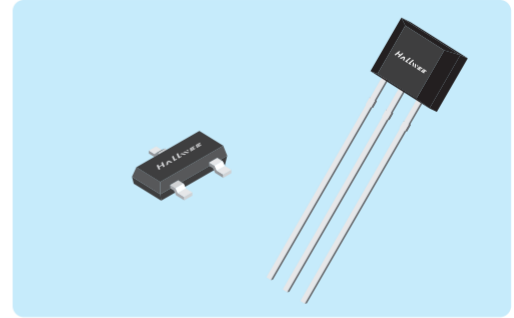


HAL93X CMOS Ratio-Metric Linear Hall Effect IC

1. Synopsis

HAL93X, 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 to use 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 2.5 mA and operating voltage range is 2.8 volts to 6.0 volts. Trim version is available for an ultra low offset products.

The three package styles available provide magnetically optimized solutions for most applications. Package types SO is an SOT-23(1.1 mm nominal height), SQ is an QFN2020-3(0.5 mm nominal height), a miniature low-profile surface-mount package, while package UA is a three-lead ultra-mini SIP for through-hole mounting.

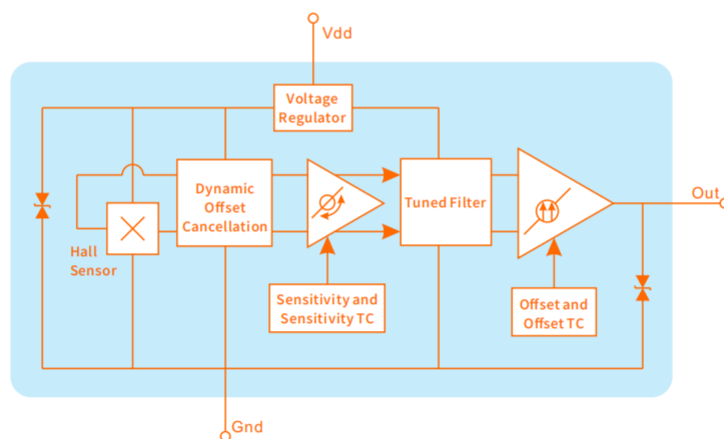
2. Features and Benefits

- ◆ Operating Voltage Range: 2.8V~6.0V
- ◆ Power consumption of 3.3 mA at 5 VDC for energy efficiency
- ◆ 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, SQ
- ◆ Trim version is precise on offset
- ◆ Robust ESD performance
- ◆ RoHS compliant 2011/65/EU and Halogen Free

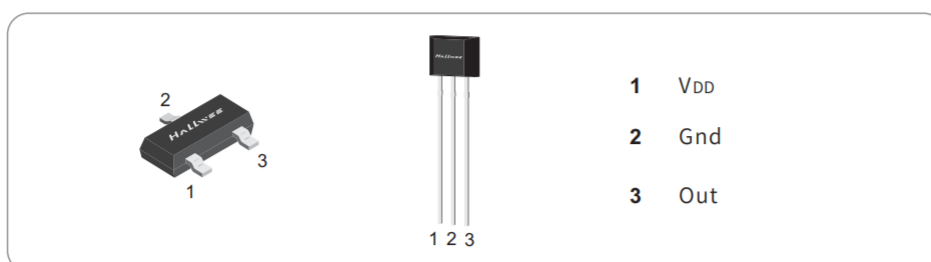
3. Applications

- ◆ 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°C

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	°C
Storage temperature Range		T _S	-65 ~ 150	°C
Maximum Junction Temp		T _J	150	°C
Thermal Resistance	UA/SO/SQ		206/543/543	°C/W
	UA/SO/SQ		148/410/410	°C/W
Package Power Dissipation	UA/SO/SQ	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°C, VCC=3.3V

