

### Low Power Linear Hall Sensor

XL47T

#### Features

- Wide Operating Voltage Range: 2.7V~8V
- Low Operation Current: 1.4mA
- Linearity:  $\pm 4\%$
- Sensitivity: 2.35mV/Gs @  $V_{DD}=3.3V$
- Low noise output without external capacitor filtering
- Temperature Grade 2:  $-40^{\circ}\text{C}$  to  $105^{\circ}\text{C}$   
Ambient Operating Temperature Range
- Device HBM ESD Classification Level Class2
- TO92S-3 package

#### Applications

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

#### General Description

The XL47T is a linear Hall-effect sensor specifically engineered for speed control turnbuckles, featuring low power consumption, wide operating voltage, and extended temperature range, with an output voltage varies proportionally with the strength of the induced magnetic field, and its linear output voltage range follows the variation of the power supply voltage. The XL47T'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  $-40^{\circ}\text{C}\sim 105^{\circ}\text{C}$ .

The XL47T 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

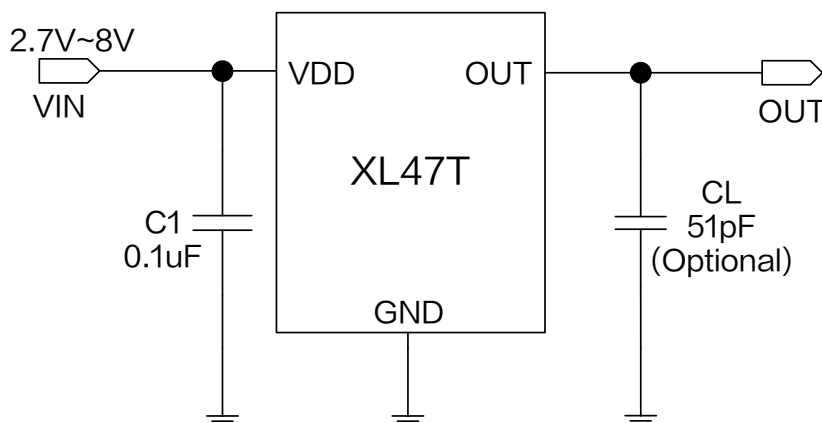


Figure1. XL47T Typical application schematic

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#### Pin Configurations

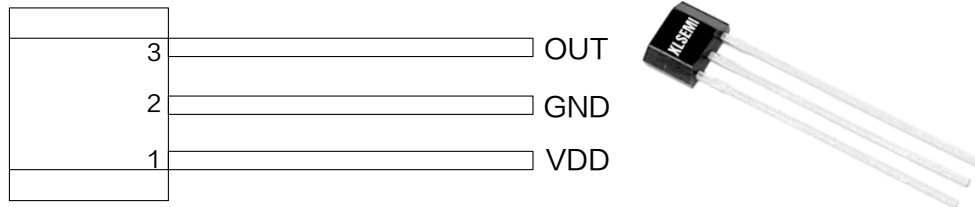


Figure2. Pin Configuration of XL47T

Table1. Pin Description

Pin Number	Pin Name	Description
1	VDD	Supply Voltage Input Pin. XL47T operates from 2.7V to 8V DC voltage.
2	GND	Ground pin.
3	OUT	Output Pin.

#### Ordering Information

Order Information	Marking ID	Package Type	Eco Plan	Packing Type Supplied As
XL47T	XL47T	TO92S-3	RoHS & HF	1000 Units Per Bag

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### Function Block

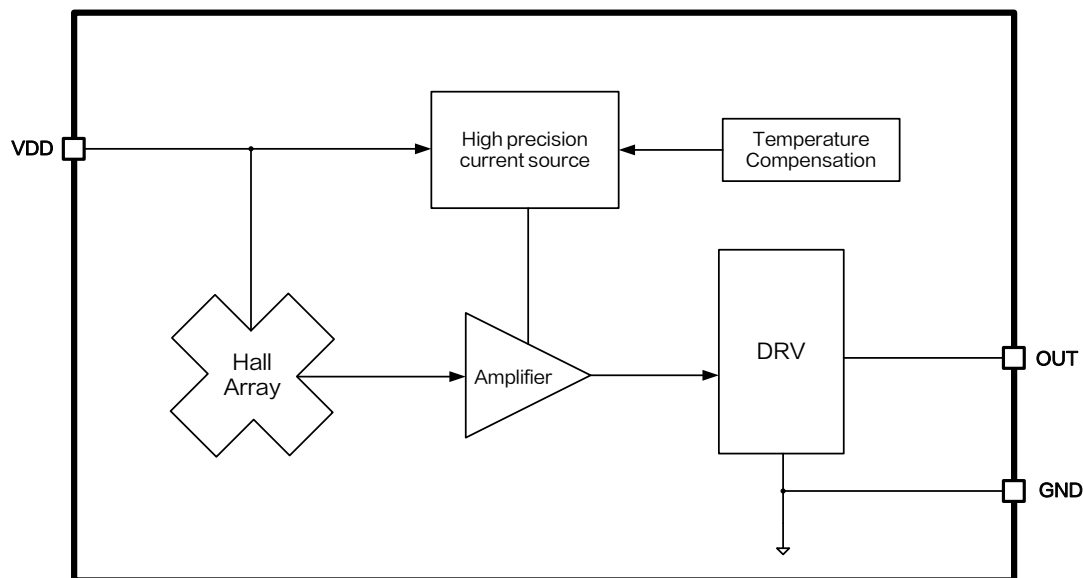


Figure3. Function Block Diagram of XL47T

### 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(TO92S-3) (Junction to Ambient, No Heatsink, Free Air)	$R_{JA}$	160	°C/W
Operating Temperature	$T_A$	-40 ~ 105	°C
Operating Junction Temperature	$T_J$	-40 ~ 125	°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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#### XL47T 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	$I_{DD}$	$V_{DD}=3.3\text{V}$	1.0	1.4	1.8	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	$V_{OUT(Q)}$	$B=0\text{Gs}$	1.452	1.65	1.848	V
Linearity	Lin	–	–4	–	4	%
Output Settling Time	–	$B=0\text{Gs}$	–	6	–	$\mu\text{s}$
Output Noise	–	Bandwidth= 10Hz to 10kHz	–	0.8	–	mV

**Note2:** The Output Settling Time is the time difference between the establishment and stabilization of the output voltage to the static output voltage.

