series

**Table 1. Electrical and Environmental Specifications (Applies to both SS400 series and 500 Series, unless otherwise noted.)**

| Characteristic                              | Symbol            | Condition                                                                                                                   | Min.      | Typ. | Max.      | Unit                  |
|---------------------------------------------|-------------------|-----------------------------------------------------------------------------------------------------------------------------|-----------|------|-----------|-----------------------|
| Supply voltage <sup>1</sup>                 | $V_s$             | —                                                                                                                           | 3.8       | —    | 30        | Vdc                   |
| Rated sinking current ( $I_{\text{sink}}$ ) | $I_{\text{sink}}$ | —                                                                                                                           | —         | 20   | —         | mA                    |
| Current consumption:                        |                   |                                                                                                                             |           |      |           |                       |
| On:                                         |                   |                                                                                                                             |           |      |           |                       |
| SS400 Series                                | —                 | $V_s = 30 \text{ Vdc}$ , $I_{\text{sink}} = 20 \text{ mA}$ , $-40^\circ\text{C} < T < 150^\circ\text{C}$ , B > operate max. | —         | —    | 10.0      | mA                    |
| SS500 Series                                |                   | $V_s = 30 \text{ Vdc}$ , $-40^\circ\text{C} < T < 150^\circ\text{C}$ , B > operate max.                                     | —         | —    | 10.0      |                       |
| Off:                                        |                   |                                                                                                                             |           |      |           |                       |
| SS400 Series                                | —                 | $V_s = 30 \text{ Vdc}$ , $I_{\text{sink}} = 20 \text{ mA}$ , $-40^\circ\text{C} < T < 150^\circ\text{C}$ , B > operate max. | —         | —    | 9.0       |                       |
| SS500 Series                                |                   | $V_s = 30 \text{ Vdc}$ , $I_{\text{sink}} = 20 \text{ mA}$ , $-40^\circ\text{C} < T < 150^\circ\text{C}$ , B > release min. | —         | —    | 10.0      |                       |
| Vsat:                                       |                   |                                                                                                                             |           |      |           |                       |
| SS400 Series                                | —                 | $V_s = 3.8 \text{ Vdc}$ , $I_{\text{sink}} = 20 \text{ mA}$ , B > operate max.                                              | —         | —    | 0.4       | V                     |
| SS500 Series                                |                   | $V_s = 3.8 \text{ Vdc}$ , B > operate max.                                                                                  | —         | —    | 0.4       |                       |
| Output leakage current:                     |                   |                                                                                                                             |           |      |           |                       |
| SS400 Series                                | —                 | $V_s = 24 \text{ V}$ , $V_{\text{out}} = 30 \text{ V}$ , B < release min.                                                   | —         | —    | 0.4       | uA                    |
| SS500 Series                                |                   | —                                                                                                                           | —         | —    | 10.0      |                       |
| Output switching time:                      |                   |                                                                                                                             |           |      |           |                       |
| rise                                        | —                 | $V_s = 12 \text{ V}$ , $R_L = 1.6 \text{ k}\Omega$ , $C_L = 20 \text{ pF}$ , $T = 25^\circ\text{C}$ [77 °F]                 | —         | —    | 1.5       | $\mu\text{s}$         |
| fall                                        |                   | $V_s = 12 \text{ V}$ , $R_L = 1.6 \text{ k}\Omega$ , $C_L = 20 \text{ pF}$ , $T = 25^\circ\text{C}$ [77 °F]                 | —         | —    | 1.5       |                       |
| Operating temperature:                      |                   |                                                                                                                             |           |      |           |                       |
| SS400 Series                                | T                 | —                                                                                                                           | -40 [-40] | —    | 150 [302] | $^\circ\text{C}$ [°F] |
| SS500 Series                                |                   | —                                                                                                                           | -50 [-58] | —    | 150 [302] |                       |
| Storage temperature:                        |                   |                                                                                                                             |           |      |           |                       |
| SS400 Series                                | $T_s$             | —                                                                                                                           | -50 [-58] | —    | 150 [302] | $^\circ\text{C}$ [°F] |
| SS500 Series                                |                   | —                                                                                                                           | -65 [-85] | —    | 150 [302] |                       |
| Soldering temp. and time:                   |                   |                                                                                                                             |           |      |           |                       |
| SS400 Series                                | —                 | wave soldering process: $250^\circ\text{C}$ to $260^\circ\text{C}$ [482 °F to 500 °F] for 3 s max.                          |           |      |           |                       |
| SS500 Series                                |                   | infrared reflow process: peak temperature $245^\circ\text{C}$ [473 °F] for 10 s max.                                        |           |      |           |                       |

<sup>1</sup>For supply voltages above 24 Vdc, a capacitor may be needed between the output and supply pins to ensure proper operation.

### 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  $\mu\text{s}$  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.



