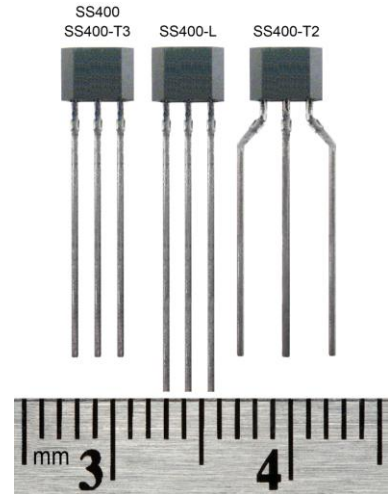


SS400 Series

Temperature Compensated Digital Hall-Effect Sensor ICs



DESCRIPTION

The SS400 Series sensor ICs are small, versatile, digital Hall-effect devices that are operated by the magnetic field from a permanent magnet or an electromagnet, and are designed to respond to alternating North and South poles or to a South pole only. Bipolar, latching and unipolar magnetics are available.

Band gap regulation provides stable operation over 3.8 Vdc to 30 Vdc supply voltage range. These sensors are capable of continuous 20 mA sinking output and may be cycled as high as 50 mA max. Its 3.8 V capability allows for use in many potential low voltage applications.

The digital, open collector sinking-type output is easily interfaced with a wide variety of electronic circuits.

FEATURES AND BENEFITS

- Quad-Hall IC design minimizes mechanical stress effects
- Temperature-compensated magnetics helps provide stable operation over a wide temperature range of -40 ° to 150 °C
- Miniature standard 3-lead plastic package with tape option for automated component placement, potentially reducing installation costs
- Broad supply voltage capability from 3.8 Vdc to 30 Vdc for application flexibility
- Digital, open collector sinking output for easy interfacing with a variety of common electronic circuits

To provide reliable products and consistent quality, the SS400 Series are tested at both 25 °C [75 °F] and 125 °C [257 °F]. All catalog listings in this series are qualified for operation up to 150 °C [302 °F].

For design flexibility, the lead and packaging options are:

- Straight leads, 14,99 mm [0.59 in] long, in bulk or ammpak tape-in-box packaging
- Straight leads, 18,7 mm [0.735 in] long, in bulk packaging
- Formed leads, 14,99 mm [0.59 in] long, in bulk or ammpak tape-in-box packaging

Please refer to SS400 Series Order Guide on page 7 for details.

POTENTIAL APPLICATIONS

Transportation:

- Speed and RPM (revolutions per minute) sensing
- Tachometer, counter pickup
- Motor and fan control
- Electric window lift
- 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

Medical:

- Motor assemblies
- Medication dispensing control

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Table 1. Operating Characteristics (over operating voltage and temperature, unless otherwise noted)

| Characteristic | Min. | Typ. | Max. | Note |
|--|---------|---------|----------|---|
| Supply voltage | 3.8 Vdc | – | 30 Vdc | – |
| Current consumption | – | – | 10 mA | – |
| Supply current (operated at 25 °C, Vs = 5 V) | – | 6.5 mA | – | – |
| Output voltage (operated) | – | – | 0.40 Vdc | sinking, 20 mA max. |
| Output current (operated) | – | – | 20 mA | – |
| Output leakage current (released) | – | – | 10 µA | – |
| Output switching time: | | | | V _{CC} = 12 V, RL = 1.6 kΩ, CL = 20 pF |
| rise, 10% to 90% | – | 0.05 µs | 1.5 µs | |
| fall, 90% to 10% | – | 0.15 µs | 1.5 µs | |

Table 2. Output Current Absolute Limits

| Supply Voltage | Output Current |
|------------------|----------------|
| -1 Vdc to 24 Vdc | 50 mA max. |
| 24 Vdc to 25 Vdc | 37 mA max. |
| 25 Vdc to 26 Vdc | 33 mA max. |
| 26 Vdc to 27 Vdc | 28 mA max. |
| 27 Vdc to 28 Vdc | 24 mA max. |
| 28 Vdc to 29 Vdc | 19 mA max. |
| 29 Vdc to 30 Vdc | 15 mA max. |

Table 3. Absolute Maximum Ratings

| Characteristic | Parameter |
|--------------------------------------|---|
| Supply voltage | -1 Vdc to +30 Vdc |
| Voltage externally applied to output | +30 Vdc max. (OFF only) -0.5 Vdc min. (OFF or ON) |
| Output ON current | see Table 2 |
| Operating temperature | -40 °C to 150 °C [-40 °F to 302 °F] |
| Storage temperature | -50 °C to 150 °C [-58 °F to 302 °F] |
| Magnetic flux | no limit; circuit cannot be damaged by magnetic overdrive |

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.