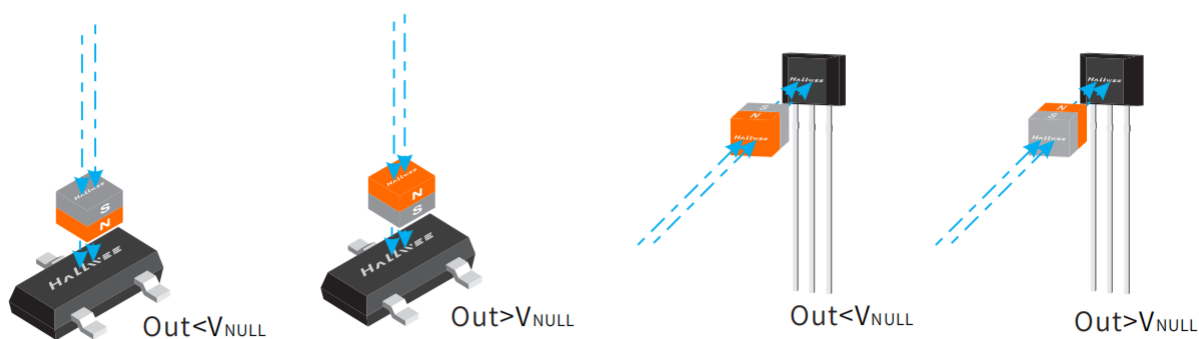
Parameters	Symbol	Test Conditions	Min	Typ	Max	Units
Supply Voltage	V _{DD}	Operating	2.8		6.0	V
Supply Current	I _{DD}	B= 0 Gauss		3.3	5.0	mA
Output Current	I _{OUT}	V _{DD} > 3V	1.0	1.5		mA
Null Output Voltage	V _{null}	B= 0 Gauss, (T Type)	2.275	2.5	2.725	V
High Output Voltage	V _{OH}	B> Max Magnetic 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°C, 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

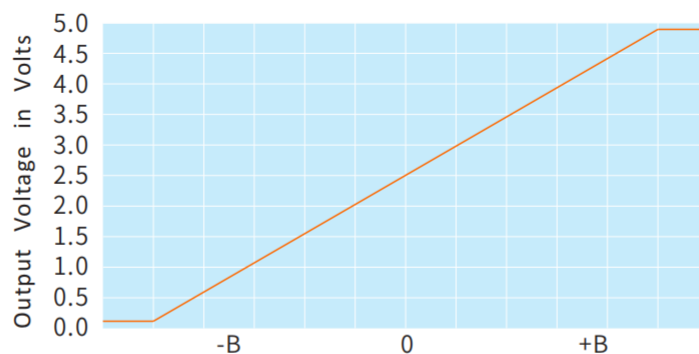
DC Operating Parameters: TA=+25°C, VCC=3.3V

Parameters	Symbol	Test Conditions	Min	Typ	Max	Units
Magnetic Range Gauss	HAL93A			±600		Gs
Magnetic Range Gauss	HAL93B			±343		Gs
Magnetic Range Gauss	HAL93C			±240		Gs
Magnetic Range Gauss	HAL93D			±185		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	HAL93A	Standard, (T type)	3.68	4.0	4.32	mV/G
Sensitivity	HAL93B	Standard, (T type)	6.44	7.0	7.56	mV/G
Sensitivity	HAL93C	Standard, (T type)	9.0	10.0	10.8	mV/G
Sensitivity	HAL93D	Standard, (T type)	11.7	13.0	14.3	mV/G
Sensitivity Temperature Coefficient	TC _{Sens}	Ta=105°C, relative to Sens@25°C		±0.1		%/°C
Delta null voltage	ΔV _{ON}	Ta=105°C, relative to V _{ON} @25°C		20		mV

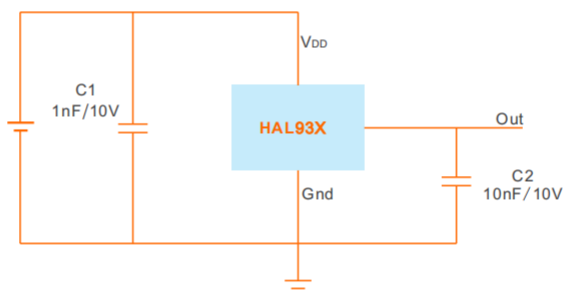
9. Output Behavior versus Magnetic Polar



