



### SS443A



*Actual product appearance may vary.*

**SS400 Series Unipolar Hall-Effect  
Digital Position Sensor; radial lead IC  
package**

#### Features

- Digital current sinking output
- Quad-Hall design virtually eliminates mechanical stress effects
- Temperature compensated magnetics
- Operate/release points can be customized
- High output current capability
- Operate/release points symmetrical around zero gauss (bipolar/latch)
- Package material: Plaskon 3300H
- Surface mount version available: SS400-S (with cut and formed leads)

#### Potential Applications

- Speed and RPM sensor
- Brushless DC motor commutation
- Motor and fan control
- Magnetic encoding
- Tachometer, counter pickup
- Disc speed, tape rotation sensing
- Flow-rate sensing

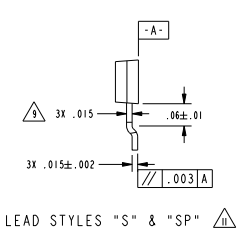
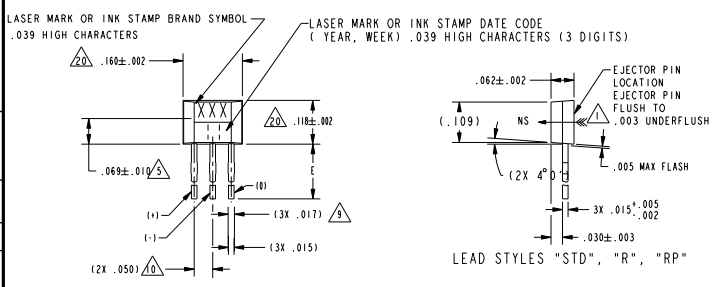
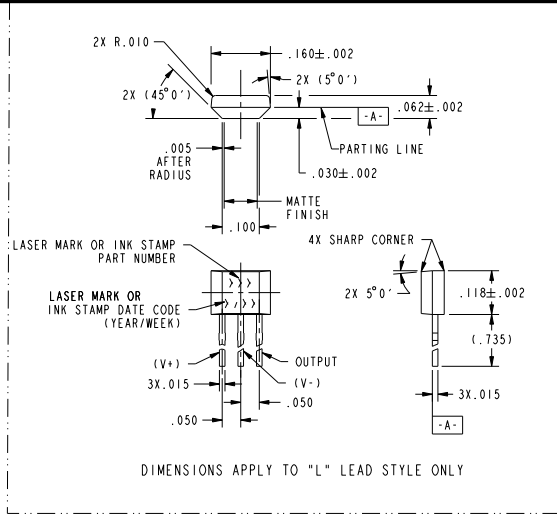
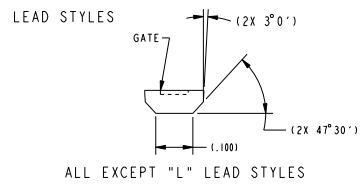
#### Description

SS400 Series position sensors have a thermally balanced integrated circuit over full temperature range. The negative compensation slope is optimized to match the negative temperature coefficient of lower cost magnets. Bipolar, latching and unipolar magnetics are available.

Band gap regulation provides extremely stable operation over 3.8 Vdc to 30 Vdc supply voltage range.

**NOTE:** Interruption of power to a latching device may cause the output to change state when power is restored. If a magnetic field of sufficient strength is present, the sensor output will be in the condition dictated by the magnetic field.

