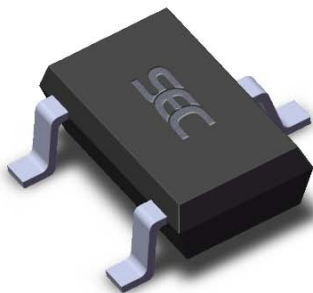


### Features

- Micropower consumption for battery powered applications
- Omnipolar, output switches with absolute value of North or South pole from magnet
- Operation down to 2.5V
- High sensitivity and high response frequency



3 pin SOT23 (suffix SO)



3 pin SIP (suffix UA)

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### General Description

The SS3411 Omnipolar Hall effect sensor IC is fabricated from mixed signal CMOS technology. It incorporates advanced chopper-stabilization techniques to provide accurate and stable magnetic switch points.

If the flux density is above or below the Bop/Brp thresholds then the output transistor is driven to change states accordingly. The design has been opti-

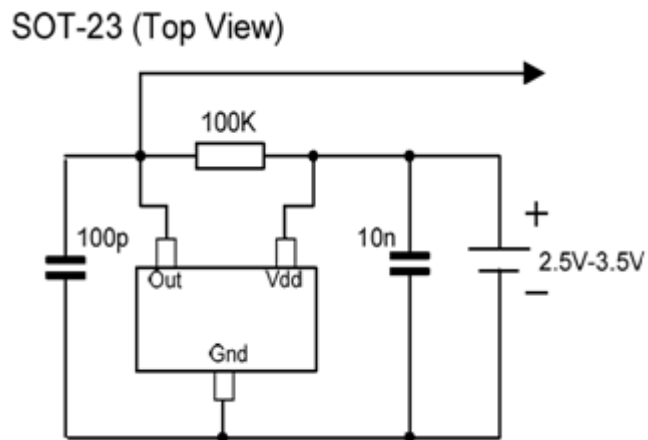
mized for service in applications requiring extended operating lifetime in battery powered systems.

The output transistor of the SS3411 will be latched on (Bop) in the presence of a sufficiently strong South or North magnetic field facing the marked side of the package. The output will be latched off (Brp) in the absence of a magnetic field.

### Applications

- Solid state switch
- Speed detection
- Relay switch
- Magnet proximity sensor for reed switch replacement in low duty cycle applications

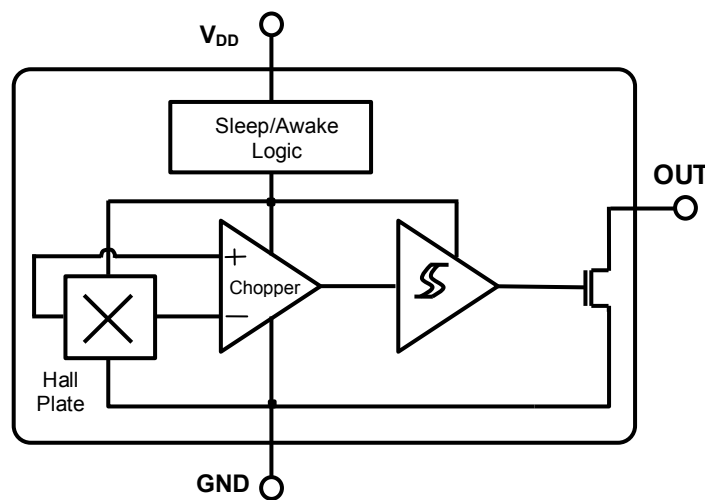
### Typical Application Circuit



SEC's pole-independent sensing technique allows for operation with either a north pole or south pole magnet orientation, enhancing the manufacturability of the device. The state-of-the-art technology provides the same output polarity for either pole face. It is strongly recommended that an external bypass

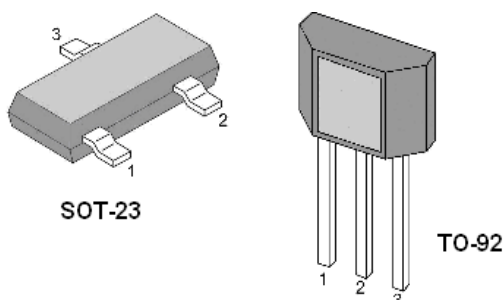
capacitor be connected (in close proximity to the Hall sensor) between the supply and ground of the device to reduce both external noise and noise generated by the chopper-stabilization technique. This is especially true due to the relatively high impedance of battery supplies.

