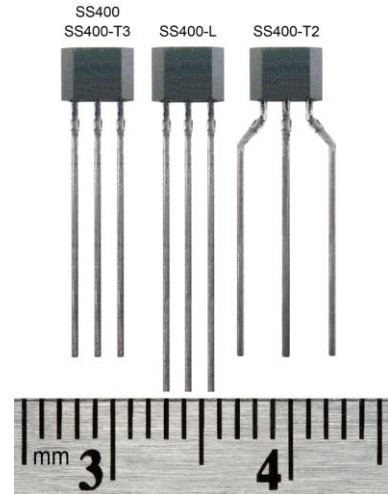


SS400 Series

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

SS400 Series

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 μ A	–
Output switching time:				V _{CC} = 12 V, RL = 1.6 k Ω , CL = 20 pF
rise, 10% to 90%	–	0.05 μ s	1.5 μ s	
fall, 90% to 10%	–	0.15 μ s	1.5 μ s	

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	SS413A	SS441A	SS443A	SS449A	SS461A	SS466A
		SS411A-L	SS413A-L	SS441A-L	SS443A-L	SS449A-L	SS461A-L	SS466A-L
		SS411A-T2	SS413A-T2	SS441A-T2	SS443A-T2	SS449A-T2	SS461A-T2	SS466A-T2
		SS411A-T3	SS413A-T3	SS441A-T3	SS443A-T3	SS449A-T3	SS461A-T3	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 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.

SS400 Series

Figure 1. Performance Charts and Block Diagram

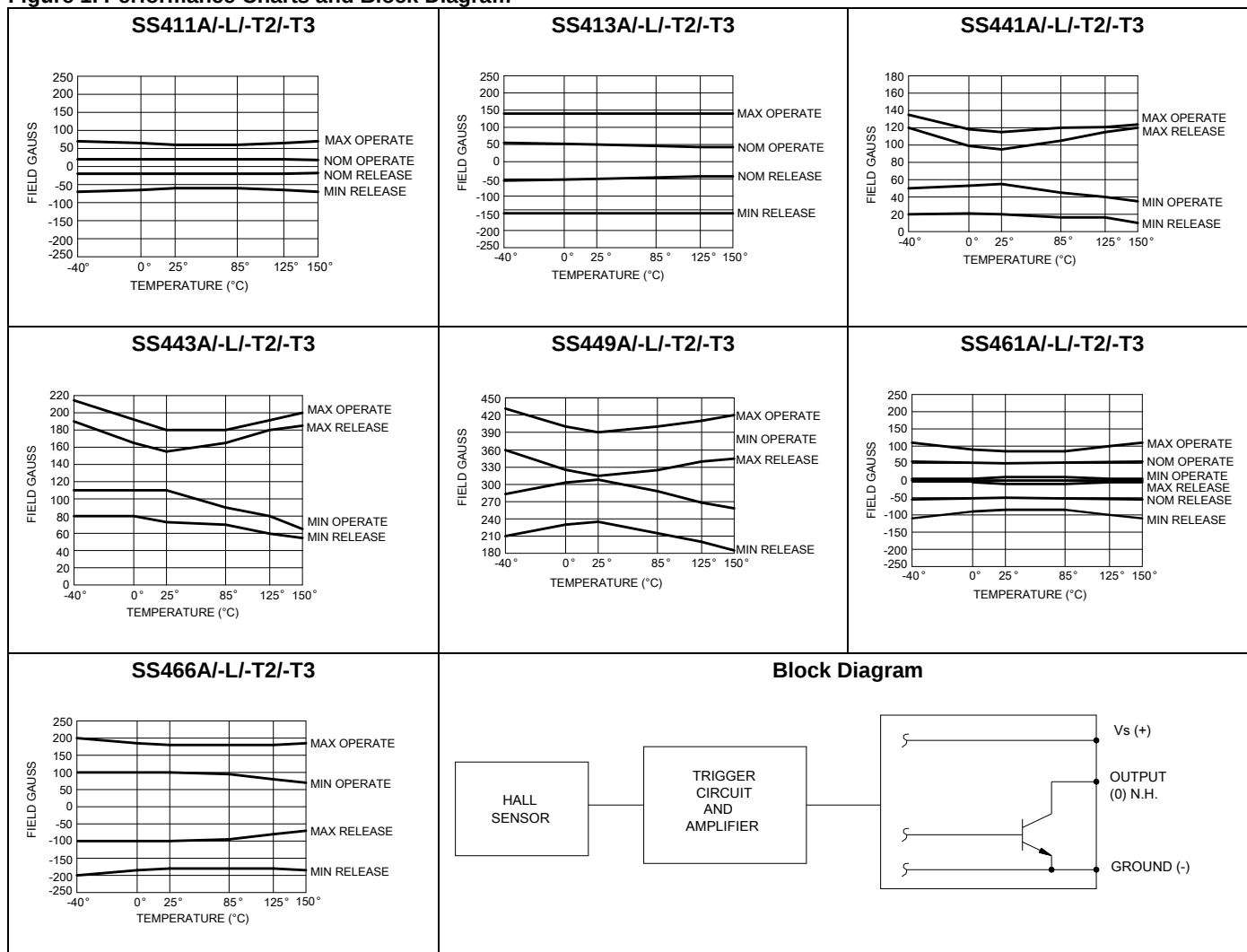
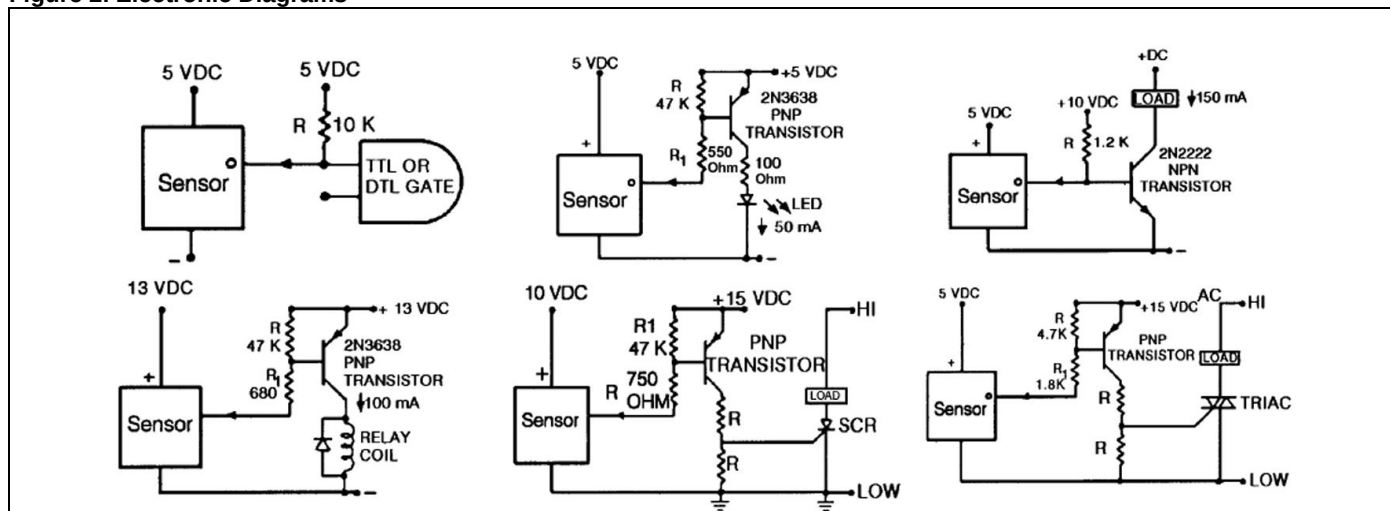
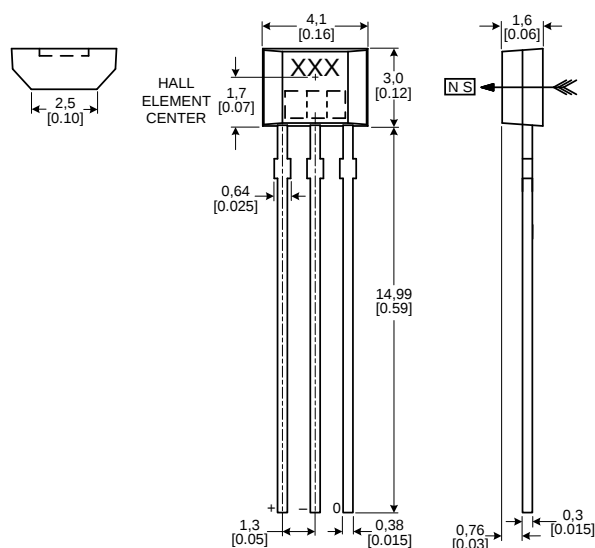