Product Specifications	
Product Type	Hall-Effect Digital Position Sensor IC
Package Quantity/Type	Available in 1,000/Bag
Package Style	Radial Lead IC
Supply Voltage	3.8 Vdc to 30.0 Vdc
Output Type	Sink
Termination Type	PC Board
Magnetic Actuation Type	Unipolar
Operating Temperature Range	-40 °C to 150 °C [-40 °F to 302 °F]
Storage Temperature	-65 °C to 160 °C [-85 °F to 320 °F]
Output Voltage	0.4 Vdc max.
Switching Time Rise (10 % to 90 %)	1.5 µs max.
Switching Time Fall (90 % to 10 %)	1.5 µs max.
Availability	Global
Supply Current (max. @ 25 °C)	10 mA
Output Current (max.)	20 mA
Operate Point @ 25 °C	18.0 mT [180 G] max.
Release Point @ 25 °C	7.5 mT [75 G] min.
Leakage Current max.	10 µA
Differential	0.5 mT [5 G] min.
Series Name	SS400



- NOTES**
- 1 THE MAGNETIC FLUX USED TO OPERATE THE SWITCH MUST BE IN THE DIRECTION AND LOCATION SHOWN (THIS ASSUMES THE CONVENTION THAT THE DIRECTION OF THE EXTERNAL FLUX OF A MAGNET IS FROM THE NORTH TO THE SOUTH POLE OF THE MAGNET) THE MAGNETIC FIELD STRENGTH (GAUSS) REQUIRED TO CAUSE THE SWITCH TO CHANGE STATE (OPERATE AND RELEASE) WILL BE AS TABULATED. TO TEST THE SWITCH AGAINST THE SPECIFIED LIMITS, THE SWITCH MUST BE PLACED IN A UNIFORM MAGNETIC FIELD. ABSOLUTE MAXIMUM RATINGS ARE THE EXTREME LIMITS THE DEVICE WILL MOMENTARILY WITHSTAND WITHOUT DAMAGE TO THE DEVICE. ELECTRICAL AND MAGNETIC CHARACTERISTICS ARE NOT GUARANTEED IF THE RATED VOLTAGE AND/OR CURRENTS ARE EXCEEDED NOR WILL THE DEVICE NECESSARILY OPERATE AT ABSOLUTE MAXIMUM RATINGS TEST CONDITIONS:  $V_{CC}=12V$ ,  $R_2=1.6K$  OHMS,  $C_2=20pF$
  - 2 APPROXIMATE HALL ELEMENT LOCATION
  - 3 LEADS MUST BE ADEQUATELY SUPPORTED DURING ANY FORMING/SHEERING OPERATION TO ASSURE THAT THE LEADS ARE NOT STRESSED WITHIN THE PLASTIC
  - 4 PCB WAVE SOLDERING GUIDELINES ARE AS FOLLOWS:  
250°C PEAK FOR 10 S MAX OR 260°C PEAK FOR 5S MAX SOLDERING TIME
  - 5 BURRED ARE ALLOWED ONLY IF FULL LENGTH OF LEADS WILL PASS THROUGH Ø.023 HOLE. LEAD REFERENCE DIMENSIONS DO NOT INCLUDE SOLDER THICKNESS
  - 6 DIMENSION REFERS TO THE LOCATION OF LEAD CENTERLINES AS THEY EXIT THE PLASTIC PACKAGE
  - 7 TYPICAL DIMENSIONS NOT SHOWN IN LEAD STYLE "S" AND "SP"
  - 8 SOME COMBINATIONS OF BASIC LISTING AND PACKING OPTIONS ARE NOT AVAILABLE TAPE AND AMMOPACK PER EIA-468-A-1990
  - 9 POCKET TAPE AND REEL PER EIA-481-A-1986
  - 10  $V_{CC}=30V$ ,  $I_{SINK}=20mA$ ,  $-40^{\circ}C<T<150^{\circ}C$ , B-MAX OP GAUSS FOR SPECIFIC LISTING
  - 11  $V_{OH}=1-30V$ ,  $V_{CC}=24V$ , B-MIN RELEASE GAUSS FOR SPECIFIC LISTING
  - 12 AMMOPACK STYLE "T2" AND "T3". 24 SWITCHES BETWEEN FOLDS. SKIP 1 SPACE AT FOLD. MAY BE REFERRED TO AS "FAN FOLD"
  - 13 LEAD STRAIGHTNESS MAY BE DETERIORATED ON SOME UNITS BY BULK PACKAGING. APPLICATIONS HAVING A CRITICAL LEAD STRAIGHTNESS REQUIREMENT SHOULD USE A TAPE PACKAGING OPTION
  - 14 MOLDED PART DIMENSIONS DO NOT INCLUDE FLASH. FLASH IS LIMITED TO .005 MAX
  - 15 THESE 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 > B<sub>OP</sub> AND < B<sub>OP</sub>). MICRO SWITCH RECOMMENDS THAT THE APPLICATION CIRCUIT DESIGNER ALLOW 10 MICROSECONDS AFTER SUPPLY VOLTAGE HAS REACHED 5 VOLTS FOR THE OUTPUT VOLTAGE TO STABILIZE