### Functional Block Diagram



### Pin Definitions and Descriptions

SOT Pin №	SIP Pin №	Name	Type	Function
1	1	V <sub>DD</sub>	Supply	Supply Voltage pin
2	3	OUT	Output	Open Drain Output pin
3	2	GND	Ground	Ground pin



### Absolute Maximum Ratings

Parameter	Symbol	Value	Units
Supply Voltage(operating)	V <sub>DD</sub>	7	V
Supply Current	I <sub>DD</sub>	5	mA
Output Voltage	V <sub>OUT</sub>	7	V
Output Current	I <sub>OUT</sub>	10	mA
Operating Temperature Range	T <sub>A</sub>	-40 to 85	°C
Storage Temperature Rang	T <sub>S</sub>	-50 to 150	°C
ESD Sensitivity	-	4000	V

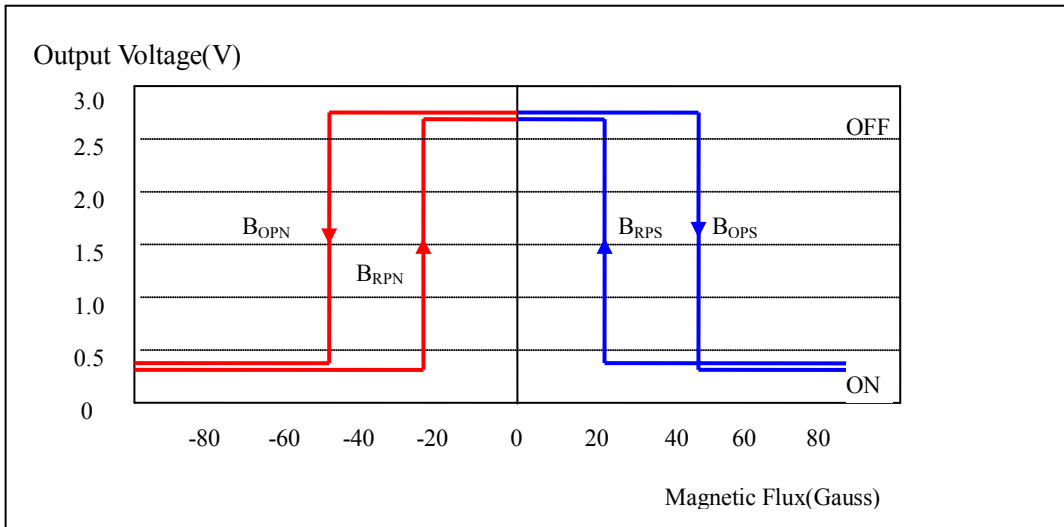
Exceeding the absolute maximum ratings may cause permanent damage. Exposure to absolute-maximum rated conditions for extended periods may affect device reliability.

### DC Electrical Characteristics

DC Operating Parameters: T<sub>A</sub> = 25°C, V<sub>DD</sub>=3V.

