Linear Hall Sensor XL591

Features

- Wide Operating Voltage Range：3V~8V
- Low noise output without external capacitor filtering
- Linearity ±5%
- Temperature Grade 1: −40℃ to 125℃ Ambient Operating Temperature Range
- Device HBM ESD Classification Level Class3B
- TO92S−3 package

Applications

- Potential Control
- Precise Position Detection
- Game Handle
- Flow Meter

General Description

The XL591 is a linear Hall sensor optimized for wide voltage and temperature ranges, with an output voltage that varies proportionally to the supply voltage, and proportional to the strength of the magnetic field it senses. the XL591's output voltage without magnetic field defaults to half of the supply voltage, the chip's typical operating voltage is 5.0V, with an ultimate withstand voltage of up to 50V, and a typical value of sensitivity of 2.4mV/Gs. The operating temperature range supports −40℃~125℃. It is widely used in consumer and industrial control applications.

The XL591 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

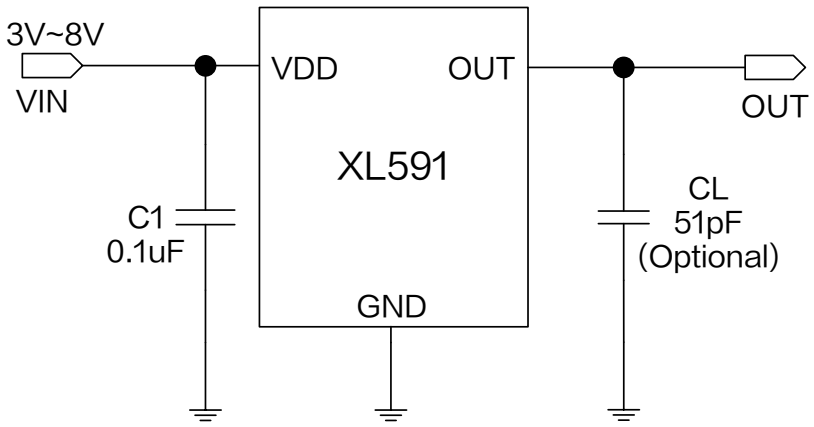


Figure1. XL591 Typical application schematic

Pin Configurations

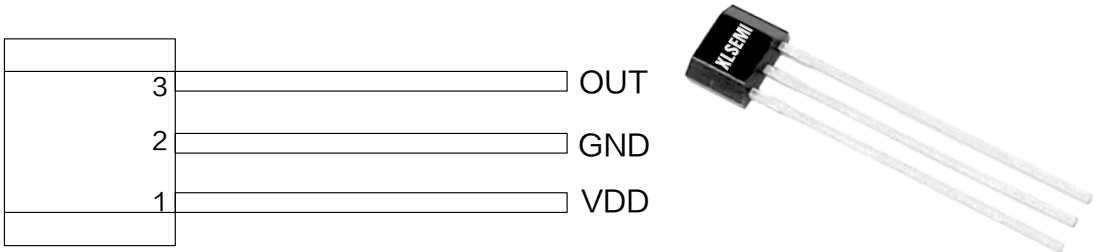


Figure2. Pin Configuration of XL591

Table 1 Pin Description

Pin Number	Pin Name	Description
1	VDD	Supply Voltage Input Pin. XL591 operates from 3V to 8V DC voltage.
2	GND	Ground pin.
3	OUT	Open Collector Output Pin, requires a resistor pull-up.