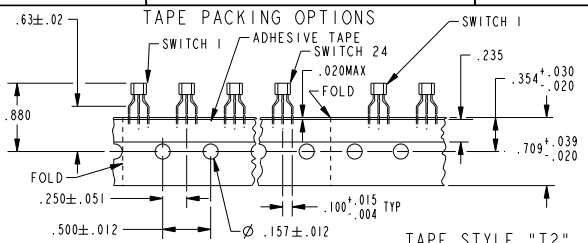


THIRD ANGLE PROJECTION			
SCALE 5 : 1			
DO NOT SCALE PRINT			
TOLERANCES			
APPLY TO DESIGN UNITS. CONVERSIONS ARE ONLY FOR REFERENCE. UNLESS NOTED, DIMENSIONS ARE:			
IN	MM	IN	MM
1/16	1.5748	1/32	0.7620
1/8	3.1750	3/16	4.7500
1/4	6.3500	1/2	12.7000
3/8	9.5250	5/8	15.8750
1/2	12.7000	3/4	19.0500
5/8	15.8750	7/8	22.1250
3/4	19.0500	1	25.4000
7/8	22.1250	1 1/8	29.5250
1	25.4000	1 1/4	31.7500
1 1/8	29.5250	1 3/8	34.9250
1 1/4	31.7500	1 7/8	44.4750
1 3/8	34.9250	2	50.8000
1 7/8	44.4750	2 1/4	60.3250
2	50.8000	3	76.2000
2 1/4	60.3250	4	101.6000
3	76.2000	5	127.0000
4	101.6000	6	152.4000
5	127.0000	8	203.2000
6	152.4000	10	254.0000
8	203.2000	12	304.8000
10	254.0000	15	381.0000
12	304.8000	20	508.0000
15	381.0000	25	635.0000
20	508.0000	30	762.0000
25	635.0000	40	1016.0000
30	762.0000	50	1270.0000
40	1016.0000	75	1905.0000
50	1270.0000	100	2540.0000
75	1905.0000	150	3810.0000
100	2540.0000	200	5080.0000
150	3810.0000	300	7620.0000
200	5080.0000	400	10160.0000
300	7620.0000	500	12700.0000
400	10160.0000	600	15240.0000
500	12700.0000	800	20320.0000
600	15240.0000	1000	25400.0000
800	20320.0000	1200	30480.0000
1000	25400.0000	1500	38100.0000
1200	30480.0000	2000	50800.0000
1500	38100.0000	2500	63500.0000
2000	50800.0000	3000	76200.0000
2500	63500.0000	4000	101600.0000
3000	76200.0000	5000	127000.0000
4000	101600.0000	6000	152400.0000
5000	127000.0000	8000	203200.0000
6000	152400.0000	10000	254000.0000
8000	203200.0000	12000	304800.0000
10000	254000.0000	15000	381000.0000
12000	304800.0000	20000	508000.0000
15000	381000.0000	25000	635000.0000
20000	508000.0000	30000	762000.0000
25000	635000.0000	40000	1016000.0000
30000	762000.0000	50000	1270000.0000
40000	1016000.0000	60000	1524000.0000
50000	1270000.0000	80000	2032000.0000
60000	1524000.0000	100000	2540000.0000
80000	2032000.0000	120000	3048000.0000
100000	2540000.0000	150000	3810000.0000
120000	3048000.0000	200000	5080000.0000
150000	3810000.0000	250000	6350000.0000
200000	5080000.0000	300000	7620000.0000
250000	6350000.0000	400000	10160000.0000
300000	7620000.0000	500000	12700000.0000
400000	10160000.0000	600000	15240000.0000
500000	12700000.0000	800000	20320000.0000
600000	15240000.0000	1000000	25400000.0000
800000	20320000.0000	1200000	30480000.0000
1000000	25400000.0000	1500000	38100000.0000
1200000	30480000.0000	2000000	50800000.0000
1500000	38100000.0000	2500000	63500000.0000