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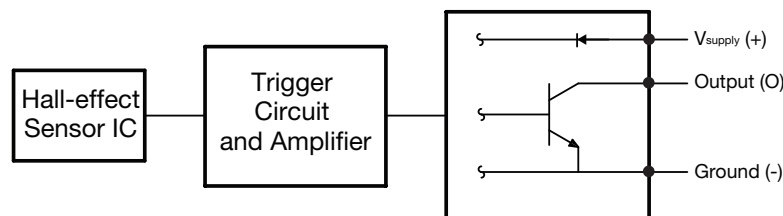
**Table 2. Absolute Maximum Specifications**

| Characteristic                              | Symbol     | Min. | Typ. | Max.     | Unit  |
|---------------------------------------------|------------|------|------|----------|-------|
| Supply voltage                              | $V_s$      | -1   | —    | 30       | V     |
| Applied output voltage:<br>SS400 Series     | $V_{out}$  | -0.5 | —    | 30       | V     |
| SS500 Series (off)                          |            | —    | —    | 30       |       |
| Output current:<br>$V_s = -1$ Vdc to 24 Vdc | $I_{sink}$ | —    | —    | 50       | mA    |
| $V_s = 24$ Vdc to 25 Vdc                    |            | —    | —    | 37       |       |
| $V_s = 25$ Vdc to 26 Vdc                    |            | —    | —    | 33       |       |
| $V_s = 26$ Vdc to 27 Vdc                    |            | —    | —    | 28       |       |
| $V_s = 27$ Vdc to 28 Vdc                    |            | —    | —    | 24       |       |
| $V_s = 28$ Vdc to 29 Vdc                    |            | —    | —    | 19       |       |
| $V_s = 29$ Vdc to 30 Vdc                    |            | —    | —    | 15       |       |
| Magnetic flux                               | —          | —    | —    | no limit | Gauss |

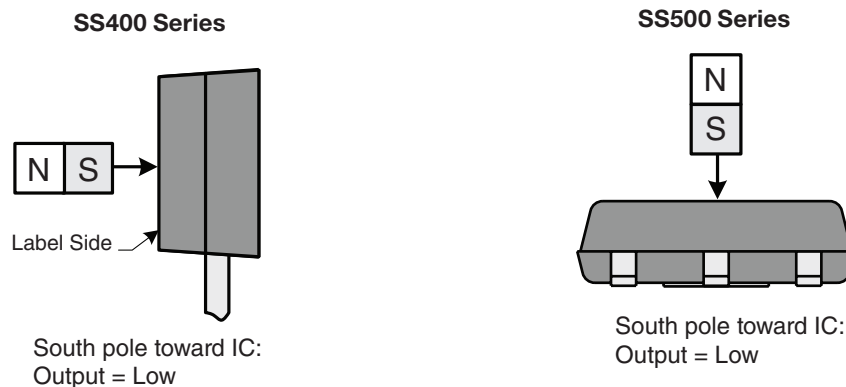
## NOTICE

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.