Temperature Compensated, Digital Hall-Effect Sensor ICs

Table 4. Magnetic Characteristics

| Temperature | Operating Characteristic | Catalog Listing | | | | | | |
|--------------------|--------------------------|--|--|--|--|--|--|--|
| | | SS411A SS411A-L SS411A-T2 SS411A-T3 | SS413A SS413A-L SS413A-T2 SS413A-T3 | SS441A SS441A-L SS441A-T2 SS441A-T3 | SS443A SS443A-L SS443A-T2 SS443A-T3 | SS449A SS449A-L SS449A-T2 SS449A-T3 | SS461A SS461A-L SS461A-T2 SS461A-T3 | SS466A SS466A-L SS466A-T2 SS466A-T3 |
| | | Bipolar | Bipolar | Unipolar | Unipolar | Unipolar | Latching | Latching |
| -40 °C [-40 °F] | min. op. | NS | NS | 50 G | 110 G | 285 G | 5 G | 100 G |
| | max. op. | 70 G | 140 G | 135 G | 215 G | 435 G | 110 G | 200 G |
| | min. rel. | -70 G | -140 G | 20 G | 80 G | 210 G | -110 G | -200 G |
| | max. rel. | NS | NS | 120 G | 190 G | 360 G | -5 G | -100 G |
| | min. dif. | 15 G | 20 G | 15 G | 25 G | 30 G | 50 G | 200 G |
| 0 °C [32 °F] | min. op. | NS | NS | 53 G | 110 G | 305 G | 5 G | 100 G |
| | max. op. | 65 G | 140 G | 117 G | 190 G | 400 G | 90 G | 185 G |
| | min. rel. | -65 G | -140 G | 20 G | 80 G | 230 G | -90 G | -185 G |
| | max. rel. | NS | NS | 99 G | 165 G | 325 G | -5 G | -100 G |
| | min. dif. | 15 G | 20 G | 15 G | 25 G | 30 G | 50 G | 200 G |
| 25 °C [77 °F] | min. op. | NS | NS | 55 G | 110 G | 310 G | 10 G | 100 G |
| | max. op. | 60 G | 140 G | 115 G | 180 G | 390 G | 85 G | 180 G |
| | min. rel. | -60 G | -140 G | 20 G | 75 G | 235 G | -85 G | -180 G |
| | max. rel. | NS | NS | 95 G | 155 G | 31 G G5 | -10 G | -100 G |
| | min. dif. | 15 G | 20 G | 20 G | 25 G | 30 G | 50 G | 200 G |
| 85 °C [185 °F] | min. op. | NS | NS | 45 G | 90 G | 290 G | 110 G | 95 G |
| | max. op. | 60 G | 140 G | 120 G | 180 G | 400 G | 85 G | 180 G |
| | min. rel. | -60 G | -140 G | 15 G | 70 G | 215 G | -85 G | -180 G |
| | max. rel. | NS | NS | 105 G | 165 G | 325 G | -10 G | -95 G |
| | min. dif. | 12 G | 20 G | 15 G | 15 G | 30 G | 50 G | 190 G |
| 125 °C [257 °F] | min. op. | NS | NS | 40 G | 80 G | 270 G | 5 G | 80 G |
| | max. op. | 65 G | 140 G | 123 G | 190 G | 410 G | 100 G | 180 G |
| | min. rel. | -65 G | -140 G | 15 G | 60 G | 200 G | -100 G | -180 G |
| | max. rel. | NS | NS | 115 G | 180 G | 340 G | -5 G | -80 G |
| | min. dif. | 12 G | 20 G | 8 G | 10 G | 30 G | 50 G | 160 G |
| 150 °C [302 °F] | min. op. | NS | NS | 35 G | 65 G | 260 G | 5 G | 70 G |
| | max. op. | 70 G | 140 G | 125 G | 200 G | 420 G | 110 G | 185 G |
| | min. rel. | -70 G | -140 G | 10 G | 55 G | 185 G | -110 G | -185 G |
| | max. rel. | NS | NS | 120 G | 195 G | 345 G | -5 G | -70 G |
| | min. dif. | 10 G | 20 G | 5 G | 5 G | 30 G | 50 G | 140 G |

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 >Brp and <Bop). Honeywell recommends allowing 10 μs for output voltage to stabilize after supply voltage has reached 5 V.