2000000	50800000.0000	3000000	76200000.0000
2500000	63500000.0000	4000000	101600000.0000
3000000	76200000.0000	5000000	127000000.0000
4000000	101600000.0000	6000000	152400000.0000
5000000	127000000.0000	8000000	203200000.0000
6000000	152400000.0000	10000000	254000000.0000
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20000000	508000000.0000	30000000	762000000.0000
25000000	635000000.0000	40000000	1016000000.0000
30000000	762000000.0000	50000000	1270000000.0000
40000000	1016000000.0000	60000000	1524000000.0000
50000000	1270000000.0000	80000000	2032000000.0000
60000000	1524000000.0000	100000000	2540000000.0000
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120000000000	3048000000000.0000	200000000000	5080000000000.0000
150000000000	3810000000000.0000	250000000000	6350000000000.0000
200000000000	5080000000000.0000	300000000000	7620000000000.0000
250000000000	6350000000000.0000	400000000000	10160000000000.0000
300000000000	7620000000000.0000	500000000000	12700000000000.0000
400000000000	10160000000000.0000	600000000000	15240000000000.0000
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600000000000	15240000000000.0000	1000000000000	25400000000000.0000
800000000000	20320000000000.0000	1200000000000	30480000000000.0000
1000000000000	25400000000000.0000	1500000000000	38100000000000.0000
1200000000000	30480000000000.0000	2000000000000	50800000000000.0000
1500000000000	38100000000000.0000	2500000000000	63500000000000.0000
2000000000000	50800000000000.0000	3000000000000	76200000000000.0000
2500000000000	63500000000000.0000	4000000000000	101600000000000.0000
3000000000000	76200000000000.0000	5000000000000	127000000000000.0000
4000000000000	101600000000000.0000	6000000000000	152400000000000.0000
5000000000000	127000000000000.0000	8000000000000	203200000000000.0000
6000000000000	152400000000000.0000	10000000000000	254000000000000.0000
8000000000000	203200000000000.0000	12000000000000	304800000000000.0000
10000000000000	254000000000000.0000	15000000000000	381000000000000.0000
12000000000000	304800000000000.0000	20000000000000	508000000000000.0000
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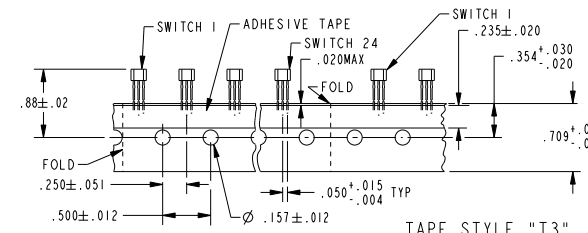
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 JAF  
 26 OCT 97  
 PTC/CAD 3D  
 DRAWN  
 KED  
 14 JAN 99  
 CHECK JAF  
 14 JAN 99  
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 RELEASE NO. PR-21345  
 REPLACES PAGE 2 OF 4