**Figure 1. Circuit Diagram**



**Figure 2. Magnetic Activation**



# Bipolar, Latching, or Unipolar Digital Hall-effect Sensor ICs:

SS400 Series, SS500 Series

Table 3. Magnetic Specifications

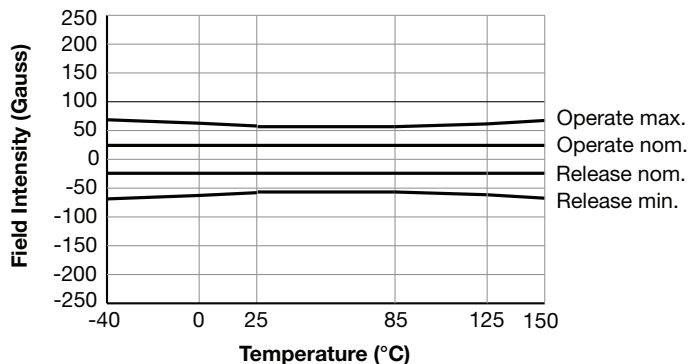
| Temperature        | Operating Characteristic | Magnetic Characteristic (Gauss) |         |       |         |          |         |       |         |       |         |          |         |       |         |
|--------------------|--------------------------|---------------------------------|---------|-------|---------|----------|---------|-------|---------|-------|---------|----------|---------|-------|---------|
|                    |                          | Bipolar                         |         |       |         | Unipolar |         |       |         |       |         | Latching |         |       |         |
|                    |                          | SS411                           | SS511AT | SS413 | SS513AT | SS441    | SS541AT | SS443 | SS543AT | SS449 | SS549AT | SS461    | SS561AT | SS466 | SS566AT |
| -40 °C<br>[-40 °F] | operate:                 |                                 |         |       |         |          |         |       |         |       |         |          |         |       |         |
|                    | minimum                  | NS                              |         | NS    |         | 50       |         | 110   |         | 285   |         | 5        | —       | 100   |         |
|                    | maximum                  | 70                              |         | 140   |         | 135      |         | 215   |         | 435   |         | 110      | 100     | 200   |         |
|                    | release:                 |                                 |         |       |         |          |         |       |         |       |         |          |         |       |         |
| 0 °C<br>[0 °F]     | minimum                  | -70                             |         | -140  |         | 20       |         | 80    |         | 210   |         | -110     | -100    | -200  |         |
|                    | maximum                  | NS                              |         | NS    |         | 120      |         | 190   |         | 360   |         | -5       | -5      | -100  |         |
|                    | differential (min.)      | 15                              |         | 20    |         | 15       |         | 25    |         | 30    |         | 50       | 50      | 200   |         |
|                    | operate:                 |                                 |         |       |         |          |         |       |         |       |         |          |         |       |         |
| 25 °C<br>[77 °F]   | minimum                  | NS                              |         | NS    |         | 53       |         | 110   |         | 305   |         | 5        |         | 100   |         |
|                    | maximum                  | 65                              |         | 140   |         | 117      |         | 190   |         | 400   |         | 90       |         | 185   |         |
|                    | release:                 |                                 |         |       |         |          |         |       |         |       |         |          |         |       |         |
|                    | minimum                  | -65                             |         | -140  |         | 20       |         | 80    |         | 230   |         | -90      |         | -185  |         |
| 85 °C<br>[185 °F]  | maximum                  | NS                              |         | NS    |         | 99       |         | 165   |         | 325   |         | -5       |         | -100  |         |
|                    | differential (min.)      | 15                              |         | 20    |         | 15       |         | 25    |         | 30    |         | 50       |         | 200   |         |
|                    | operate:                 |                                 |         |       |         |          |         |       |         |       |         |          |         |       |         |
|                    | minimum                  | NS                              |         | NS    |         | 55       |         | 110   |         | 310   |         | 10       |         | 100   |         |
| 125 °C<br>[257 °F] | maximum                  | 60                              |         | 140   |         | 115      |         | 180   |         | 390   |         | 85       |         | 180   |         |
|                    | release:                 |                                 |         |       |         |          |         |       |         |       |         |          |         |       |         |
|                    | minimum                  | -60                             |         | -140  |         | 20       |         | 75    |         | 235   |         | -85      |         | -180  |         |
|                    | maximum                  | NS                              |         | NS    |         | 95       |         | 155   |         | 315   |         | -10      |         | -100  |         |
| 150 °C<br>[302 °F] | differential (min.)      | 15                              |         | 20    |         | 20       |         | 25    |         | 30    |         | 50       |         | 200   |         |
|                    | operate:                 |                                 |         |       |         |          |         |       |         |       |         |          |         |       |         |
|                    | minimum                  | NS                              |         | NS    |         | 45       |         | 90    |         | 290   | —       | 10       |         | 95    |         |
|                    | maximum                  | 60                              |         | 140   |         | 120      |         | 180   |         | 400   | 400     | 85       |         | 180   |         |
| 125 °C<br>[257 °F] | release:                 |                                 |         |       |         |          |         |       |         |       |         |          |         |       |         |
|                    | minimum                  | -60                             |         | -140  |         | 15       |         | 70    |         | 215   | 315     | -85      |         | -180  |         |
|                    | maximum                  | NS                              |         | NS    |         | 105      |         | 165   |         | 325   | —       | -10      |         | -95   |         |
|                    | differential (min.)      | 12                              |         | 20    |         | 15       |         | 15    |         | 30    | 30      | 50       |         | 190   |         |
| 125 °C<br>[257 °F] | operate:                 |                                 |         |       |         |          |         |       |         |       |         |          |         |       |         |
|                    | minimum                  | NS                              |         | NS    |         | 40       |         | 80    |         | 270   | 290     | 5        |         | 80    |         |
|                    | maximum                  | 65                              |         | 140   |         | 123      |         | 190   |         | 410   | 400     | 100      |         | 180   |         |
|                    | release:                 |                                 |         |       |         |          |         |       |         |       |         |          |         |       |         |
| 150 °C<br>[302 °F] | minimum                  | -65                             |         | -140  |         | 15       |         | 60    |         | 200   | 215     | -100     |         | -180  |         |
|                    | maximum                  | NS                              |         | NS    |         | 115      |         | 180   |         | 340   | 325     | -5       |         | -80   |         |
|                    | differential (min.)      | 12                              |         | 20    |         | 8        |         | 10    |         | 30    | 30      | 50       |         | 160   |         |
|                    | operate:                 |                                 |         |       |         |          |         |       |         |       |         |          |         |       |         |
| 150 °C<br>[302 °F] | minimum                  | NS                              |         | NS    |         | 35       |         | 65    |         | 260   |         | 5        |         | 70    |         |
|                    | maximum                  | 70                              |         | 140   |         | 125      |         | 200   |         | 420   |         | 110      |         | 185   |         |
|                    | release:                 |                                 |         |       |         |          |         |       |         |       |         |          |         |       |         |
|                    | minimum                  | -70                             |         | -140  |         | 10       |         | 55    |         | 185   |         | -110     |         | -185  |         |
| 150 °C<br>[302 °F] | maximum                  | NS                              |         | NS    |         | 120      |         | 195   |         | 345   |         | -5       |         | -70   |         |
|                    | differential (min.)      | 10                              |         | 20    |         | 5        |         | 5     |         | 30    |         | 50       |         | 140   |         |