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Figure 1. Performance Charts and Block Diagram

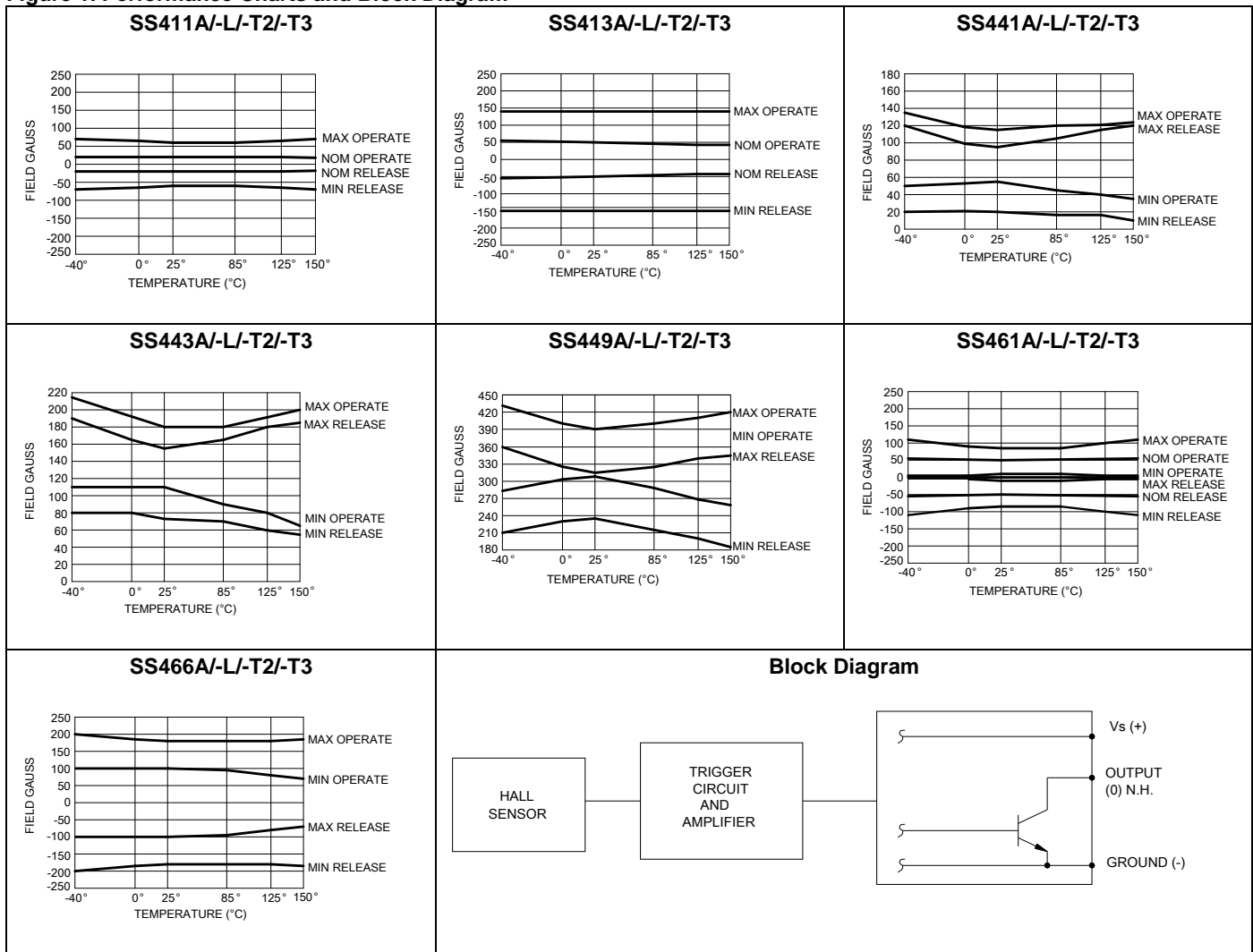
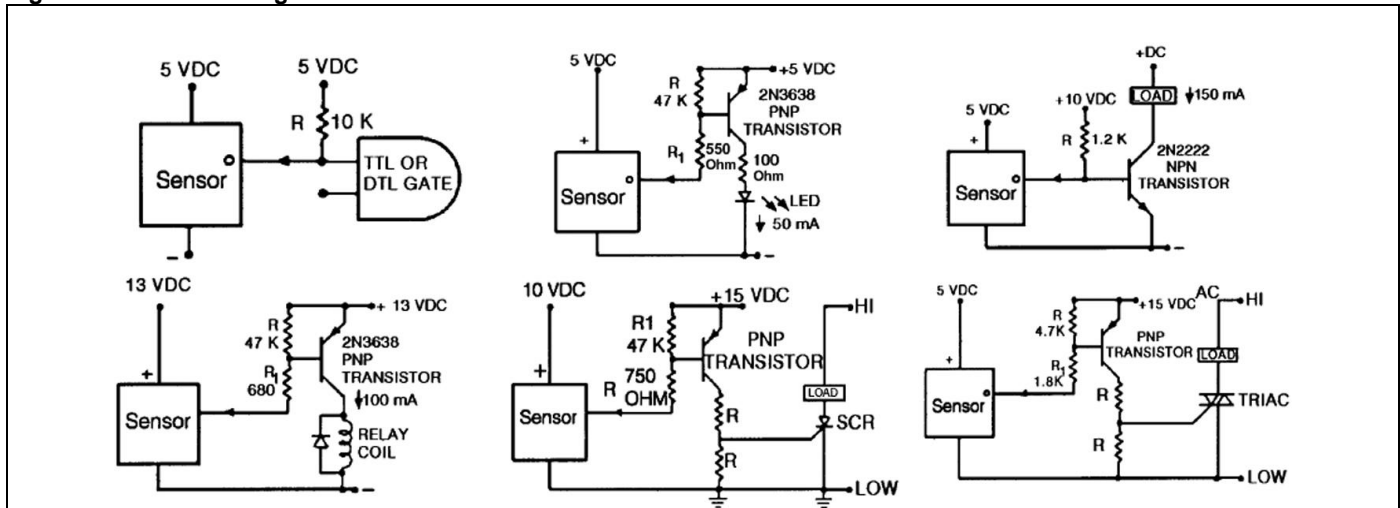
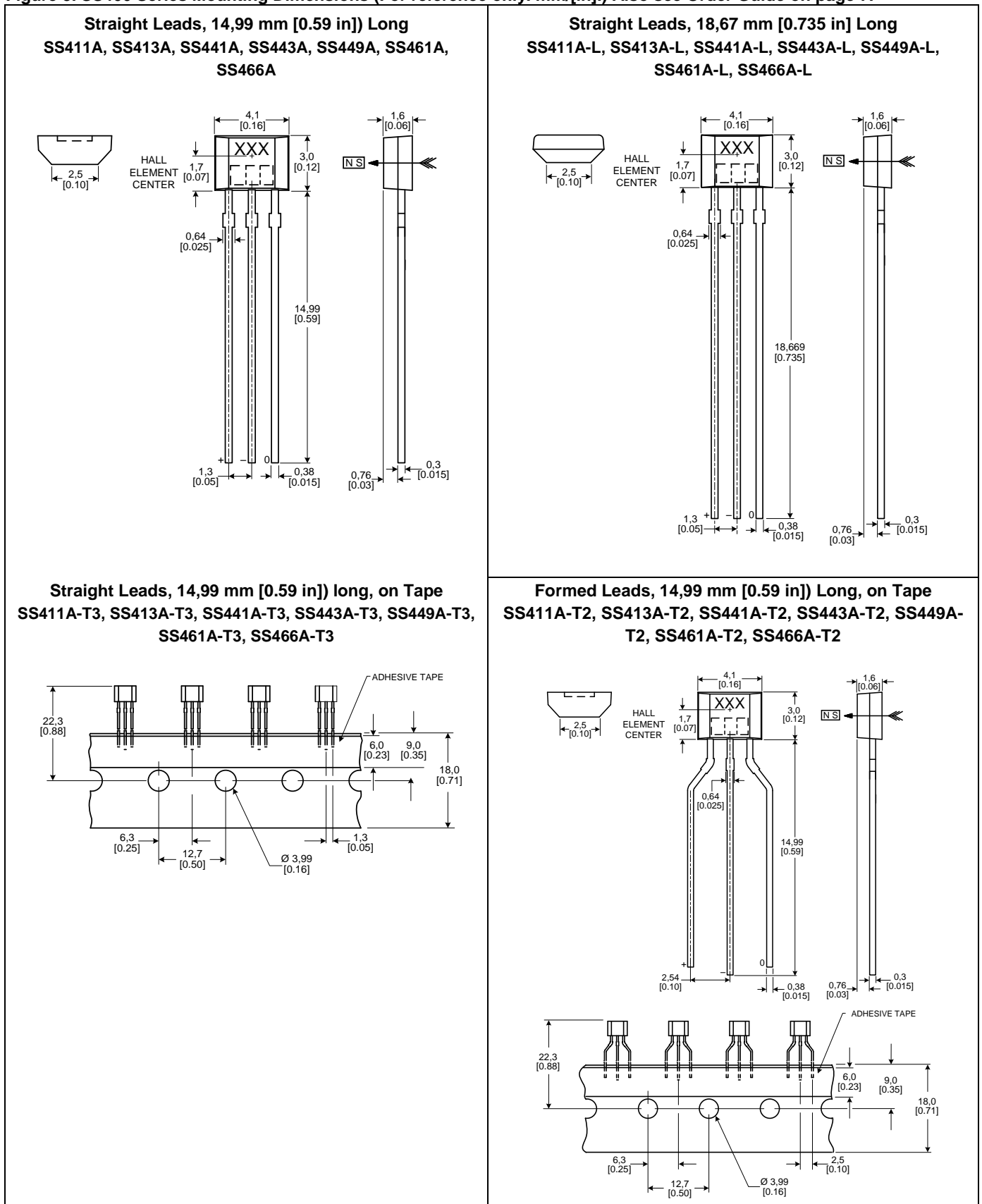