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Operating voltage	V <sub>DD</sub>	Operating	2.5	3	5.5	V
Output Current	I <sub>OUT</sub>			0.5	2	mA
Saturation Voltage	V <sub>SAT</sub>	I <sub>OUT</sub> =10mA, B>Bop			0.5	V
Leakage Current	I <sub>OFF</sub>	B < Brp, V <sub>OUT</sub> = 24V		1	5	μA
Raise time	T <sub>R</sub>	R <sub>L</sub> = 1KΩ, C <sub>L</sub> = 20pF		0.25		μs
Fall time	T <sub>F</sub>	R <sub>L</sub> = 1KΩ, C <sub>L</sub> = 20pF		0.25		μs
Conversion frequency	FSW			10		KHz
Thermal resistance	R <sub>TH</sub>	Single layer board		301		°C /W

### Magnetic Characteristics



Operating Parameters: T<sub>A</sub> = 25°C, V<sub>DD</sub> = 2.75V<sub>DC</sub>.

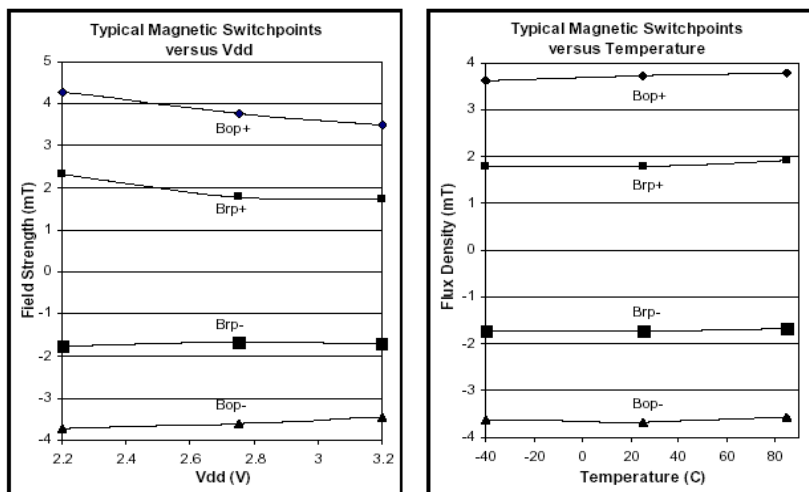
PARAMETER	Symbol	Min	Type	Max	Units
Operating Point	B <sub>op</sub>	-	+/-35	+/-50	Gs
Release Point	B <sub>rp</sub>	+/-5	+/-25	-	Gs
Hysteresis	B <sub>hys</sub>	-	10	-	Gs

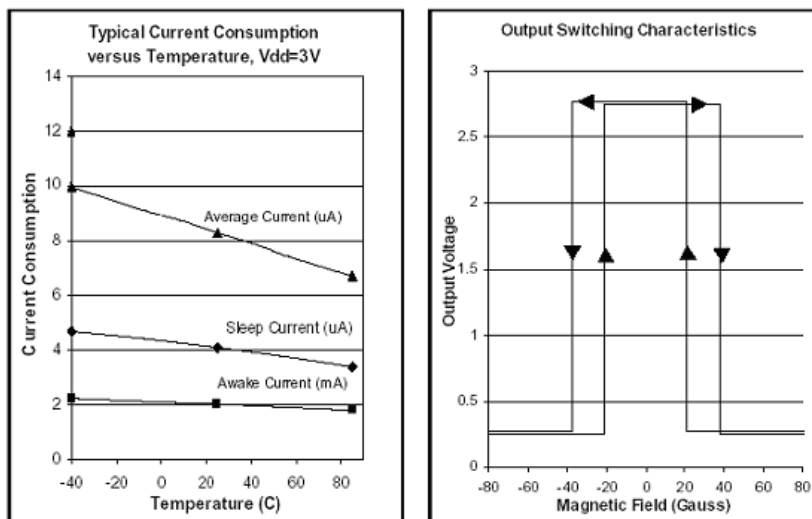
### ESD Protection

Human Body Model (HBM) tests according to: Mil. Std. 883F method 3015.7

Parameter	Symbol	Limit Values		Unit	Notes
		Min	Max		
ESD Voltage	V <sub>ESD</sub>		±4	kV	