**MICRO SWITCH**  
 a Honeywell Division  
**SOLID STATE SENSOR**  
**SS400 SERIES CHART 1**

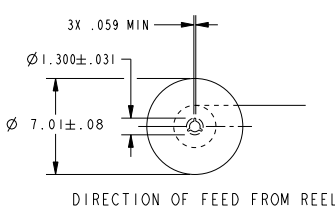
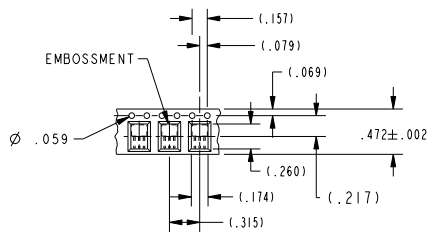
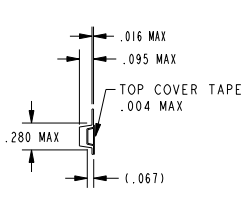
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TAPE STYLE "T2" 13 18



TAPE STYLE "T3" 13 18



TAPE STYLE "SP" & "RP" 14

CATALOGING SYSTEM 12

PREFIX SUFFIX  
 BASIC CATALOG LISTING: PACKAGE STYLE, MAGNETIC TYPE, ELECTRICAL/MAGNETIC SPECS  
 LEAD & PACKAGING OPTIONS: BULK, TAPE & REEL, POCKET TAPE & REEL

CHARACTERS IN THESE POSITIONS OF THE LISTING ARE BRANDED ON THE PRODUCT

SS441A  
 SS4=PACKAGE STYLE  
 MAGNETIC TYPE  
 1=BIPOLAR  
 4=UNIPOLAR  
 6=LATCH  
 9=LINEAR  
 RELATIVE GAUSS OPERATING RANGE (0-9, 9=HIGH GAUSS)#  
 ELECTRICAL/MAGNETIC OPTIONS (A-K, & U-Z)  
 A=STANDARD  
 B-K & U-Z=SPECIALS  
 SPECIAL FEATURE (BLANK, 1-9)  
 BLANK=STANDARD  
 1-9=SPECIALS

DESCRIPTION	NOMINAL LEAD SPACING	NOMINAL "E" DIM LENGTH ±.015	PARTS PER CONTAINER
STANDARD, BULK PACK <span style="border: 1px solid black; padding: 2px;">19</span>	.050	.590	1000/BAG
-T 2 TAPE, AMMOPACK	.100	.590	5000/BOX
-T 3 TAPE, AMMOPACK	.050	.590	5000/BOX
-S SURFACE MOUNT, BULK PACK	.050	.125	1000/BAG
-S P SURFACE MOUNT, POCKET TAPE	.050	.125	1000/REEL
-R REDUCED LENGTH, BULK PACK	.050	.130	1000/BAG
-R P REDUCED LENGTH, POCKET TAPE	.050	.130	1000/REEL
-L LONG LEADS, BULK PACK	.050	.735	1000/BAG



THIRD ANGLE PROJECTION	
SCALE	NONE
DO NOT SCALE PRINT	
UNLESS OTHERWISE SPECIFIED TOLERANCES ARE	
ONE PLACE	(.01) ±.030
TWO PLACE	(.00) ±.015
THREE PLACE	(.000) ±.005
ANGLES	±
WEIGHT	

ANSI Y14.5M-1982 APPLIES

ISSUE 16  
 CATALOG LISTING SS400 SERIES CHART 1  
 REVISIONS  
 E 0034535  
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 RELEASE NO. PR-21345  
 PAGE 3 OF 4  
 REPLACES

