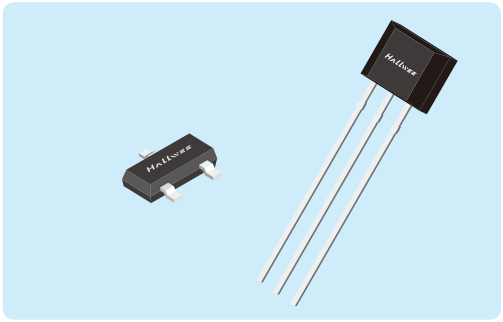
HAL90X CMOS Ratio-Metric Linear Hall Effect IC

1. Synopsis



HAL90X, a linear Hall-effect sensor, is composed of Hall sensor, linear amplifier and Totem-Pole output stage. It features low noise output, which makes it unnecessary touse external filtering. It also can provide increased temperature stability and accuracy.The linear Hall sensor has a wide operating temperature range of -40°C to +125°C, appropriate for commercial, consumer, and industrial environments.

The high sensitivity of Hall-effect sensor accurately tracks extremely weak changes in magnetic flux density. The linear sourcing output voltage is set by the supply voltage and in proportion of vary of the magnetic flux density. Typical operation current is 1.8mA and operating voltage range is 2.8 volts to 6.0 volts. Trim version is available for anultra low offset products.

The two package styles available provide magnetically optimized solutions for mostapplications. Package types SO is an SOT-23(1.1 mm nominal height), package UA is a three-lead ultra-mini SIP for through-hole mounting.

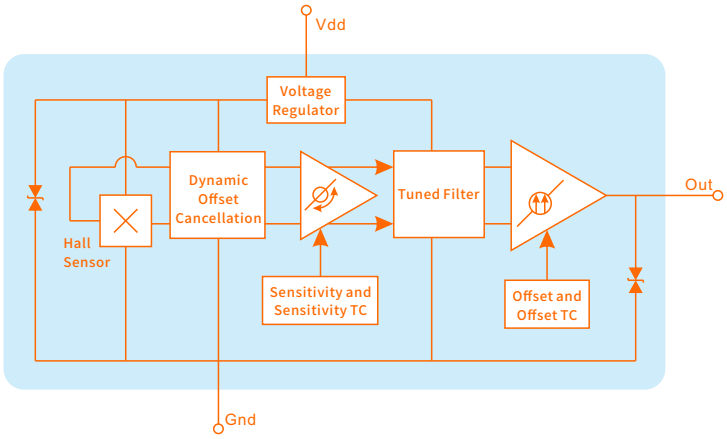
2. Features and Benefits

- Operating Voltage Range: 2.8V~6.0V
- Power consumption of 1.8 mA at 5 VDC for energyefficiency
- Low-Noise Operation
- Linear output for circuit design flexibility
- Totem-Pole for a stable and accurate output
- Responds to either positive or negative gauss
- Magnetically Optimized Package for UA,SO
- Trim version is precise on offset
- Robust ESD performance
- RoHS compliant 2011/65/EU and Halogen Free

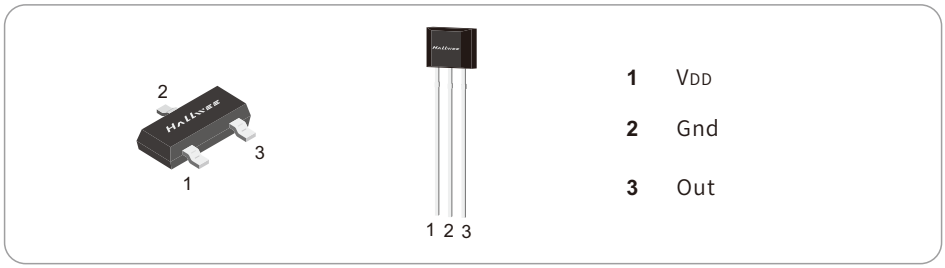
3. Applications

- Current sensing
- Motor control
- Position sensing
- Magnetic code reading
- Rotary encoder
- Ferrous metal detector
- Vibration sensing
- Liquid level sensing
- Weight sensing

4. Functional Diagram



5. Pin Definition



6. Absolute Maximum Ratings

TA=+25℃

Characteristics		Symbol	Values	Unit
Supply Voltage		V_{DD}	8	V
Reverse Voltage		V_{DD}	-0.5	V
Output Voltage		V_{out}	8	V
Output current		I_{out}	5	mA
Operating Temperature Range		T_A	-40 ~ 125	℃
Storage temperature Range		T_S	-65 ~ 150	℃
Maximum Junction Temp		T_J	150	℃
Thermal Resistance	UA/SO		206/543/543	℃/W
	UA/SO		148/410/410	℃/W
Package Power Dissipation	UA/SO	P_D	606/230/230	mW

Note: Do not apply reverse voltage to VDD and VOUT Pin, It may be caused for Miss function or damaged device.