10. Magnetoelectric characteristic curve



11. Typical application circuit

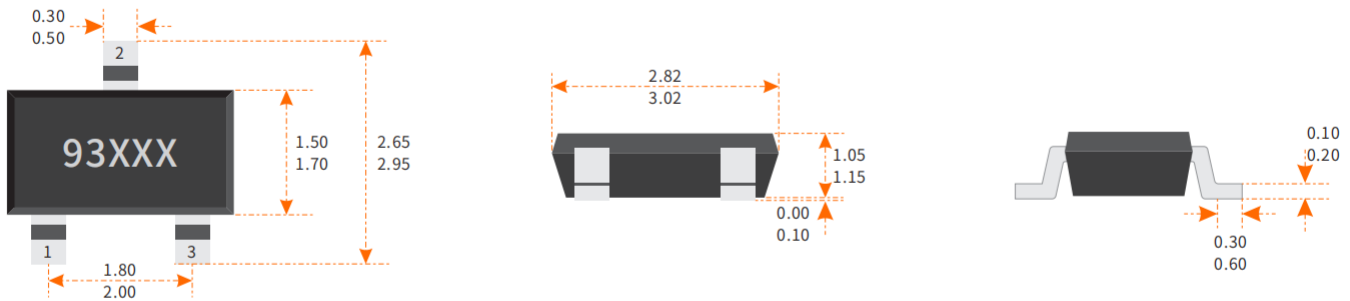


12. Order information

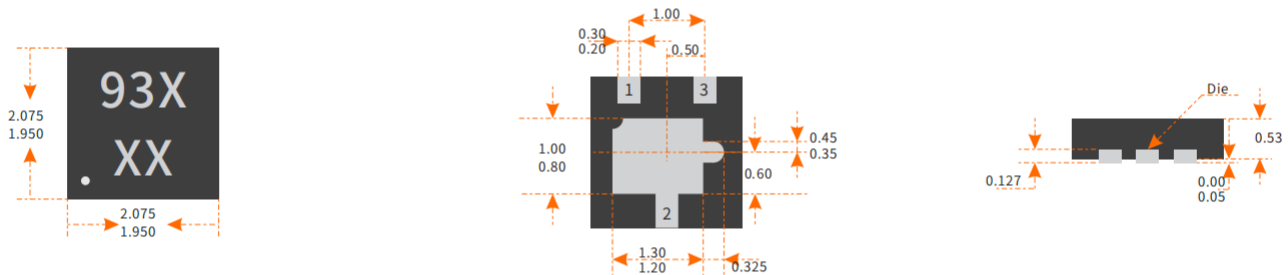
产品型号	封装类型	最小包装数
HAL93A/B/C/D SO	SO (SOT-23-3L)	3000PCS
HAL93A/B/C/D UA	UA (TO-92S)	1000PCS
HAL93A/B/C/D SD	SD (DFNWB2020)	3000PCS

12. Package Dimension and Marking

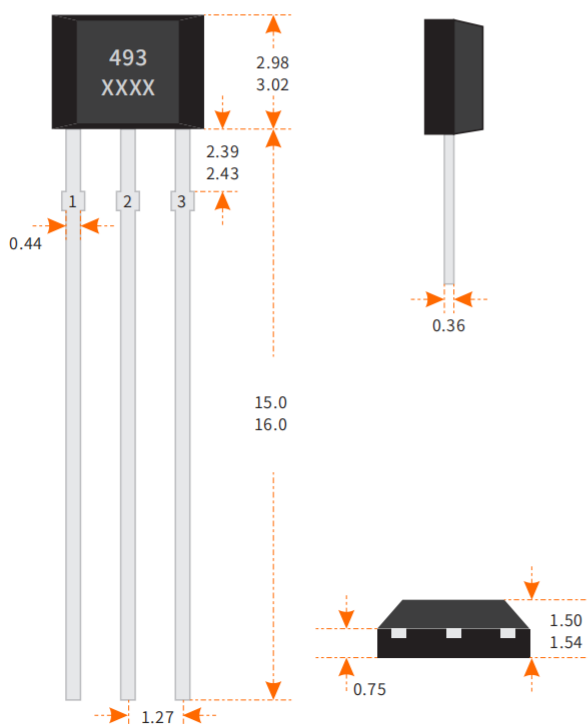
SOT-23 SO



DFN2020-3 SD封装



TO-92S UA



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;

Marking:

93X/493 -- Code of Device (HAL490X);

XX/XXXX -- Lot Number;