### Performance Characteristics





## Unique Features

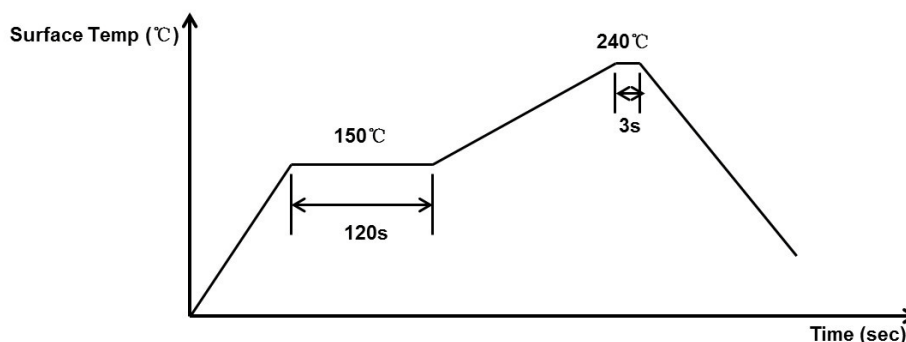
### CMOS Hall IC Technology

The chopper stabilized amplifier uses switched capacitor techniques to eliminate the amplifier offset voltage, which, in bipolar devices, is a major source of temperature sensitive drift. CMOS makes this advanced technique possible. The CMOS chip is also much smaller than a bipolar chip, allowing very sophisticated circuitry to be placed in less space. The small chip size also contributes to lower physical stress and less power consumption.

## Installation Comments

Consider temperature coefficients of Hall IC and magnetics, as well as air gap and life time variations. Observe temperature limits during wave soldering. Typical IR solder-reflow profile:

- No Rapid Heating and Cooling.
- Recommended Preheating for max. 2minutes at 150°C
- Recommended Reflowing for max.3seconds at 240°C



## ESD Precautions

Electronic semiconductor products are sensitive to Electro Static Discharge (ESD). Always observe Electro Static Discharge control procedures whenever handling semiconductor products.

### Application Information

It is strongly recommended that an external bypass capacitor be connected (in close proximity to the Hall sensor) between the supply ( $V_{DD}$  Pin) and ground (GND Pin) of the device to reduce both external noise and noise generated by the chopper stabilization technique. As is shown in the two figures, a  $0.1\mu\text{F}$  capacitor is typical.

For reverse voltage protection, it is recommended to connect a resistor or a diode in series with the  $V_{DD}$  pin.

When using a resistor, three points are important:

- the resistor has to limit the reverse current to 50mA maximum ( $V_{CC} / R1 \leq 50\text{mA}$ )
- the resulting device supply voltage  $V_{DD}$  has to be higher than  $V_{DD}$  min ( $V_{DD} = V_{CC} - R1 * I_{DD}$ )
- the resistor has to withstand the power dissipated in reverse voltage condition ( $P_D = V_{CC}^2 / R1$ )

When using a diode, a reverse current cannot flow and the voltage drop is almost constant ( $\approx 0.7\text{V}$ ).

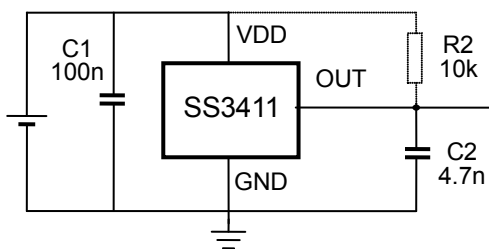
Therefore, a  $100\Omega/0.25\text{W}$  resistor for 5V application and a diode for higher supply voltage are recommended.

Both solutions provide the required reverse voltage protection.

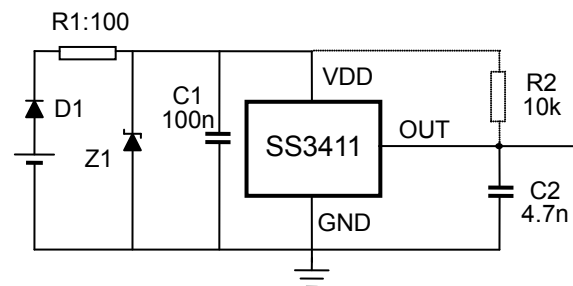
When a weak power supply is used or when the device is intended to be used in noisy environment, it is recommended that the second following figure is used.

