

## Packages



3 pin SOT23 (suffix SO)

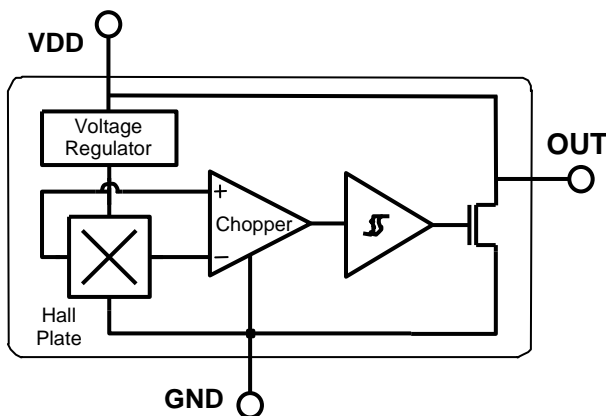


3 pin SIP (suffix UA)

## Features and Benefits

- 4.5V to 24V Operation
- -40°C to 150°C Superior temperature operation
- Bipolar technology
- Open-collector 25 mA output
- Reverse battery protection
- Small Size-SOT23 3L or SIP 3L
- Solid-state reliability
- Resistant to physical stress
- Activate with small, commercially available Permanent magnets

## Functional Block Diagram



SIP Package	SOT Package
Pin 1 – V <sub>DD</sub>	Pin 1 – V <sub>DD</sub>
Pin 2 – GND	Pin 2 – OUT
Pin 3 – OUT	Pin 3 – GND

## Application Examples

- Automotive, Consumer and Industrial
- Solid-state switch
- Brushless DC motor commutation
- Speed detection
- Angular position detection
- Linear position detection
- Proximity detection

## General Description

The SS189 is a unipolar Hall-effect sensor IC fabricated from bipolar technology. The device integrates a voltage regulator, reverse battery protection diode, Hall sensor with dynamic offset cancellation system, temperature compensation circuitry, small signal amplifier, Schmitt trigger and an open-collector output to sink up to 25 mA. With suitable output pull up, they can be used with bipolar or CMOS logic circuits.

These Hall-effect switches are monolithic integrated circuits with tighter magnetic specifications, designed to operate continuously over extended temperatures to +150°C, and are more stable with both temperature and supply voltage changes. The unipolar switching characteristic makes these devices ideal for use with a simple bar or rod magnet.

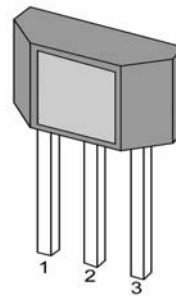
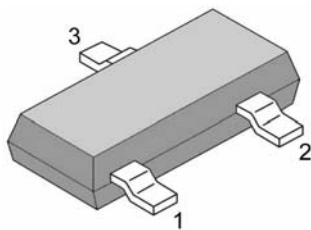
Thanks to its wide operating voltage range and extended choice of temperature range, it is quite suitable for use in automotive, industrial and consumer applications.

The device is delivered in a Small Outline Transistor (SOT) or in a Plastic Single In Line (SIP 3L flat). Both 3-lead packages are RoHS compliant.

## Glossary of Terms

MilliTesla (mT), Gauss	Units of magnetic flux density: 1 mT = 10 Gauss
RoHS	Restriction of Hazardous Substances
Operating Point ( $B_{OP}$ )	Magnetic flux density applied on the branded side of the package which turns the output driver ON ( $V_{OUT} = V_{DSon}$ )
Release Point ( $B_{RP}$ )	Magnetic flux density applied on the branded side of the package which turns the output driver OFF ( $V_{OUT} = \text{high}$ )

## Pin Definitions and Descriptions



SOT Pin №	SIP Pin №	Name	Type	Function
1	1	VDD	Supply	Supply Voltage pin
2	3	OUT	Output	Open Drain Output pin
3	2	GND	Ground	Ground pin

Table 1: Pin definitions and descriptions

## Absolute Maximum Ratings

Parameter	Symbol	Value	Units
Supply Voltage	$V_{DD}$	28	V
Supply Current	$I_{DD}$	50	mA
Output Voltage	$V_{OUT}$	28	V
Output Current	$I_{OUT}$	50	mA
Storage Temperature Range	$T_S$	-65 to 170	°C