# Bipolar, Latching, or Unipolar Digital Hall-effect Sensor ICs:

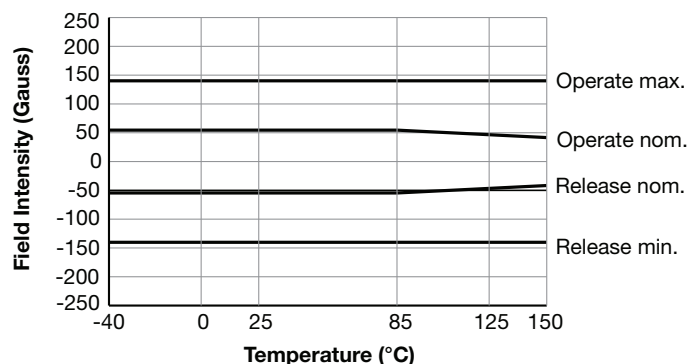
SS400 Series, SS500 Series

Figure 3. Operate and Release Point Performance Graphics

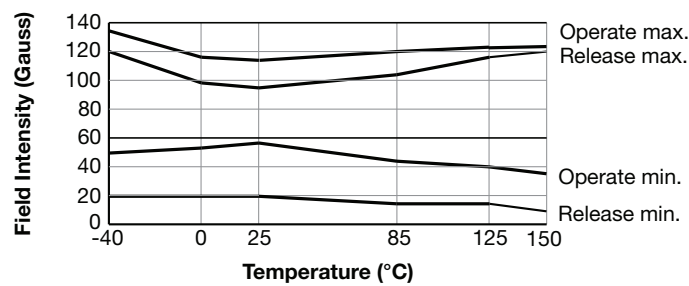
SS411/SS511AT



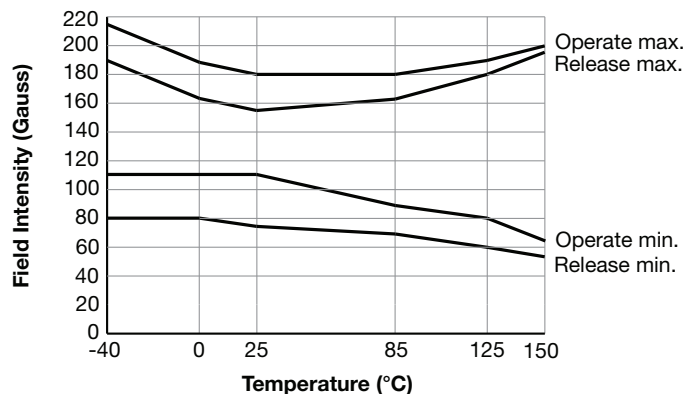
SS413/SS513AT



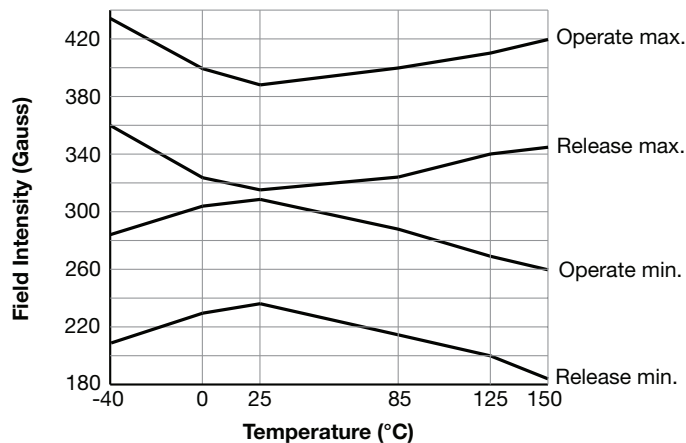
SS441/SS541AT



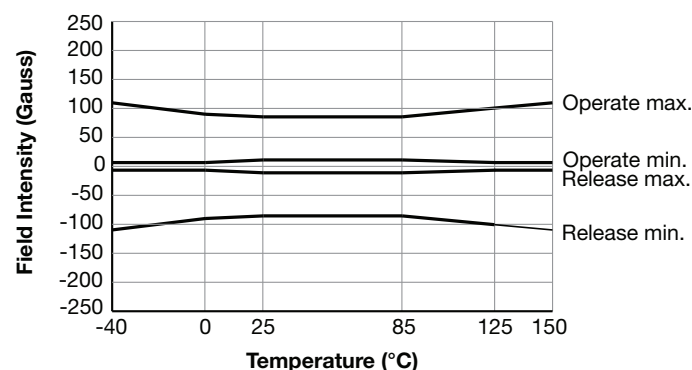
SS443/SS443AT



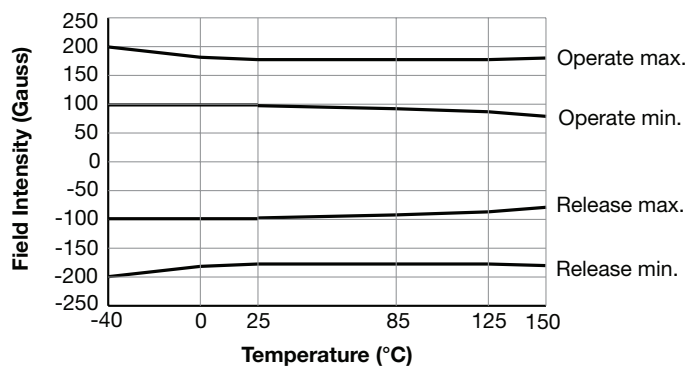
SS4449/SS549AT



