

Low Power Linear Hall Sensor

XL47S

Features

- Wide Operating Voltage Range: 2.7V~8V
- Low Operation Current: 1.4mA
- Linearity $\pm 4\%$
- Sensitivity: 2.3mV/Gs @ $V_{DD}=3.3V$
- Low noise output without external capacitor filtering
- Temperature Grade 2: $-40^{\circ}C$ to $105^{\circ}C$
Ambient Operating Temperature Range
- Device HBM ESD Classification Level Class2
- SOT23-3 package

Applications

- Game Handle
- Magnetic Axis Keyboards
- Liquid Level Detection
- Speed control turnbuckles

General Description

The XL47S is a linear Hall-effect sensor specifically engineered for game handle, featuring low power consumption, wide operating voltage, and extended temperature range, with an output voltage that varies proportionally to the supply voltage, and proportional to the strength of the magnetic field it senses. The XL47S's output voltage without magnetic field defaults to half of the supply voltage, the chip's typical operating voltage is 3.3V, with low operation current. The operating temperature range supports $-40^{\circ}C \sim 105^{\circ}C$.

The XL47S 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

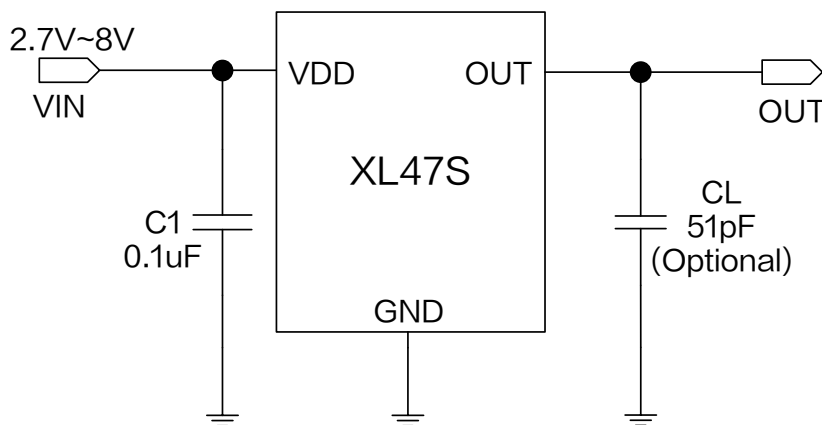


Figure1. XL47S Typical application schematic

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Pin Configurations

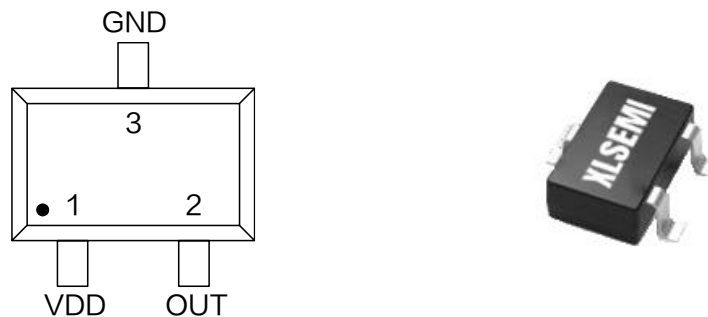


Figure2. Pin Configuration of XL47S

Table1.Pin Description

Pin Name	Description
VDD	Supply Voltage Input Pin, XL47S operates from 2.7V to 8V DC voltage.
GND	Ground Pin.
OUT	Output Pin.

Ordering Information

Order Information	Marking ID	Package Type	Eco Plan	Packing Type Supplied As
XL47S	XL47S	SOT23-3	RoHS & HF	3000 Units Per Reel