Table 2: Absolute maximum ratings

Operating Temperature Range	Symbol	Value	Units
Temperature Suffix "E"	$T_A$	-40 to 85	°C
Temperature Suffix "K"	$T_A$	-40 to 125	°C
Temperature Suffix "L"	$T_A$	-40 to 150	°C

Exceeding the absolute maximum ratings may cause permanent damage. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

### General Electrical Specifications

DC Operating Parameters  $T_A = 25^\circ\text{C}$ ,  $V_{DD} = 3.5\text{V to } 24\text{V}$  (unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Supply Voltage	$V_{DD}$	Operating	4.5		24	V
Supply Current	$I_{DD}$	$B < B_{RP}$	4	5	7	mA
Output Saturation Voltage	$V_{DSon}$	$I_{OUT} = 20\text{mA}$ , $B > B_{OP}$		0.3	0.5	V
Output Leakage Current	$I_{OFF}$	$B < B_{RP}$ , $V_{OUT} = 24\text{V}$		0.1	10	$\mu\text{A}$
Output Rise Time	$t_r$	$R_L = 820\Omega$ , $C_L = 20\text{pF}$		0.04	2.0	$\mu\text{s}$
Output Fall Time	$t_f$	$R_L = 820\Omega$ , $C_L = 20\text{pF}$		0.18	2.0	$\mu\text{s}$

Table 3: Electrical Specifications

### Magnetic Specifications

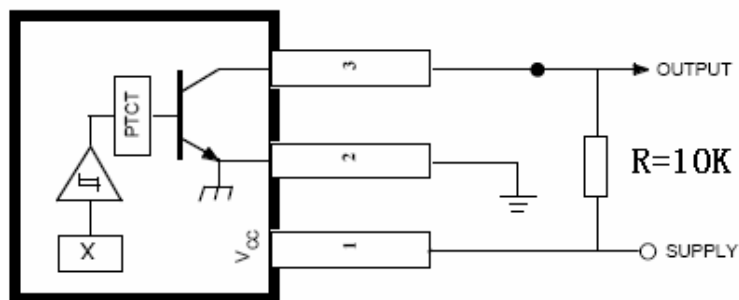
DC Operating Parameters  $V_{DD} = 4.5\text{V to } 24\text{V}$  (unless otherwise specified)

SS189

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Operating Point	$B_{OP}$	$T_A = 25^\circ\text{C}$ , $V_{DD} = 12\text{V DC}$	100	120	150	G
Release Point	$B_{RP}$		50	70	120	G
Hysteresis	$B_{HYST}$			50		G