Ordering Information

Order Information	Marking ID	Package Type	Eco Plan	Packing Type Supplied As
XL591	XL591	TO92S-3	RoHS & HF	1000 Units Per Bag

Function Block

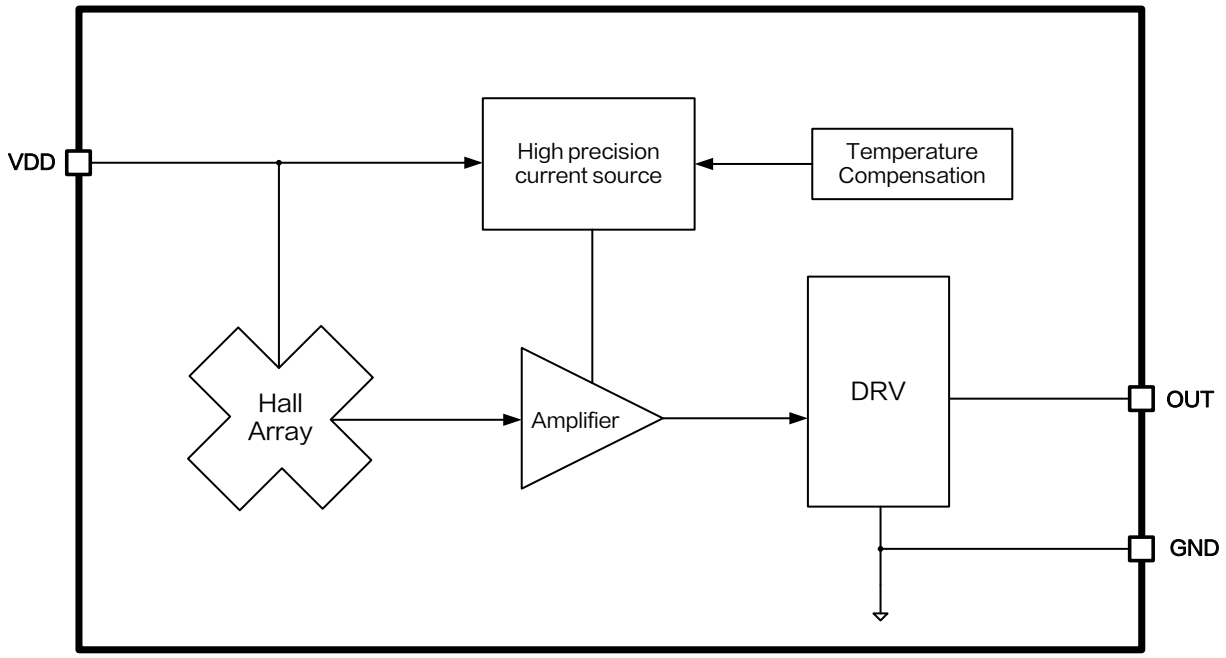


Figure3. Function Block Diagram of XL591

Absolute Maximum Ratings（Note1）

Parameter	Symbol	Value	Unit
Input Voltage	V_{DD}	−0.3～50	V
Output Pin Voltage	V_{OUT}	−0.3～40	V
Output Current	I_{OUT}	1	mA
Thermal Resistance (TO92S−3) (Junction to Ambient, No Heatsink, Free Air)	R_{JA}	160	℃/W
Operating Temperature	T_A	−40～125	℃
Operating Junction Temperature	T_J	−40～150	℃
Storage Temperature	T_{STG}	−65～150	℃
Lead Temperature (Soldering, 10 sec)	T_{LEAD}	260	℃
ESD (HBM)		>8000	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.

XL591 Electrical Characteristics（Note2）

T_A = 25℃, V_{DD}=5V; system parameters test circuit figure1, unless otherwise specified.

Parameters	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Operation Voltage	V_{DD}		3		8	V
Operation Current	I_{DD}			6.5	10	mA
Output Load Resistance	R_L		2.5			kΩ
Output Voltage Range	$V_{OUT(H)}$		4.0	4.2		V
	$V_{OUT(L)}$			0.8	1.0	V
Static Output Voltage	$V_{OUT(Q)}$	B=0Gs, R_L=10kΩ	2.4	2.5	2.6	V
Sensitivity	SENS		2.0	2.4	2.8	mV/Gs
Linearity	Lin		−5		5	%
Response Time	t_r			1		uS

Note2 : A south pole near the marked side of the package is a positive magnetic field.

