Low Power Linear Hall Sensor XL44A

Features

- Wide Operating Voltage Range: 3V~7V
- Low Operation Current: 1.3mA@V_{DD}=3.3V
- Linearity: ±1%
- Sensitivity: 4.0mV/Gs@V_{DD}=3.3V
- Rail to Rail Linear Range: 0.2V ~ 3.1V@V_{DD}=3.3V
- Low Noise Output Without External Capacitor Filtering
- Built in Output Anti Backflow Function
- Temperature Grade 1: −40℃ to 125℃ Ambient Operating Temperature Range
- Device HBM ESD Classification Level Class3A
- TO92S−3 package

Applications

- Game Handle Trigger / Joystick
- Position / Liquid Level Sensing
- Motor Control

General Description

XL44A is a low−power, wide voltage, wide linear range, and wide temperature range rail to rail linear Hall sensor optimized for gaming controller applications. Its output voltage varies proportionally with the induced magnetic field strength, and its linear output voltage range follows the power supply voltage variation. The zero point output voltage (without magnetic field) of XL44A defaults to half of the power supply voltage. The typical operating voltage of the chip is 3.3V, with low operating current and a working temperature range of −40 ℃~125 ℃. It is widely used in consumer electronics and industrial control fields.

The XL44A integrates high precision current source, temperature compensation module, Hall array, amplifier, driver module and other circuit modules, which provides high linearity and strong immunity to electromagnetic interference over the full voltage range and full temperature range.

Typical application schematic

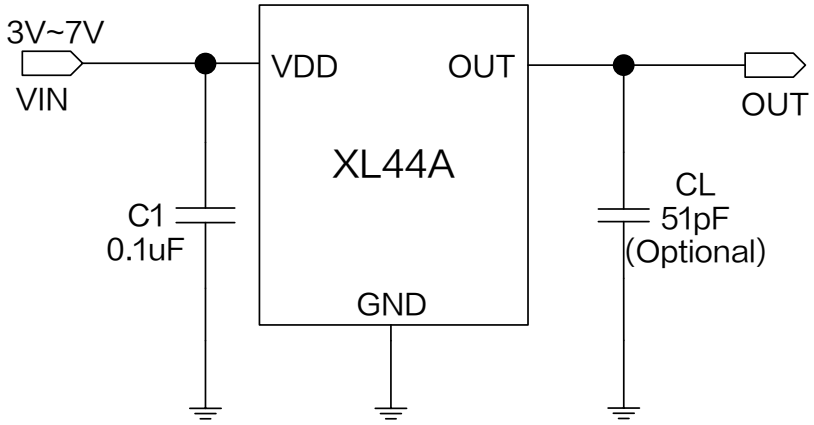


Figure1.XL44A Typical application schematic

Pin Configurations

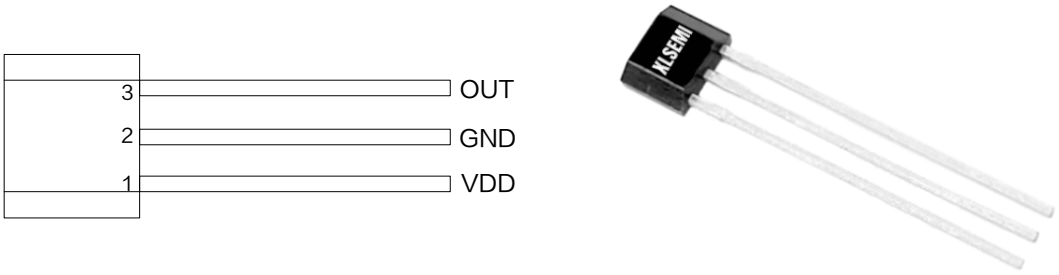


Figure2.Pin Configuration of XL44A

Table1.Pin Description

Pin Number	Pin Name	Description
1	VDD	Supply Voltage Input Pin，XL44A operates from 3V to 7V DC voltage.
2	GND	Ground pin.
3	OUT	Output Pin.