SS461/SS561AT



SS466/SS566AT



# Bipolar, Latching, or Unipolar Digital Hall-effect Sensor ICs:

SS400 Series, SS500 Series

Figure 4. Circuit Diagrams

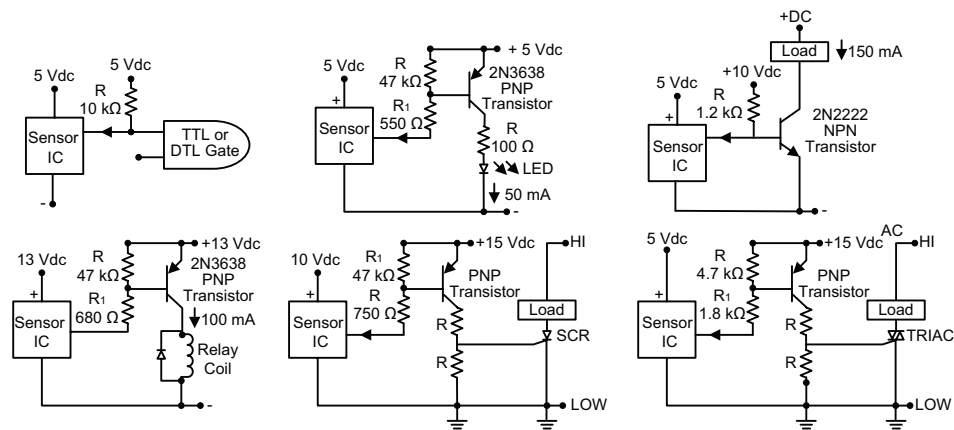
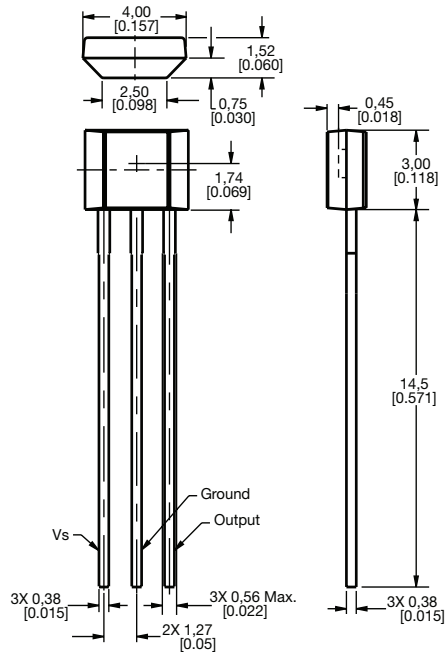
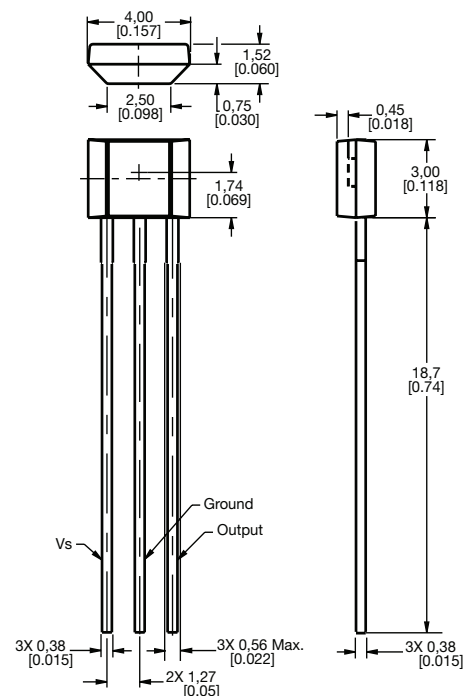


Figure 5. SS400 Series Flat TO-92-Style Mounting and Dimensional Drawings (For reference only: mm/[in].)

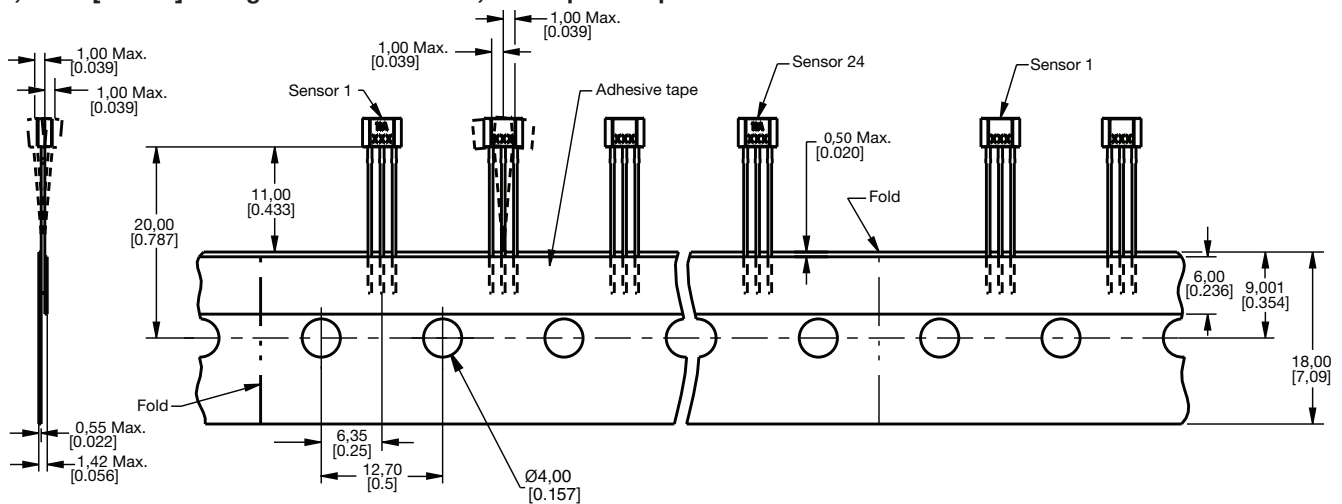
A: 14,5 mm [0.57 in] Straight Standard Leads Sensor IC, Bulk Pack