The low-pass filter formed by  $R1$  and  $C1$  and the Zener diode  $Z1$  bypass the disturbances or voltage spikes occurring on the device supply voltage  $V_{DD}$ . The diode  $D1$  provides additional reverse voltage protection.

**Typical Three-Wire Application Circuit**

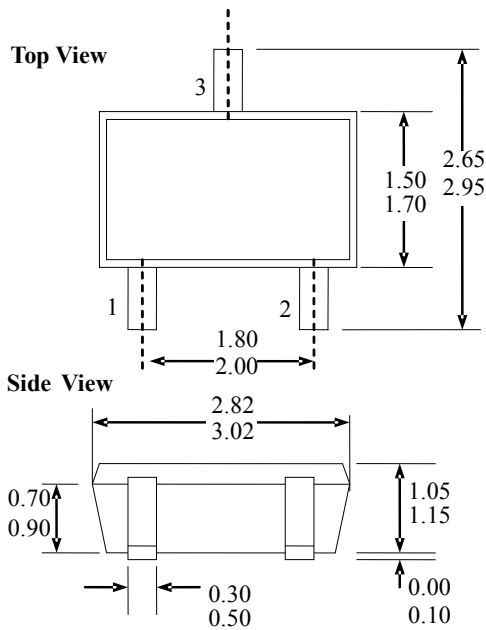


**Automotive and Severe Environment Protection Circuit**



### Package Information

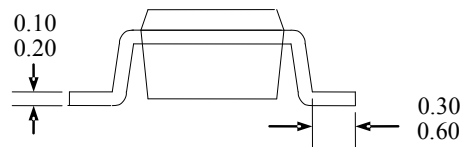
Package SO, 3-Pin SOT-23:



**Notes**

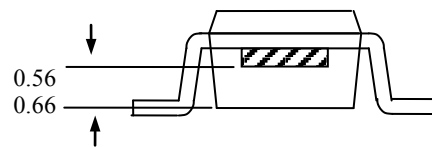
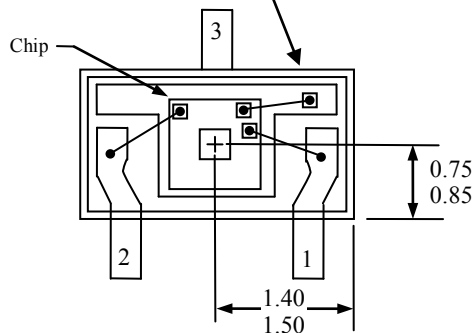
- 1). PINOUT: Pin 1  $V_{DD}$   
Pin 2 Output  
Pin 3 GND
- 2). All dimensions are in millimeters;

