Low Power Linear Hall Sensor XL462

Features

- Tunnel Magnetoresistance (TMR) Technology
- Wide Operating Voltage Range
- Differential Sinusoidal Output
- Full 360° In-Plane Rotation Sensing
- Large Air Gap Capability
- Temperature Grade 1: −40℃ to 125℃ Ambient Operating Temperature Range
- Device HBM ESD Classification Level Class3B
- SOT23-5 package

Applications

- Angular Position Measurement
- Rotational Position Measurement

General Description

The XL462 is a high-precision Tunnel Magnetoresistance (TMR) angle sensor optimized for angle detection applications. Integrating four high-sensitivity TMR sensing elements, it converts the angular variation of the applied magnetic field into differential sine and cosine voltage signals to enable precise 360° angle measurement.

The output signal period corresponds to a full 360° rotation of the magnetic field vector within the sensing plane, independent of magnetic field strength. Featuring a maximum operating voltage of 5.5 V and an operating temperature range from −40° C to +125° C, it can be widely used in fields such as automotive electronics and industrial automation.

Typical application schematic

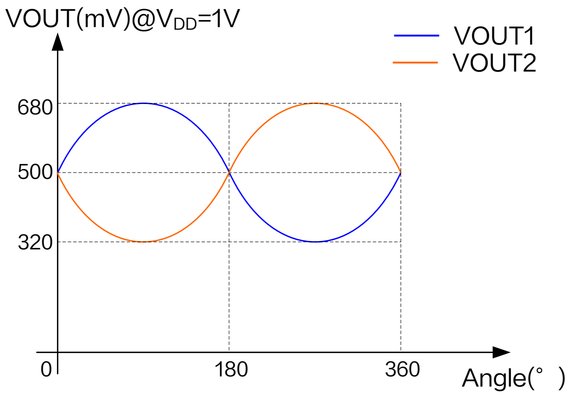


Figure1.XL462 Typical application diagram and output characteristic curve

Pin Configurations

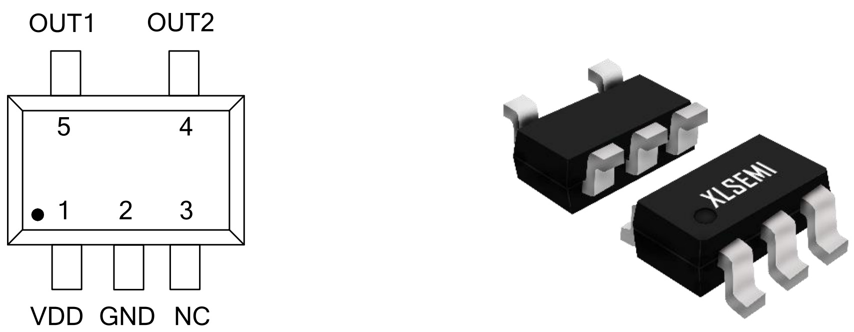


Figure2.Pin Configuration of XL462

Table 1. Pin Description

Pin Number	Pin Name	Description
1	VDD	Supply Voltage Input Pin. XL462 operates from 2.7V to 8V DC voltage.
2	GND	Ground pin.
3	NC	No Connected.
4	OUT2	Analog Differential Output Pin 2.
5	OUT1	Analog Differential Output Pin 1.

Ordering Information

Order Information	Marking ID	Package Type	Eco Plan	Packing Type Supplied As
XL462	XL462	SOT23-5	RoHS & HF	3000 Units Per Reel

Internal Structure

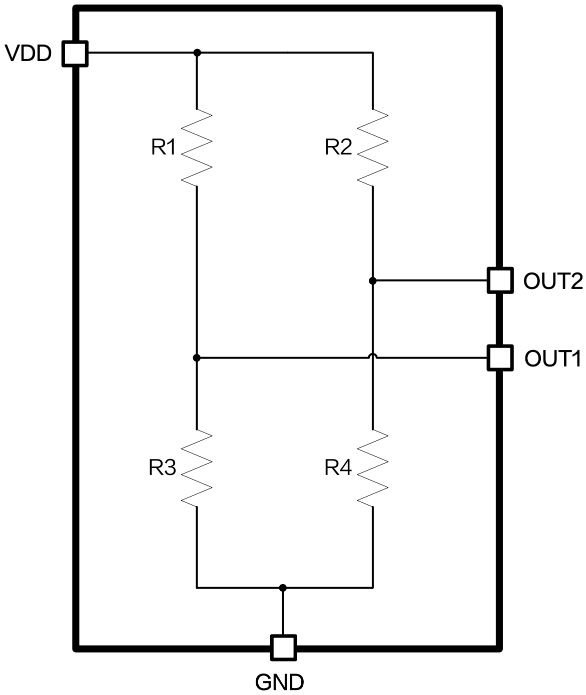


Figure3.Internal Structure Diagram of XL462

Absolute Maximum Ratings (Note 1)

Parameter	Symbol	Value	Unit
Input Pin Voltage	V_{DD}	−0.5 ~ 6	V
Thermal Resistance (SOT23−5) (Junction to Ambient, No Heatsink, Free Air)	R_{JA}	160	℃/W
Operating Temperature	T_A	−40 ~ 125	℃
Operating Junction Temperature	T_J	−40 ~ 155	℃
Storage Temperature	T_{STG}	−65 ~ 150	℃
Lead Temperature (Soldering, 10 sec)	T_{LEAD}	260	℃
ESD (HBM)	−	≥8000	V

Note 1: 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.