Ordering Information

Order Information	Marking ID	Package Type	Eco Plan	Packing Type Supplied As
XL44A	XL44A	TO92S-3	RoHS & HF	1000 Units Per Bag

Function Block

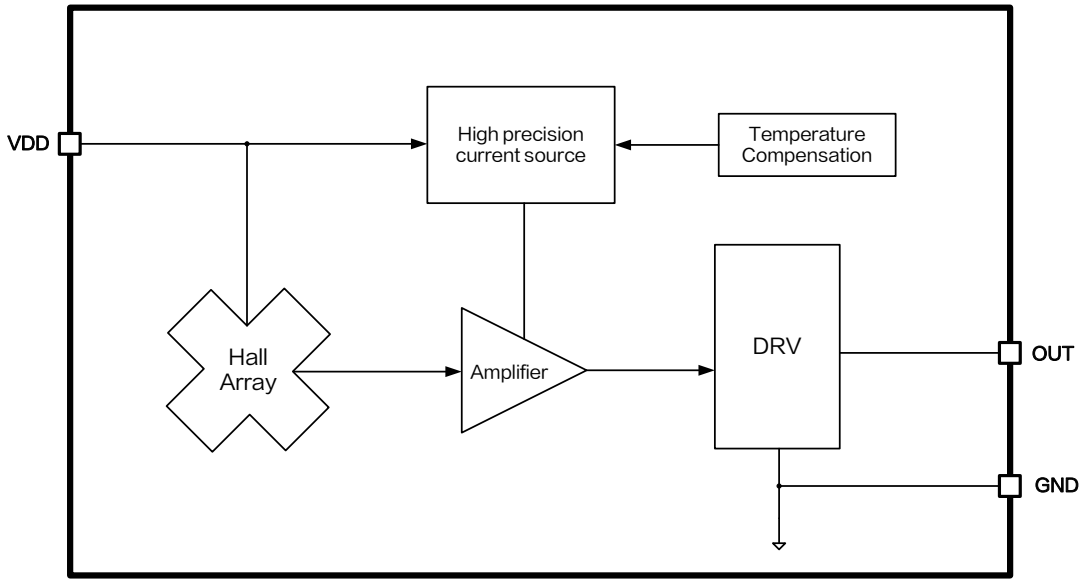


Figure3.Function Block Diagram of XL44A

Absolute Maximum Ratings (Note1)

Parameter	Symbol	Value	Unit
Input Pin Voltage	V_{DD}	−0.3 ~ 25	V
Output Pin Voltage	V_{OUT}	−0.3 ~ 25	V
Thermal Resistance(TO92S−3) (Junction to Ambient，No Heatsink, Free Air)	R_{JA}	160	°C/W
Operating Temperature	T_A	−40 ~ 125	°C
Operating Junction Temperature	T_J	−40 ~ 150	°C
Storage Temperature	T_{STG}	−65 ~ 150	°C
Lead Temperature(Soldering,10sec)	T_{LEAD}	260	°C
ESD(HBM)	−	>4000	V

Note1: Stresses greater than those listed under Maximum Ratings may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operation is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

XL44A Electrical Characteristics (Note2)

T_A = 25℃, V_{DD} = 3.3V, system parameters test circuit figure1, unless otherwise specified.

Parameters	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Operation Voltage	V_{DD}	–	3	3.3	7	V
Operation Current	I_{DD}	–	1.1	1.3	1.6	mA
Output Load Resistance	R_L	B=−1000Gs	–	10	–	kΩ
Output Voltage Range	$V_{OUT(H)}$	B=+1000Gs V_{DD}=3.3V	3.05	3.1	–	V
		B=+1000Gs V_{DD}=5.0V	4.75	4.8	–	V
	$V_{OUT(L)}$	B=−1000Gs V_{DD}=3.3V	–	0.2	0.25	V
		B=−1000Gs V_{DD}=5.0V	–	0.2	0.25	V
Static Output Voltage	$V_{OUT(Q)}$	B=0Gs V_{DD}=3.3V	1.533	1.65	1.767	V
		B=0Gs V_{DD}=5.0V	–	2.50	–	V
Linearity	Lin	–	−1	–	1	%
Output Settling Time	–	B=0Gs	–	15	20	μs
Output Noise	–	Bandwidth= 10Hz to 10kHz	–	1.5	–	mV

Note2:

(1) Linearity is the degree to which the static characteristic curve between the input and output quantities deviates from a straight line.