**End View**

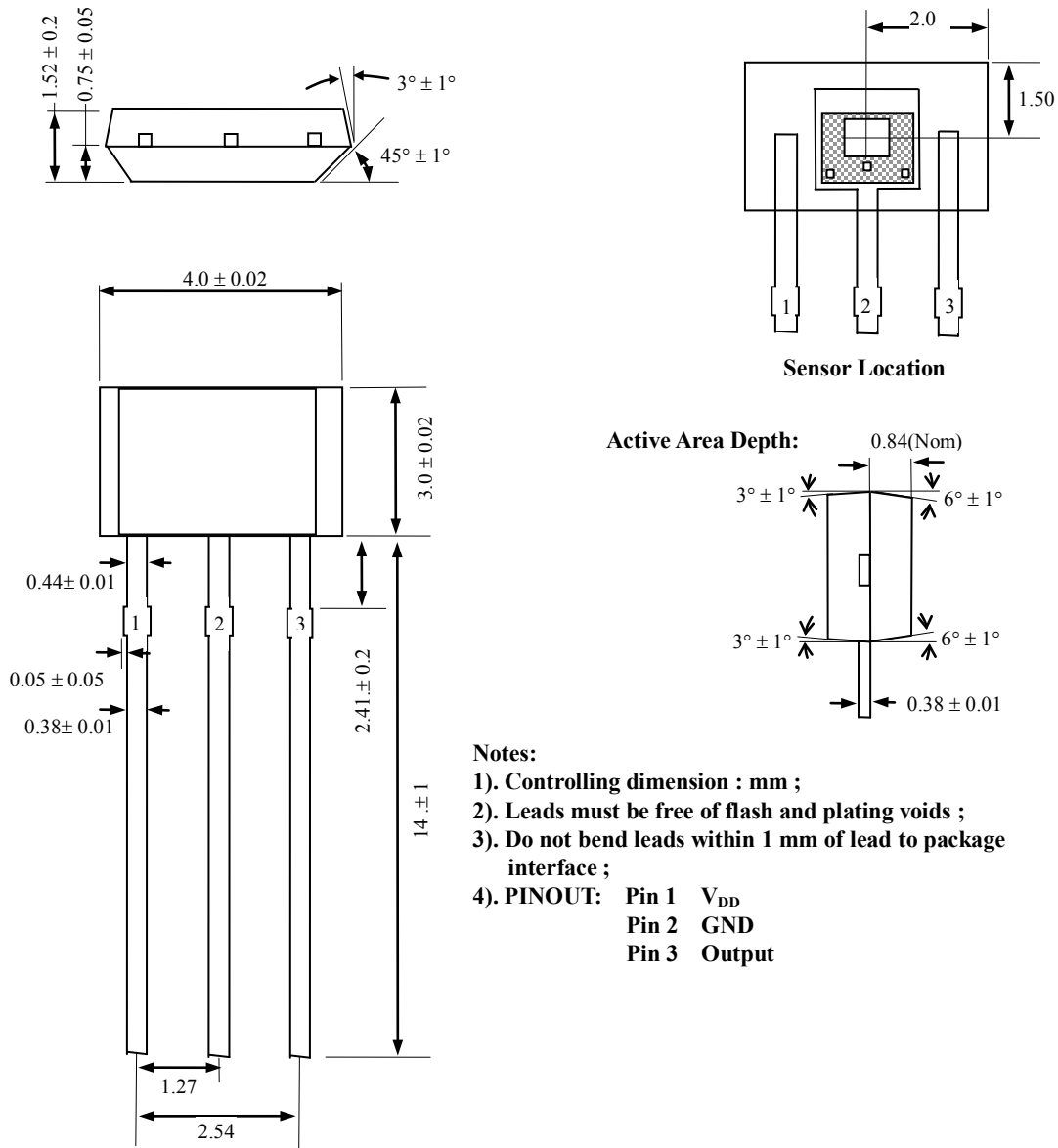


### SOT-23 Package Hall Location

**Bottom View of SOT-23 Package**



**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  $V_{DD}$   
Pin 2 GND  
Pin 3 Output



**Ordering Information**

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<b>Part No.</b>	<b>Pb-free</b>	<b>Temperature Code</b>	<b>Package Code</b>	<b>Packing</b>
SS3411ESOT	YES	-40°C to 85°C	SOT-23	7-in. reel, 3000 pieces/ reel
SS3411EUA	YES	-40°C to 85°C	TO-92	Bulk, 1000 pieces/ bag
SS3411KSOT	YES	-40°C to 125°C	SOT-23	7-in. reel, 3000 pieces/ reel
SS3411KUA	YES	-40°C to 125°C	TO-92	Bulk, 1000 pieces/ bag
SS3411LSOT	YES	-40°C to 150°C	SOT-23	7-in. reel, 3000 pieces/ reel
SS3411LUA	YES	-40°C to 150°C	TO-92	Bulk, 1000 pieces/ bag

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