#### XL47T Magnetic Characteristics ( Note3 )

Parameters	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Sensitivity	Sens	$V_{DD}=3.3\text{V}$	2.07	2.35	2.63	mV/Gs

**Note3:** XL47T is optimized for speed control turnbuckles, with sensitivity corresponding to output voltage in the linear range of 0.8V~2.5V as shown in the table.

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#### Output Characteristics

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

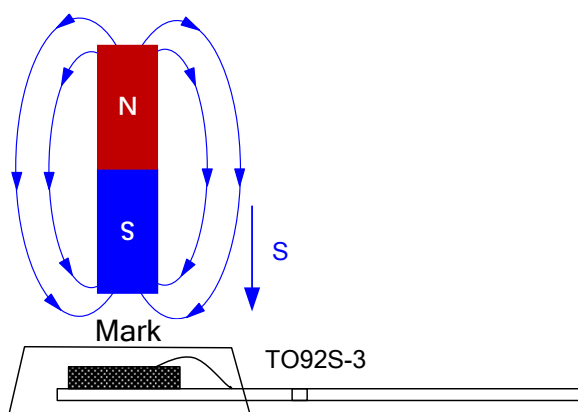


Figure4. Test Schematic of XL47T

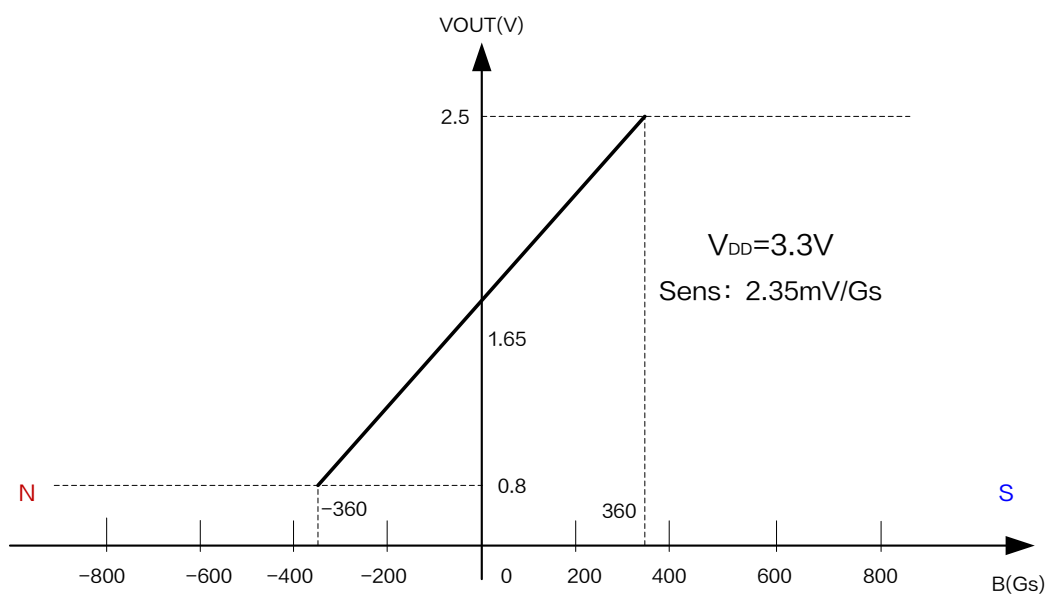


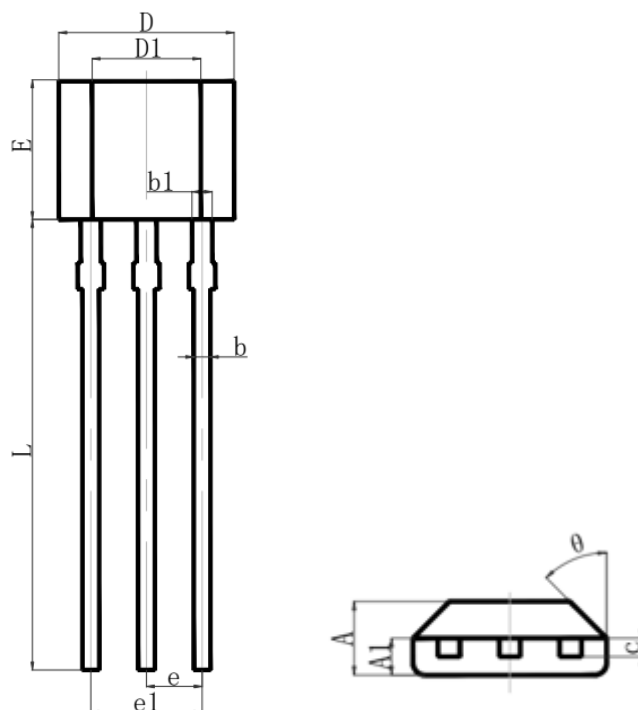
Figure5. Output Characteristic Curve of XL47T

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#### 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	0.161
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	0.531	0.610
θ	45° REF.		45° REF.	

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