B: 18,7 mm [0.74 in] Straight Long Leads Sensor IC, Bulk Pack



C. 14,5 mm [0.57 in] Straight Standard Leads, Ammopack Tape-in-Box

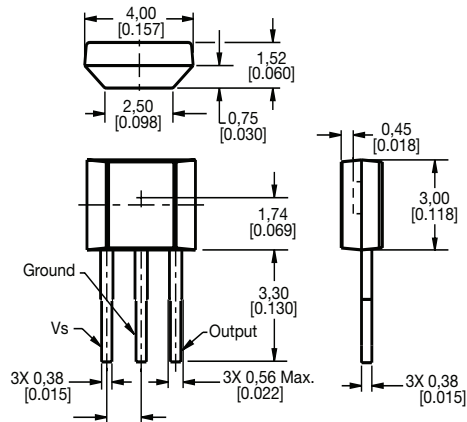


# Bipolar, Latching, or Unipolar Digital Hall-effect Sensor ICs:

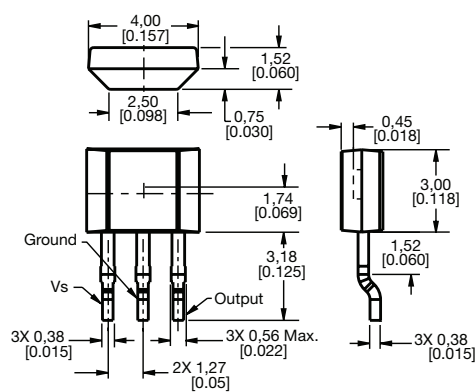
SS400 Series, SS500 Series

Figure 5. SS400 Series Flat TO-92-Style Mounting and Dimensional Drawings (continued)

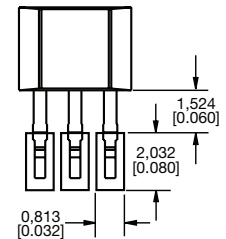
## D. 3,30 [0.130 in] Straight Reduced Leads Sensor IC, Bulk Pack



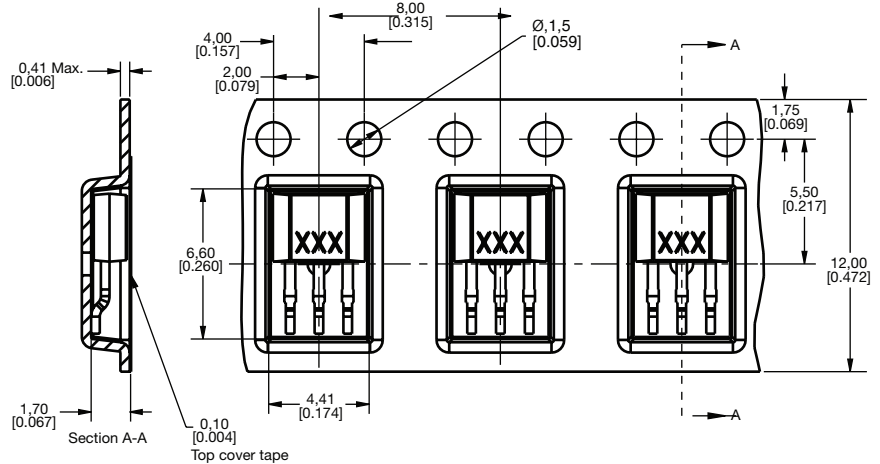
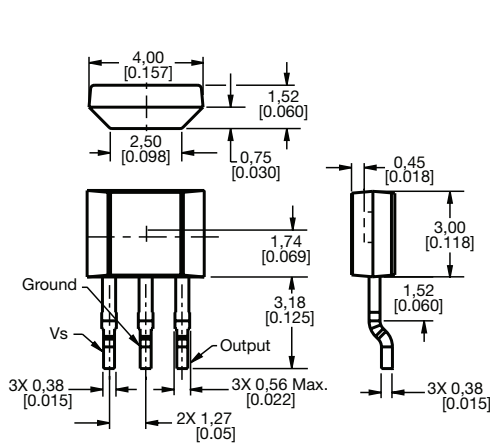
## E. 3,18 [0.125 in] Surface Mount Sensor IC, Bulk Pack