XL462 Electrical Characteristics

T_A = 25℃, V_{DD} = 1V, system parameters test circuit figure1, unless otherwise specified.

Parameters	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Operation Voltage	V_{DD}	–	–	1	5.5	V
Zero-Field Resistance	R_0	B=0Gs VDD to GND	100	200	300	kΩ
Peak Voltage	V_{PEAK}	B=300Gs	–	350	–	mV/V
Midpoint Voltage	V_{Mid}	B=300Gs	450	500	550	mV/V
Bias Voltage	V_{OFFSET}	B=300Gs	-15	–	15	mV/V
Bridge Resistance Temperature Coefficient	TCR_B	–	–	-0.05	–	%/℃
Peak Voltage Temperature Coefficient	TCV_{PEAK}	–	–	-0.09	–	%/℃

XL462 Magnetic Characteristics

Parameters	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Operating Magnetic Field	B	–	300	–	800	Gs

Output Characteristics

T_A = 25℃, V_{DD} = 1V, system parameters test circuit figure1, unless otherwise specified.

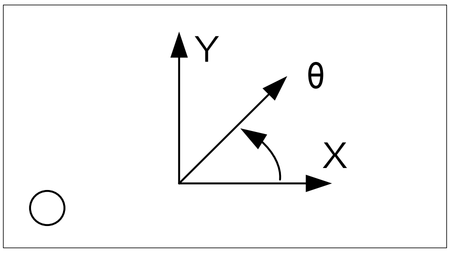


Figure4.XL462 Sensitivity Direction

The definition of the magnetic field angle is illustrated in Figure 4; as the magnetic field angle is continuously swept across the range of 0° to 360° , the output voltage of the XL462 exhibits a characteristic sinusoidal waveform, as shown in Figures 5 and 6.

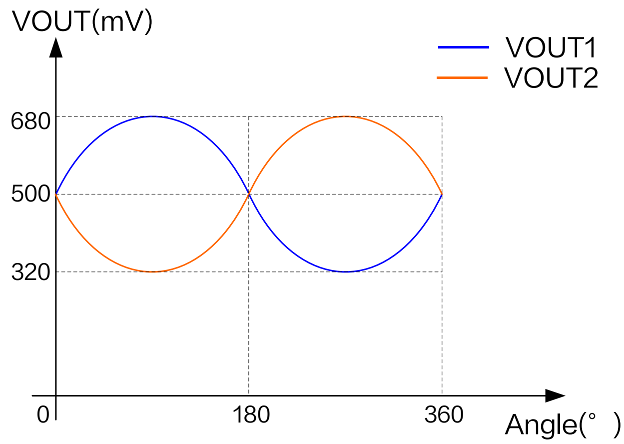


Figure5.XL462 Single-Period Single-Ended Output at V_{DD}=1V

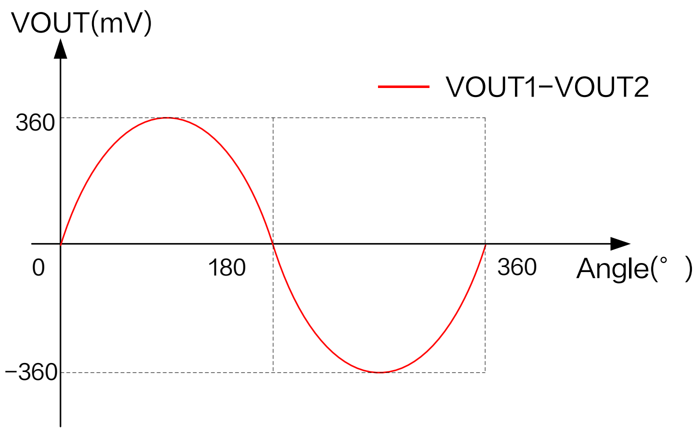


Figure6. XL462 Single-Period Differential Output at V_{DD}=1V

Parameter Definitions

Zero-Field Resistance

Resistance between the VDD and GND pins under zero magnetic field conditions.