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Function Block

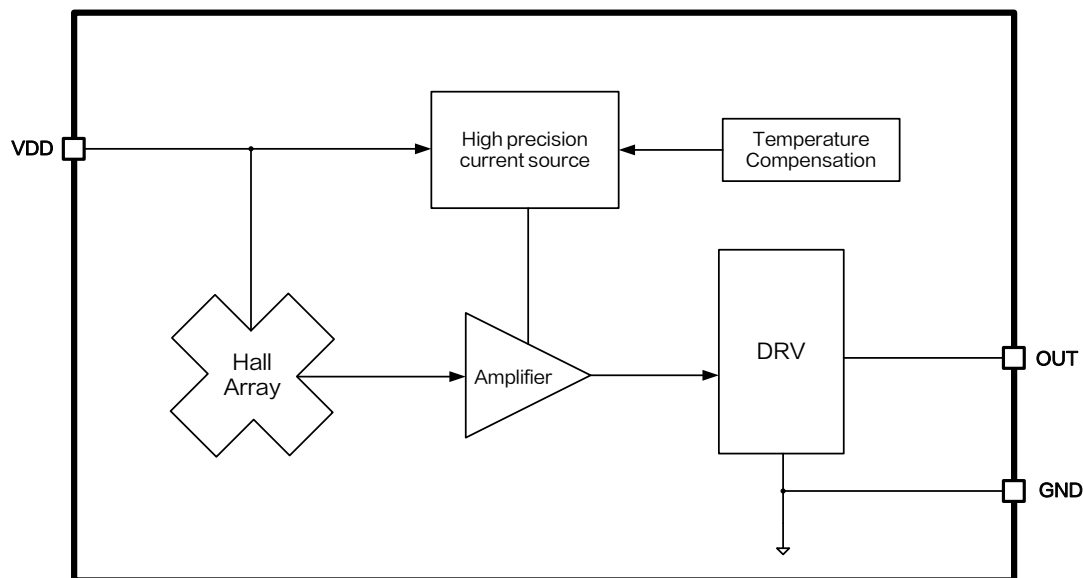


Figure3. Function Block Diagram of XL47S

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
Output Current	I_{OUT}	2	mA
Thermal Resistance(SOT23-3) (Junction to Ambient, No Heatsink, Free Air)	R_{JA}	200	°C/W
Operating Temperature	T_A	-40 ~ 105	°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)	—	≥2500	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.

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XL47S Electrical Characteristics (Note2)

$T_A = 25^{\circ}\text{C}$, $V_{DD}=3.3\text{V}$, system parameters test circuit figure1, unless otherwise specified.

Parameters	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Operation Voltage	V_{DD}	–	2.7	3.3	8	V
Operation Current	I_{DD}	$V_{DD}=3.3\text{V}$	–	1.4	1.6	mA
Output Load Resistance	R_L	$B=+1000\text{Gs}$	20	–	–	$k\Omega$
Output Voltage Range	$V_{OUT(H)}$	$B=+1000\text{Gs}$	2.45	2.5	–	V
	$V_{OUT(L)}$	$B=-1000\text{Gs}$	–	0.8	0.85	V
Static Output Voltage	$V_{OUT(Q)}$	$B=0\text{Gs}$	1.48	1.65	1.82	V
Linearity	Lin	–	–4	–	4	%
Power on start-up time	–	$B=0\text{Gs}$	–	6	–	
Response time	–	$B=-1000\text{Gs}$	–	0.7	–	μS
Output Noise	–	Bandwidth= 10Hz to 10kHz	–	0.8	–	mV

Note2: The power on start-up time and response time are both the time difference between the test input voltage and the time when the output voltage is stabilized.

XL47S Magnetic Characteristics (Note3)

Parameters	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Sensitivity	Sens	$V_{DD}=3.3\text{V}$	2.02	2.3	2.58	mV/Gs

Note3: with sensitivity corresponding to output voltage in the linear range of $0.8\text{V} \sim V_{DD} - 0.8\text{V}$ as shown in the table.

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Output Characteristics

$T_A = 25\text{ }^{\circ}\text{C}$, $V_{DD} = 3.3\text{V}$, system parameters test circuit figure1, test methods figure4, unless otherwise specified.