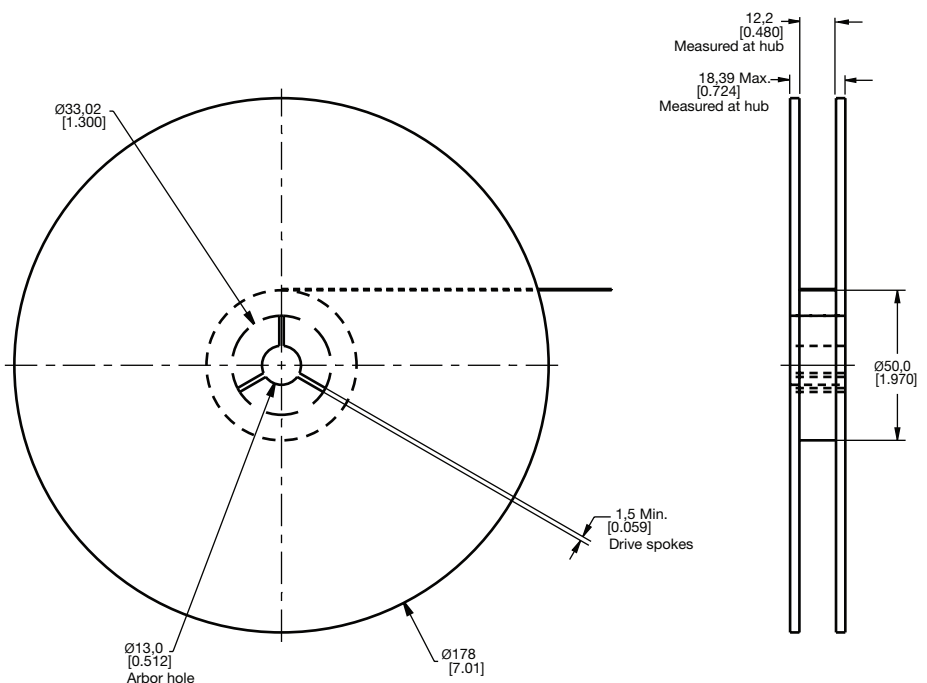
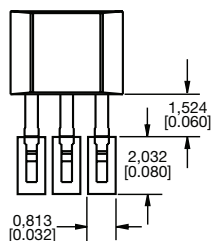
### PCB Land Pattern