(2) The output settling time is the time interval from when the output voltage begins to establish until it stabilizes at 90% of the steady−state output voltage.

(3) Built in output anti backflow function, when used in parallel, if some chips fail or lose power, their output will be high impedance.

XL44A Magnetic Characteristics (Note3)

Parameters	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Sensitivity	Sens	V_{DD}=3.3V	3.72	4.0	4.28	mV/Gs
		V_{DD}=5.0V	-	6.85	-	mV/Gs

Note3:

(1) The magnetic South Pole (S) is defined as the positive magnetic field. The sensitivity in the table corresponds to measurements taken with the magnetic field perpendicular to the chip's marking surface.

(2) XL44A is optimized for game handles. When V_{DD}=3.3V, the sensitivity corresponding to output voltage is in the linear range of 0.2V~3.1V as shown in the table. When V_{DD}=5.0V, the sensitivity corresponding to output voltage is in the linear range of 0.2V~4.8V as shown in the table.

XL44A Output Characteristics

T_A = 25℃, system parameters test circuit figure1, test methods figure4, unless otherwise specified.

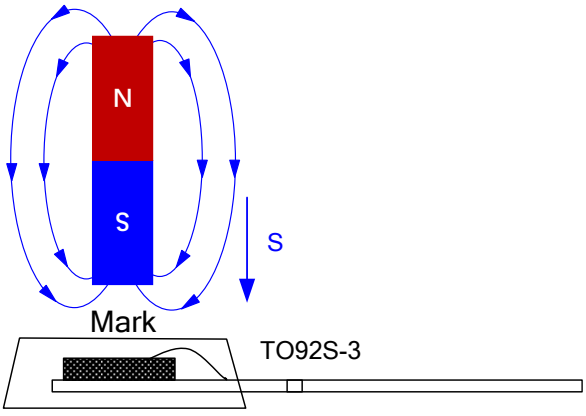


Figure4.Test Schematic of XL44A

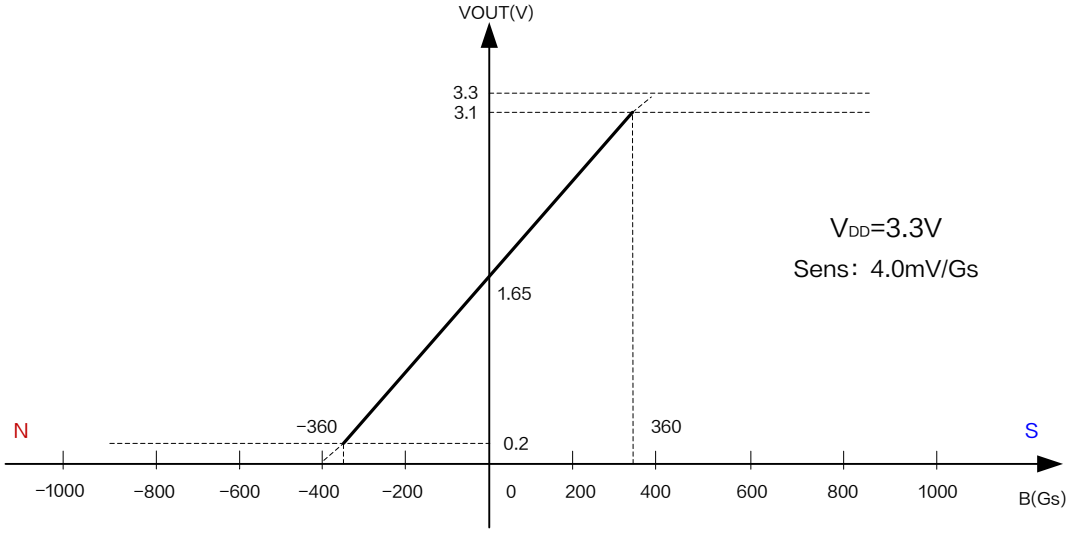


Figure5.Output Characteristic Curve of XL44A (V_{DD} = 3.3V)