Figure 2. Electronic Diagrams



Straight Leads, 14,99 mm [0.59 in]) Long
SS411A, SS413A, SS441A, SS443A, SS449A, SS461A,
SS466A



Technical drawing of a Hall element assembly, showing three views with dimensions in mm and inches.

Top View (Left): Shows the Hall element with a width of 2.5 [0.10].

Side View (Middle): Shows the assembly with a total height of 4.1 [0.16]. The Hall element is 1.7 [0.07] high. The distance from the top of the Hall element to the top of the mounting pins is 3.0 [0.12]. The distance from the top of the mounting pins to the bottom of the assembly is 18.669 [0.735]. The distance from the center of the Hall element to the center of the mounting pins is 0.64 [0.025]. The distance from the center of the Hall element to the center of the mounting pins is 1.3 [0.05]. The distance from the center of the Hall element to the center of the mounting pins is 0.38 [0.015].

Front View (Right): Shows the assembly with a total width of 1.6 [0.06]. The distance from the center of the Hall element to the center of the mounting pins is 0.3 [0.015]. The distance from the center of the Hall element to the center of the mounting pins is 0.76 [0.03].

Technical drawing of a Hall element assembly, showing dimensions in mm and inches.

Top View (Left): Shows a trapezoidal shape with a width of 2.5 [0.10].

Side View (Center): Shows the Hall element (XXX) mounted on a substrate. Dimensions include:

- Top width: 4.1 [0.16]
- Top thickness: 1.7 [0.07]
- Bottom thickness: 3.0 [0.12]
- Lead wire diameter: 0.64 [0.025]
- Lead wire length: 14.99 [0.59]
- Lead wire spacing: 2.54 [0.10]
- Lead wire diameter at base: 0.38 [0.015]
- Lead wire diameter at tip: 0.76 [0.03]

Side View (Right): Shows the adhesive tape (N) with a width of 1.6 [0.06] and a thickness of 0.3 [0.015].

Bottom View (Bottom): Shows the assembly mounted on a substrate. Dimensions include:

- Substrate width: 22.3 [0.88]
- Substrate thickness: 6.3 [0.25]
- Substrate diameter: Ø 3.99 [0.16]
- Substrate spacing: 12.7 [0.50]
- Substrate width at bottom: 2.5 [0.10]
- Substrate thickness at bottom: 6.0 [0.23]
- Substrate diameter at bottom: Ø 3.99 [0.16]
- Substrate spacing at bottom: 9.0 [0.35]
- Substrate thickness at bottom: 18.0 [0.71]

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 ammopack 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 ammopack 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

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