## F. 3,18 [0.125 in] Surface Mount Sensor IC, Pocket Tape and Reel



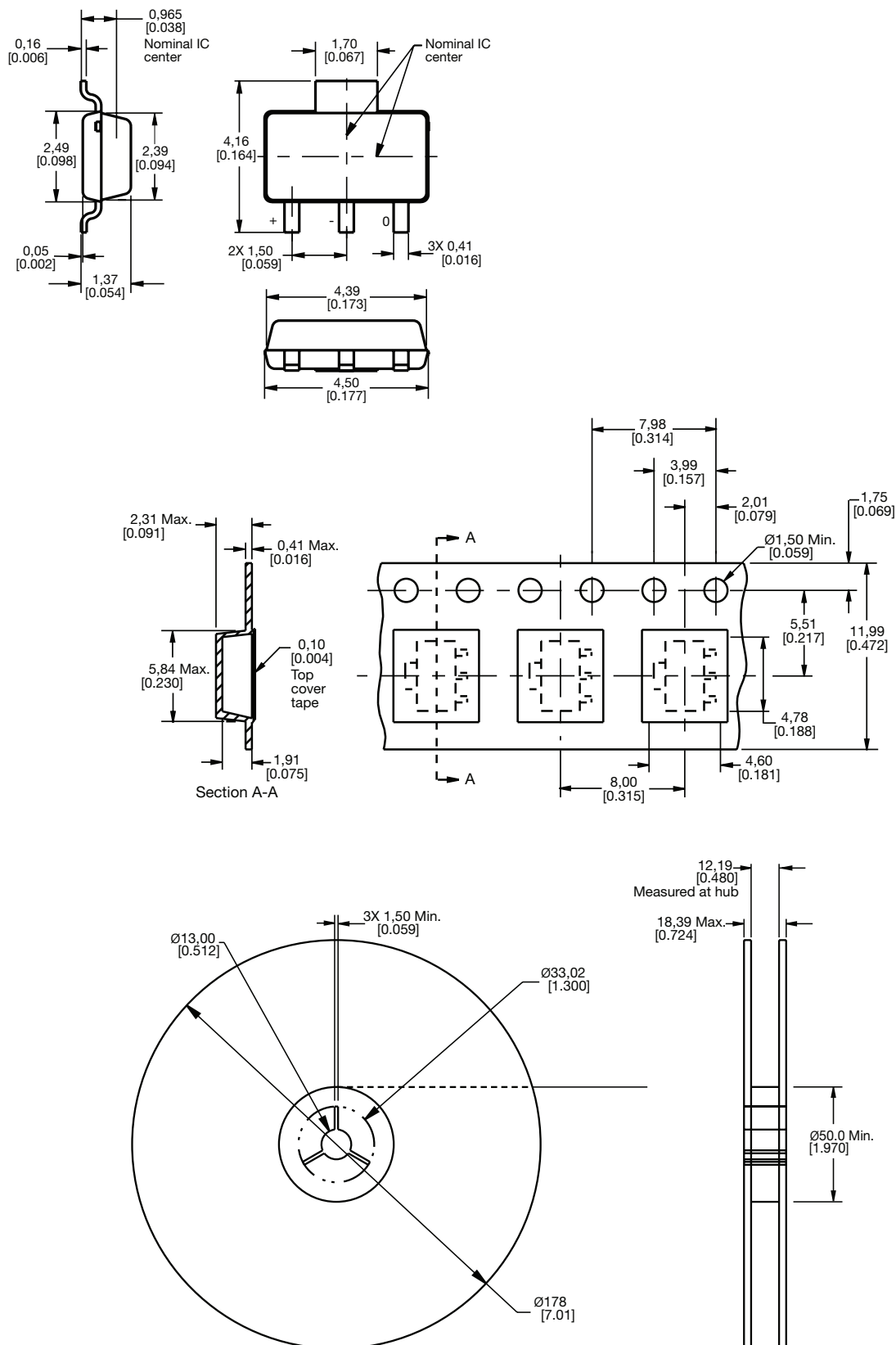
### PCB Land Pattern



# Bipolar, Latching, or Unipolar Digital Hall-effect Sensor ICs: SS400 Series, SS500 Series

**Figure 6. SS500 Series Mounting and Dimensional Drawings (For reference only: mm/[in].)**

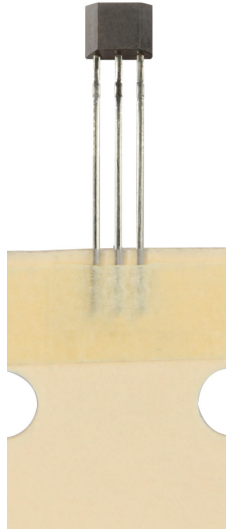
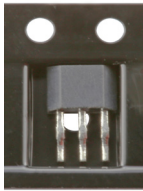
## SOT-89B Sensor IC, Pocket Tape and Reel



# Bipolar, Latching, or Unipolar Digital Hall-effect Sensor ICs:

## SS400 Series, SS500 Series

**Table 4. Order Guide for the SS400 Series (Flat TO-92-Style)**

| Catalog Listing                                                                          | Description | SS4XX                                                                                | SS4XX-L                                                                              | SS4XX-T3                                                                             |
|------------------------------------------------------------------------------------------|-------------|--------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| SS4XX: 14,5 mm [0.57 in] straight standard leads, bulk pack, 1000 units/bag              |             |   |   |   |
| SS411A                                                                                   | Bipolar     |                                                                                      |                                                                                      |                                                                                      |
| SS413A                                                                                   | Bipolar     |                                                                                      |                                                                                      |                                                                                      |
| SS441A                                                                                   | Unipolar    |                                                                                      |                                                                                      |                                                                                      |
| SS443A                                                                                   | Unipolar    |                                                                                      |                                                                                      |                                                                                      |
| SS449A                                                                                   | Unipolar    |                                                                                      |                                                                                      |                                                                                      |
| SS461A                                                                                   | Latching    |                                                                                      |                                                                                      |                                                                                      |
| SS466A                                                                                   | Latching    |                                                                                      |                                                                                      |                                                                                      |
| SS4XX-L: 18,7 mm [0.74 in] straight long leads, bulk pack, 1000 units/bag                |             |                                                                                      |                                                                                      |                                                                                      |
| SS461A-L                                                                                 | Latching    |                                                                                      |                                                                                      |                                                                                      |
| SS4XX-T3: 14,5 mm [0.57 in] straight standard leads, ammpack tape-in-box, 5000 units/box |             |                                                                                      |                                                                                      |                                                                                      |
| SS443A-T3                                                                                | Unipolar    |                                                                                      |                                                                                      |                                                                                      |
| SS449A-T3                                                                                | Unipolar    |                                                                                      |                                                                                      |                                                                                      |
| SS4XX-R: 3,30 [0.130 in] straight reduced leads, bulk pack, 1000 units/bag               |             |                                                                                      |                                                                                      |                                                                                      |
| SS411A-R                                                                                 | Bipolar     |                                                                                      |                                                                                      |                                                                                      |
| SS4XX-S: 3,18 [0.125 in] surface mount, bulk pack                                        |             |                                                                                      |                                                                                      |                                                                                      |
| SS411A-S                                                                                 | Bipolar     |  |  |  |
| SS443A-S                                                                                 | Unipolar    |                                                                                      |                                                                                      |                                                                                      |
| SS449A-S                                                                                 | Unipolar    |                                                                                      |                                                                                      |                                                                                      |
| SS4XX-SP: 3,18 [0.125 in] surface mount, pocket tape and reel, 1000 units/reel           |             |                                                                                      |                                                                                      |                                                                                      |
| SS443A-SP                                                                                | Unipolar    |                                                                                      |                                                                                      |                                                                                      |
| SS449A-SP                                                                                | Unipolar    |                                                                                      |                                                                                      |                                                                                      |

**Table 5. Order Guide for the SS500 Series (SOT-89B, Pocket Tape and Reel, 1000 Units/Reel)**

| Catalog Listing | Description |                                                                                       |
|-----------------|-------------|---------------------------------------------------------------------------------------|
| SS511AT         | Bipolar     |  |
| SS513AT         | Bipolar     |                                                                                       |
| SS541AT         | Unipolar    |                                                                                       |
| SS543AT         | Unipolar    |                                                                                       |
| SS549AT         | Unipolar    |                                                                                       |
| SS561AT         | Latching    |                                                                                       |
| SS566AT         | Latching    |                                                                                       |



## 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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Fort Mill, SC 29707  
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## 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 Honeywell may 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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32320997-A-EN IL50 GLO  
June 2016  
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