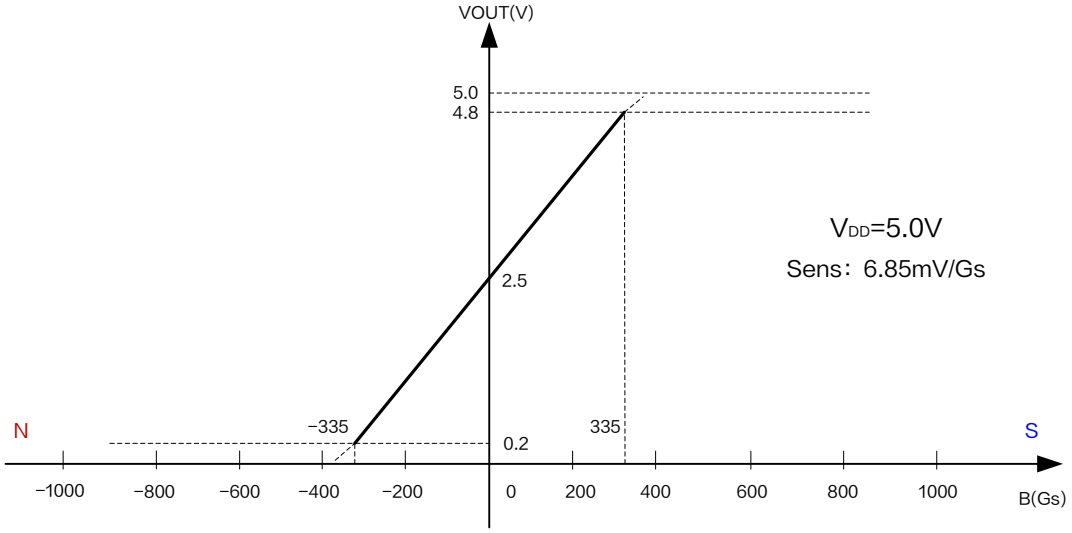
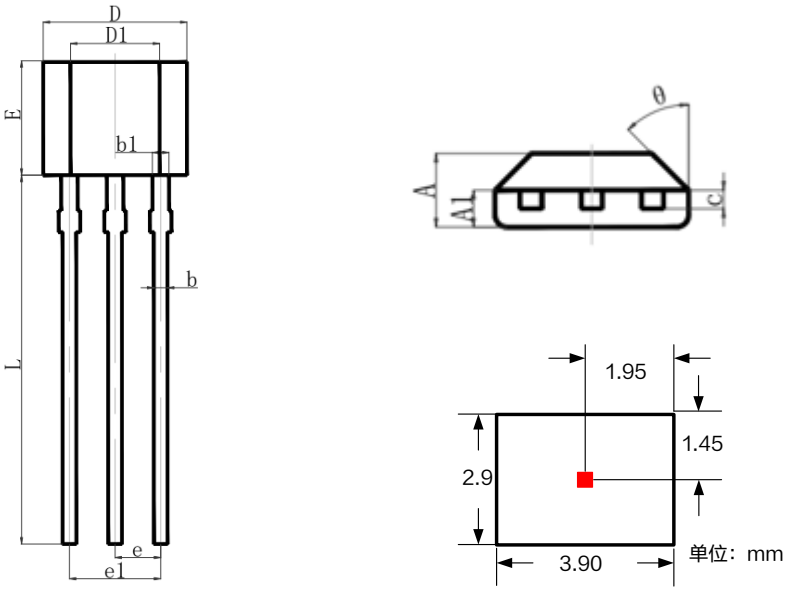


Figure6.Output Characteristic Curve of XL44A (V_{DD} = 5.0V)

Package Information

TO92S-3



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.42	1.62	0.056	0.064
A1	0.66	0.87	0.026	0.034
b	0.33	0.56	0.013	0.022
b1	0.40	0.51	0.016	0.020
c	0.33	0.51	0.013	0.020
D	3.90	4.10	0.154	0.162
D1	2.28	2.68	0.090	0.106
E	2.90	3.25	0.114	0.128
e	1.27 REF		0.050 REF	
e1	2.44	2.64	0.096	0.104
L	13.50	15.50	0.532	0.611
θ	45° REF		45° REF	

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