7. Electrical Specifications

DC Operating Parameters: TA=+25℃, VCC=3.3V

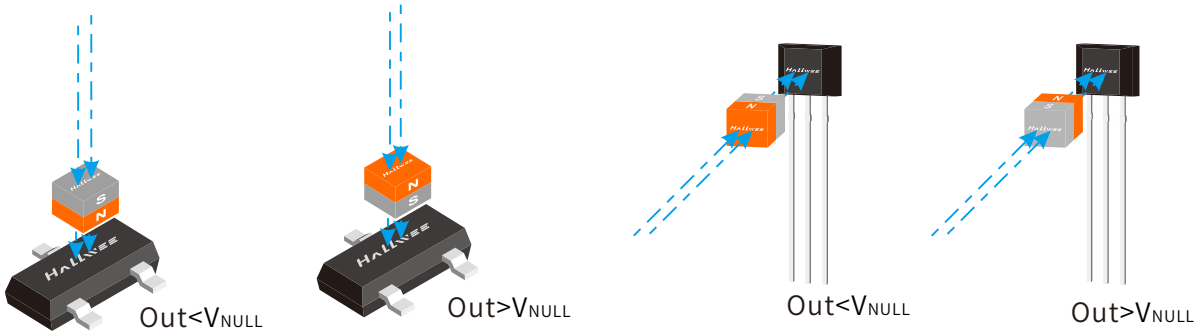
Parameters	Symbol	Test Conditions	Min	Typ	Max	Units
Supply Voltage	V_{DD}	Operating	2.5		6.5	V
Supply Current	I_{DD}	B= 0 Gauss		1.8	3.0	mA
Output Current	I_{OUT}	V_{DD} > 3V		1.4	2.0	mA
Null Output Voltage	V_{null}	B= 0 Gauss, (T Type)	2.375	2.5	2.625	V
High Output Voltage	V_{OH}	B> Max Magnetic Gauss		4.9	4.99	V
Low Output Voltage	V_{OL}	B> Min Magnetic Gauss	0.01	0.1		V
Output Voltage Span	V_{OS}			4.8		V
Output Referred Noise	V_{ON}	Ta=25℃, output open		20		mV
Power-On Time	T_P				100	uS
Output Switch Time	T_{SW}				150	uS
Output Switch Frequency	F_{SW}		3			Khz
Electro-Static Discharge	HBM			4		KV

8. Electrical Characteristics

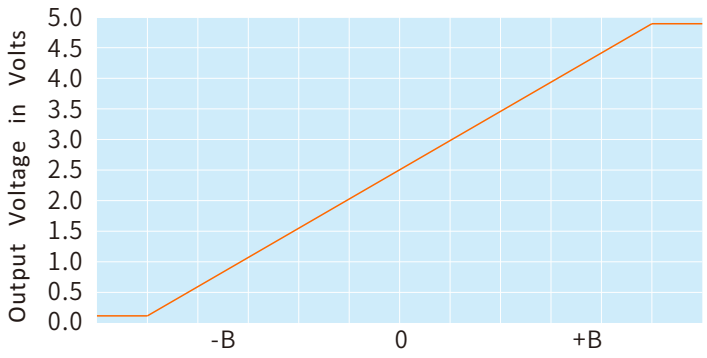
DC Operating Parameters: TA=+25°C, VCC=3.3V

Parameters	Symbol	Test Conditions	Min	Typ	Max	Units
Magnetic Range Gauss	HAL901			±100		Gs
Magnetic Range Gauss	HAL902			±220		Gs
Magnetic Range Gauss	HAL903			±450		Gs
Magnetic Range Gauss	HAL904			±1000		Gs
Ratiometry Null output error	R_{VON}	Operating voltage range relative to 5V		±1.5		%
Ratiometry Sensitivity error	R_{SEN}	Operating voltage range relative to 5V		±1.5		%
Linearity	LIN	% of Span		±1.5		%
Sensitivity	HAL901	VCC=3.3V	13	15	17	mV/G
Sensitivity	HAL902	VCC=3.3V	6	7.5	8.5	mV/G
Sensitivity	HAL903	VCC=3.3V	3	3.7	4.3	mV/G
Sensitivity	HAL904	VCC=3.3V	1.2	1.5	1.8	mV/G
Sensitivity Temperature Coefficient	TC_{Sens}	Ta=105°C, relative to Sens@25°C		±0.1		%/°C
Delta null voltage	$\triangle V_{ON}$	Ta=105°C, relative to V_{ON} @25°C		20		mV