TABLE 1 - MAGNETIC AND ELECTRICAL SPECIFICATIONS  $\Delta$   $\nabla$   $\nabla$

	-40°C	0°C	25°C	85°C	125°C	150°C
<b>MIN OPERATE GAUSS</b>						
SS411A	NS	NS	NS	NS	NS	NS
SS413A	NS	NS	NS	NS	NS	NS
SS441A	50	53	55	45	40	35
SS443A	110	110	110	90	80	65
SS449A	285	305	310	290	270	260
SS461A	5	5	10	10	5	5
SS466A	100	100	100	95	80	70
<b>MAX OPERATE GAUSS</b>						
SS411A	70	65	60	60	65	70
SS413A	140	140	140	140	140	140
SS441A	135	117	115	120	123	125
SS443A	215	190	180	180	190	200
SS449A	435	400	390	400	410	420
SS461A	110	90	85	85	100	110
SS466A	200	185	180	180	180	185
<b>MIN RELEASE GAUSS</b>						
SS411A	-70	-65	-60	-60	-65	-70
SS413A	-140	-140	-140	-140	-140	-140
SS441A	20	20	20	15	15	10
SS443A	80	80	75	70	60	55
SS449A	210	230	235	215	200	185
SS461A	-110	-90	-85	-85	-100	-110
SS466A	-200	-185	-180	-180	-100	-185
<b>MAX RELEASE GAUSS</b>						
SS411A	NS	NS	NS	NS	NS	NS
SS413A	NS	NS	NS	NS	NS	NS
SS441A	120	99	95	105	115	120
SS443A	190	165	155	165	180	195
SS449A	360	325	315	325	340	345
SS461A	-5	-5	-10	-10	-5	-5
SS466A	-100	-100	-100	-95	-80	-70
<b>MIN DIFF GAUSS</b>						
SS411A	15	15	15	12	12	10
SS413A	20	20	20	20	20	20
SS441A	15	15	20	15	8	5
SS443A	25	25	25	15	10	5
SS449A	30	30	30	30	30	30
SS461A	50	50	50	50	50	50
SS466A	200	200	200	190	160	140

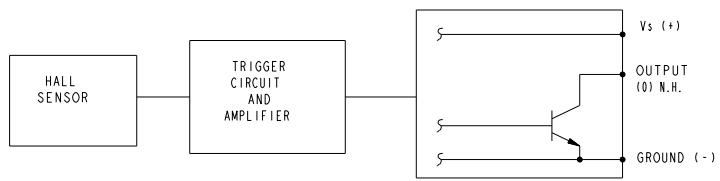


TABLE 2

PACKING	BAG
SPECIFIED VOLTAGE RANGE	3.8 - 30
MAX Ioff milliamp / 15	9.0
MAX Ion milliamp / 15	10.0
RATED SINK CURRENT Ma	20
MAX Vsat VOLTS / 18	0.4
MAX LEAKAGE AT 24V, IA / 17	10
RISE TIME AT 25°C 10% TO 90% $\mu$ S / 4	1.5
FALL TIME AT 25°C 90% TO 10% $\mu$ S / 4	1.5
STORAGE TEMP °C	-65 TO +160
OPERATING TEMP °C	-55 TO +160

TABLE 4

CATALOG LISTING	MAGNETIC TYPE	BRAND SYMBOL
SS411A	BIPOLAR	11A
SS413A	BIPOLAR	13A
SS441A	UNIPOLAR	41A
SS443A	UNIPOLAR	43A
SS449A	UNIPOLAR	49A
SS461A	LATCH	61A
SS466A	LATCH	66A

ABSOLUTE LIMITS  $\Delta$   $\nabla$   $\nabla$  TABLE 3

SUPPLY VOLTAGE	-1 TO +30
APPLIED OUTPUT VOLTAGE	-0.5 TO +30
OUTPUT CURRENT mA	SEE TABLE 5
MAGNETIC FLUX GAUSS	NO LIMIT



TABLE 5

OUTPUT CURRENT ABSOLUTE LIMITS	
SUPPLY VOLTAGE	OUTPUT CURRENT MAX, MA
-1 TO 24	50
24 TO 25	37
25 TO 26	33
26 TO 27	28
27 TO 28	24
28 TO 29	19
29 TO 30	15