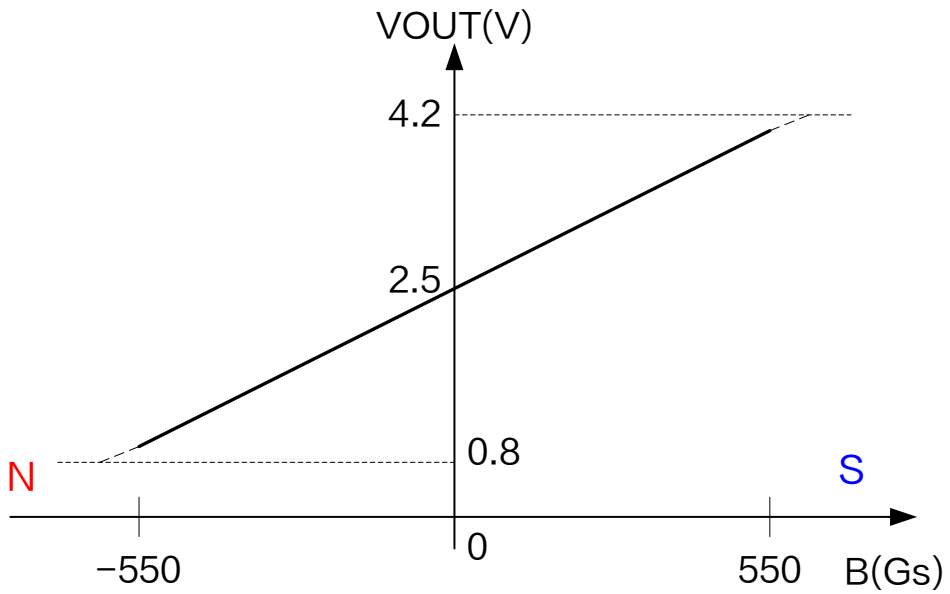
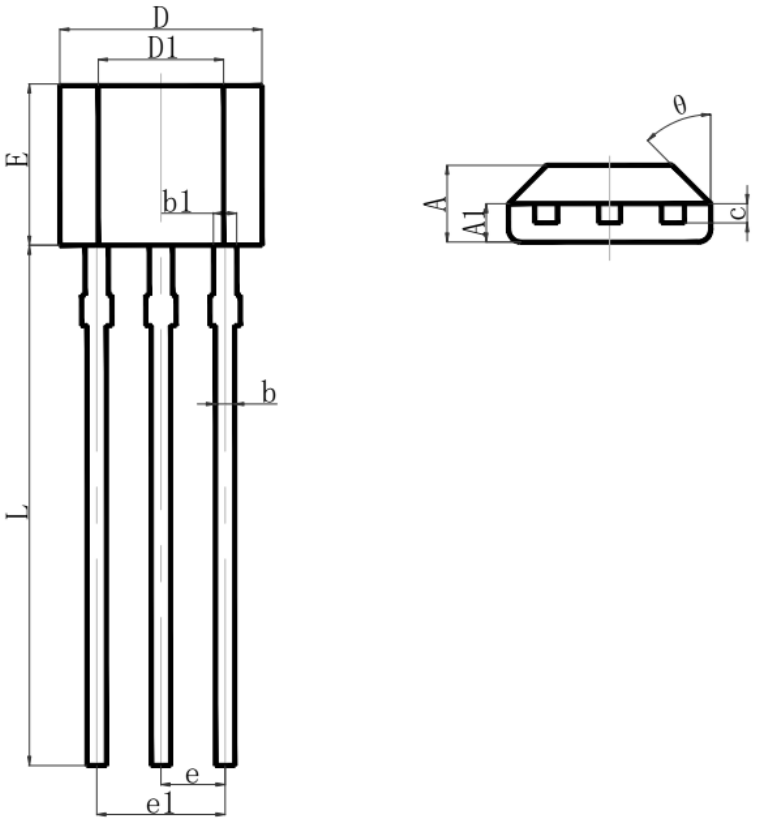


Figure4. XL591 Output characteristic curve

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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