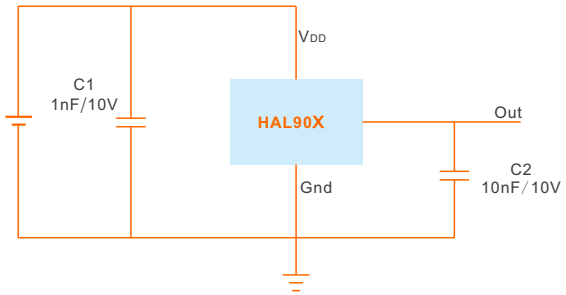
9. Output Behavior versus Magnetic Polar



10. Magnetoelectric characteristic curve



11. Typical application circuit

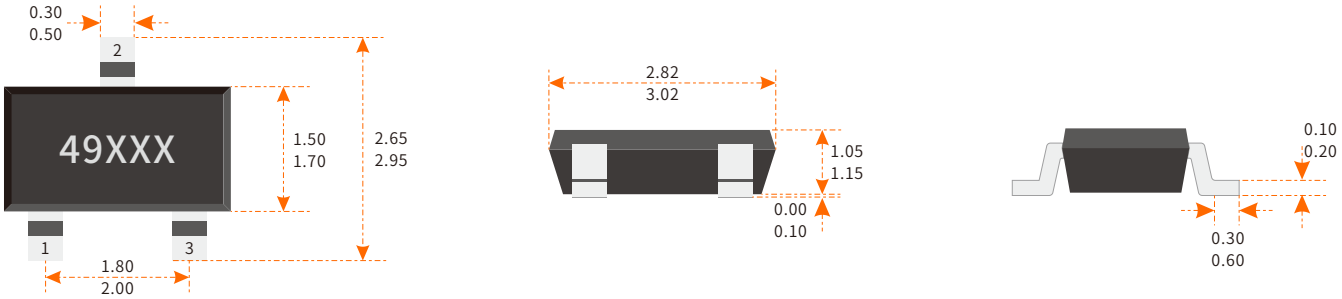


12. Order information

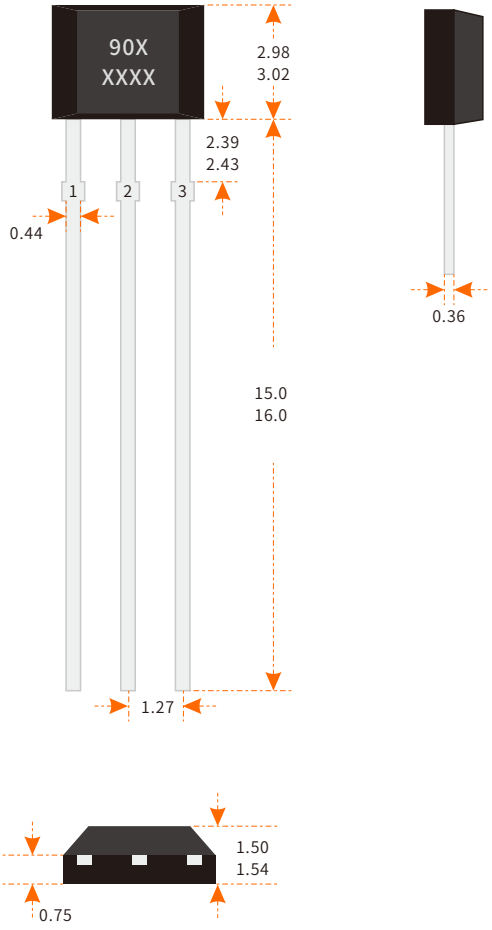
产品型号	封装类型	最小包装数
HAL901/2/3/4 SO	SO(SOT-23-3L)	3000PCS
HAL901/2/3/4 UA	UA(TO-92S)	1000PCS

12. Package Dimension and Marking

SOT-23 SO



TO-92S UA



NOTES:

1. Controlling dimension: mm
2. Lead thickness after solder plating will be 0.254mm maximum
3. Chip must be in PKG. center.
4. PINOUT (See Top View at left :

   Pin 1 V_{DD};

   Pin 2 Output;

   Pin 3 GND

Marking:

90X -- Code of Device (HAL90X);

XX/XXXX -- Lot Number ;