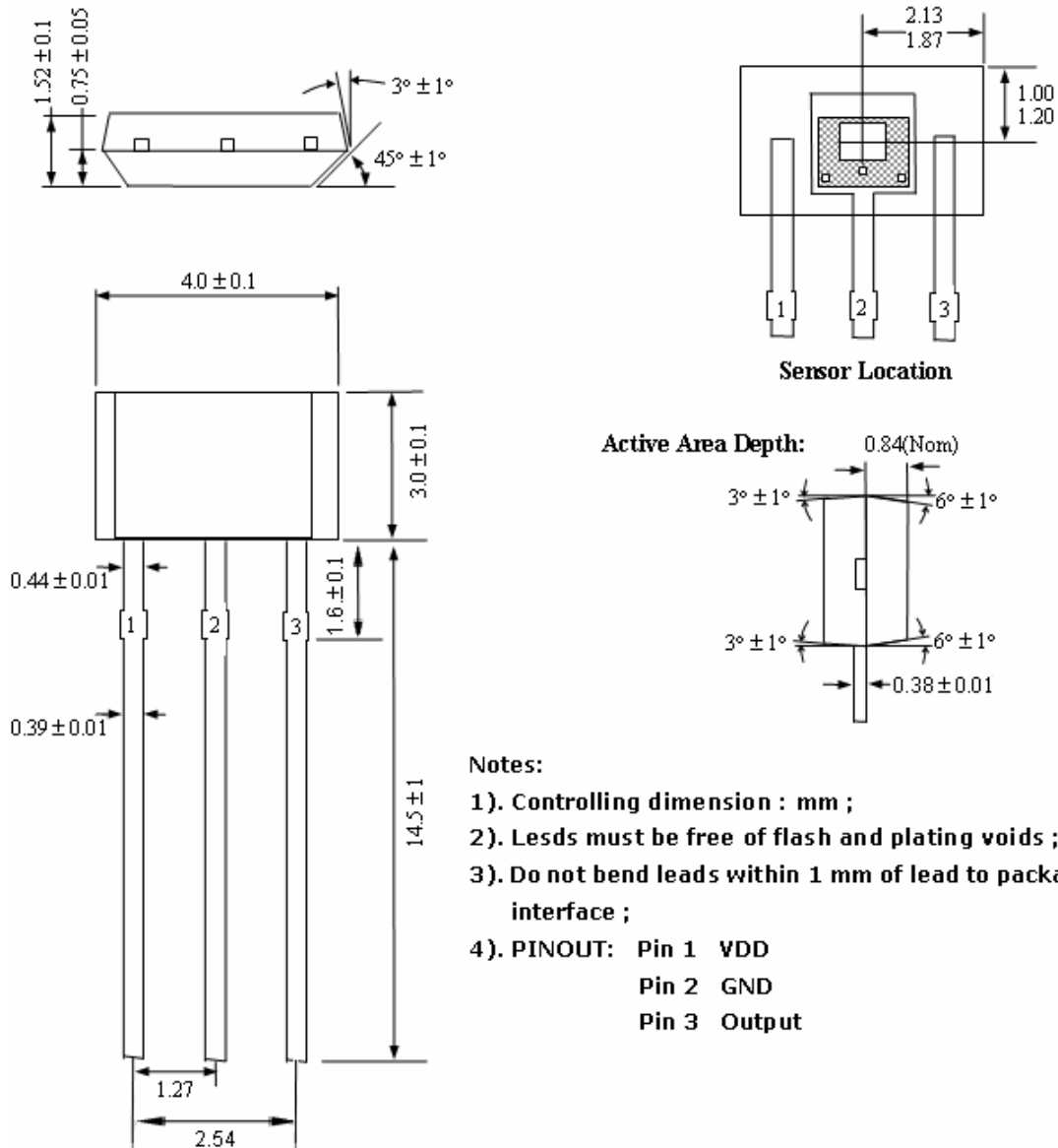
Table 4: Magnetic Specifications

### Application Information



### Package Information

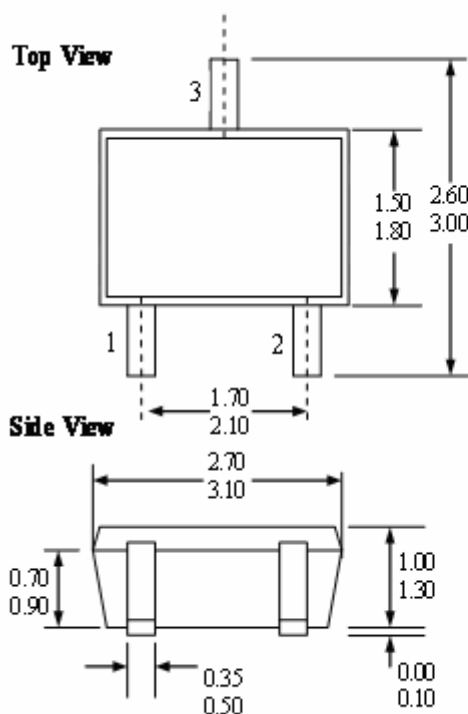
#### Package UA, 3-Pin SIP:



#### Notes:

- 1). Controlling dimension : mm ;
- 2). Leads must be free of flash and plating voids ;
- 3). Do not bend leads within 1 mm of lead to package interface ;
- 4). PINOUT: Pin 1 VDD  
Pin 2 GND  
Pin 3 Output

### Package LH, 3-Pin SOT-23:



- Notes:
- 1). PINOUT: Pin 1 VDD  
Pin 2 Output  
Pin 3 GND
  - 2). All dimensions are in millimeters ;

### Ordering Information

Part No.	Pb-free	Temperature Code	Package Code	Packing
SS189ESOT	YES	-40°C to 85°C	SOT-23	7-in. reel, 3000 pieces/reel
SS189EUA	YES	-40°C to 85°C	TO-92	Bulk, 1000 pieces/bag
SS189KSOT	YES	-40°C to 125°C	SOT-23	7-in. reel, 3000 pieces/reel
SS189KUA	YES	-40°C to 125°C	TO-92	Bulk, 1000 pieces/bag
SS189LSOT	YES	-40°C to 150°C	SOT-23	7-in. reel, 3000 pieces/reel
SS189LUA	YES	-40°C to 150°C	TO-92	Bulk, 1000 pieces/bag