Peak Voltage V_{PEAK}

$$V_{PEAK1}=\frac{V_{MAX1}-V_{MIN1}}{2\times V_{DD}} \qquad V_{PEAK2}=\frac{V_{MAX2}-V_{MIN2}}{2\times V_{DD}}$$

$$V_{PEAK}=V_{PEAK1}+V_{PEAK2}$$

Midpoint Voltage V_{Mid}

$$V_{Mid1}=\frac{V_{MAX1}+V_{MIN1}}{2\times V_{DD}} \qquad V_{Mid2}=\frac{V_{MAX2}+V_{MIN2}}{2\times V_{DD}}$$

Bias Voltage V_{OFFSET}

$$V_{OFFSET}=V_{Mid1}-V_{Mid2}$$

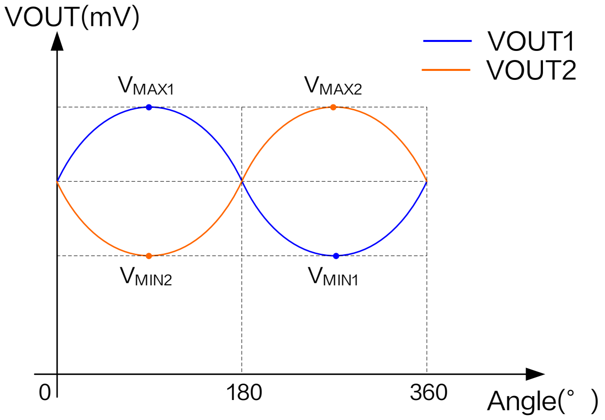


Figure7.Schematic Diagram of XL462 Parameter Definitions

Bridge Resistance Temperature Coefficient TCR_B

$$TCR_B=\frac{R_H-R_L}{R_N(T_H-T_L)}\times 100\%$$

R_H: Resistance at high temperature	R_L: Resistance at low temperature	R_N: Resistance at 25 ℃
T_H: High temperature	T_L: Low temperature	T_N: 25℃

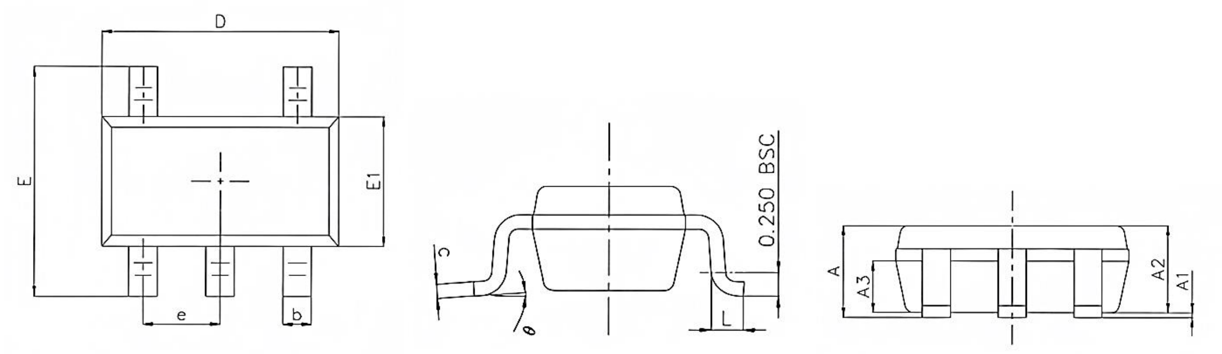
Peak Voltage Temperature Coefficient TCV_{PEAK}

$$TCV_{PEAK1}=\frac{V_{PEAKH1}-V_{PEAKL1}}{V_{PEAKN1}(T_H-T_L)}\times 100\% \qquad TCV_{PEAK2}=\frac{V_{PEAKH2}-V_{PEAKL2}}{V_{PEAKN2}(T_H-T_L)}\times 100\%$$

V_{PEAKH1}: Output value of OUT1 at high temperature	V_{PEAKL1}: Output value of OUT1 at low temperature	V_{PEAKN1}: Output value of OUT1 at 25℃
V_{PEAKH2}: Output value of OUT2 at high temperature	V_{PEAKL2}: Output value of OUT2 at low temperature	V_{PEAKN2}: Output value of OUT2 at 25℃
T_H: High temperature	T_L: Low temperature	T_N: 25℃

Package Information

SOT23-5



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.05	1.25	0.041	0.049
A1	0.00	0.10	0.000	0.004
A2	1.00	1.20	0.039	0.047
A3	0.55	0.75	0.022	0.030
D	2.82	3.02	0.111	0.119
E1	1.51	1.70	0.059	0.067
E	2.65	2.95	0.104	0.116
b	0.30	0.40	0.012	0.016
e	0.95 BSC		0.037 BSC	
θ	0°	8°	0°	8°
L	0.30	0.57	0.012	0.022
c	0.10	0.20	0.004	0.008

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