THIRD ANGLE PROJECTION

SCALE NONE

DO NOT SCALE PRINT

UNLESS OTHERWISE SPECIFIED TOLERANCES ARE

ONE PLACE (.01) ±.030

TWO PLACE (.001) ±.015

THREE PLACE (.0001) ±.005

ANGLES ±

WEIGHT

REVISIONS	DATE	BY	CHKD
E	0034535	PS	JL
	26 OCT 97		

DATE	BY	CHKD
14 JAN 99	JAF	JAF

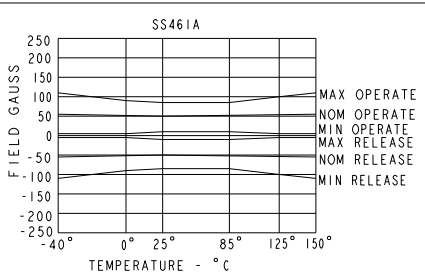
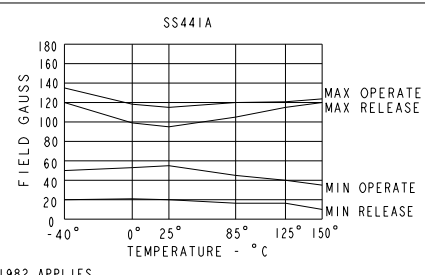
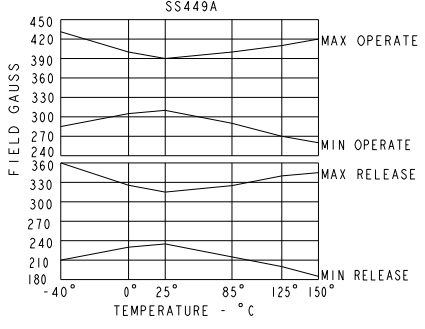
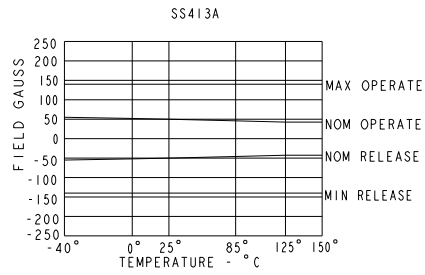
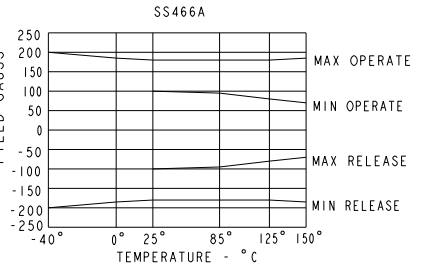
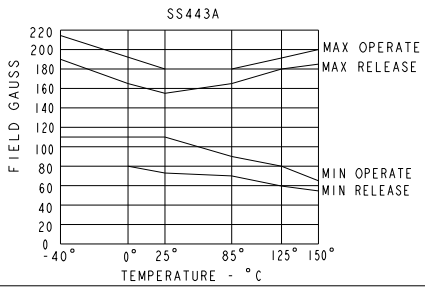
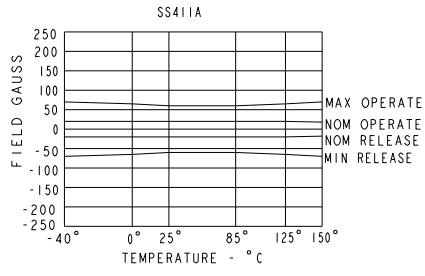
DATE	BY	CHKD
14 JAN 99	JAF	JAF

**MICRO SWITCH**  
 a Honeywell Division  
 FED. MFG. CODE 91929

**SOLID STATE SENSOR SS400 SERIES CHART 1**

CATALOG LISTING

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ANSI Y14.5M-1982 APPLIES



THIRD ANGLE PROJECTION	
SCALE	NONE
DO NOT SCALE PRINT	
UNLESS OTHERWISE SPECIFIED TOLERANCES ARE	
ONE PLACE	(.0) ±.030
TWO PLACE	(.00) ±.015
THREE PLACE	(.000) ±.005
ANGLES	±
WEIGHT	