Figure 2. Electronic Diagrams



Temperature Compensated, Digital Hall-Effect Sensor ICs

Figure 3. SS400 Series Mounting Dimensions (For reference only. mm/[in.]) Also see Order Guide on page 7.



SS400 Series

Order Guide for SS400 Series

| Catalog Listing | Description |
|---|--|
| Digital Hall-effect sensor IC, flat TO-92-style package, straight leads 14,99 mm [0.59 in] long, 1,30 mm [0.05 in] spacing, bulk packaging (1000 units per bag) | |
| SS411A | Bipolar magnetics, low Gauss operating characteristics, |
| SS413A | Bipolar magnetics, medium Gauss operating characteristics |
| SS441A | Unipolar magnetics, low Gauss operating characteristics |
| SS443A | Unipolar magnetics, medium Gauss operating characteristics |
| SS449A | Unipolar magnetics, high Gauss operating characteristics |
| SS461A | Latching magnetics, low Gauss operating characteristics |
| SS466A | Latching magnetics, medium Gauss operating characteristics |
| Digital Hall-effect sensor IC, flat TO-92-style package, straight leads 18,67 mm [0.735 in] long, 1,30 mm [0.05 in] spacing, bulk packaging (1000 units per bag) | |
| SS411A-L | Bipolar magnetics, low Gauss operating characteristics |
| SS413A-L | Bipolar magnetics, medium Gauss operating characteristics |
| SS441A-L | Unipolar magnetics, low Gauss operating characteristics |
| SS443A-L | Unipolar magnetics, medium Gauss operating characteristics |
| SS449A-L | Unipolar magnetics, high Gauss operating characteristics |
| SS461A-L | Latching magnetics, low Gauss operating characteristics |
| SS466A-L | Latching magnetics, medium Gauss operating characteristics |
| Digital Hall-effect sensor IC, flat TO-92-style package, formed leads 14,99 mm [0.59 in] long, 2,54 mm [0.10 in] spacing, on ammpack tape-in-box (5000 units per box) | |
| SS411A-T2 | Bipolar magnetics, low Gauss operating characteristics |
| SS413A-T2 | Bipolar magnetics, medium Gauss operating characteristics |
| SS441A-T2 | Unipolar magnetics, low Gauss operating characteristics |
| SS443A-T2 | Unipolar magnetics, medium Gauss operating characteristics |
| SS449A-T2 | Unipolar magnetics, high Gauss operating characteristics |
| SS461A-T2 | Latching magnetics, low Gauss operating characteristics |
| SS466A-T2 | Latching magnetics, medium Gauss operating characteristics |
| Digital Hall-effect sensor IC, flat TO-92-style package, straight leads 14,99 mm [0.59 in] long, 1,30 mm [0.05 in] spacing, on ammpack tape-in-box (5000 units per box) | |
| SS411A-T3 | Bipolar magnetics, low Gauss operating characteristics |
| SS413A-T3 | Bipolar magnetics, medium Gauss operating characteristics |
| SS441A-T3 | Unipolar magnetics, low Gauss operating characteristics |
| SS443A-T3 | Unipolar magnetics, medium Gauss operating characteristics |
| SS449A-T3 | Unipolar magnetics, high Gauss operating characteristics |
| SS461A-T3 | Latching magnetics, low Gauss operating characteristics |
| SS466A-T3 | Latching magnetics, medium Gauss operating characteristics |

WARNING

MISUSE OF DOCUMENTATION

- The information presented in this product sheet 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.

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.

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:

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