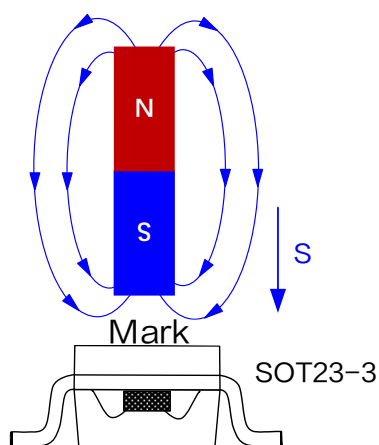


Figure4. Test Schematic of XL47S

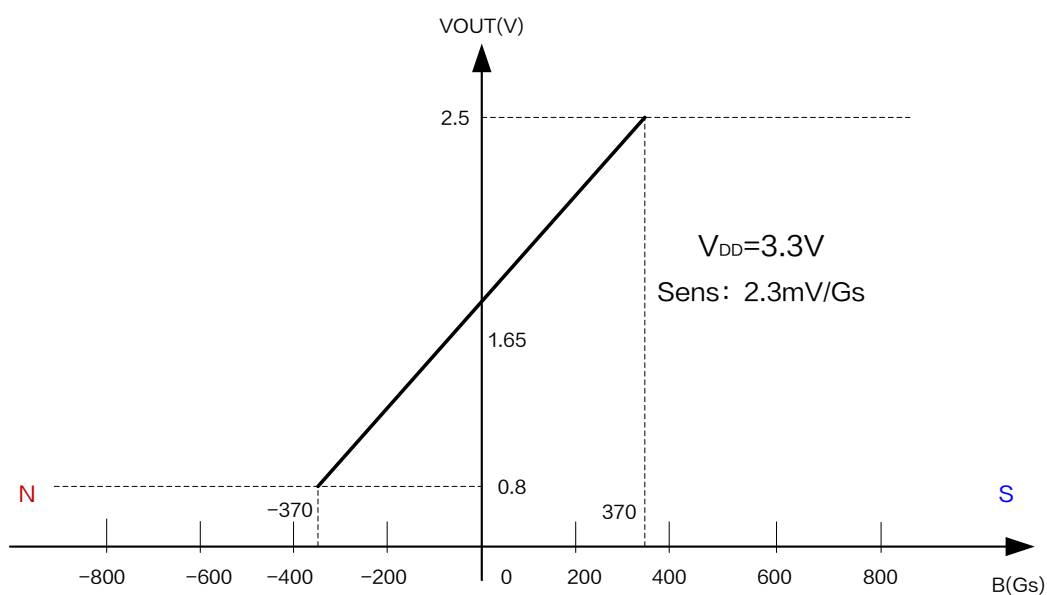


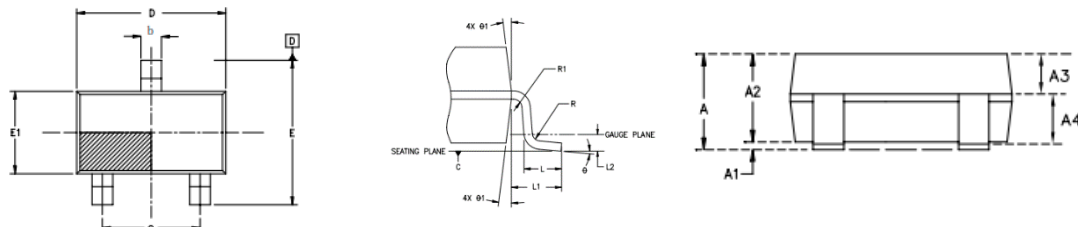
Figure5. Output Characteristic Curve of XL47S

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Package Information

SOT23-3



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.00	1.35	0.039	0.053
A1	0.00	0.15	0.000	0.006
A2	1.00	1.20	0.039	0.047
A3	0.349	0.449	0.014	0.018
A4	0.511	0.701	0.020	0.028
b	0.35	0.45	0.014	0.018
b1	0.32	0.38	0.013	0.015
c	0.14	0.20	0.006	0.008
c1	0.14	0.16	0.006	0.006
D	2.82	3.02	0.111	0.119
E	2.60	3.00	0.102	0.118
E1	1.526	1.726	0.060	0.068
e	1.80	2.00	0.071	0.079
L	0.35	0.60	0.014	0.024
L1	0.6REF.		0.6REF.	
L2	0.25REF.		0.25REF.	
R	0.1	—	0.004	—
R1	0.1	0.25	0.004	0.010
θ	0°	8°	0°	8°
θ1	5°	15°	0°	8°

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