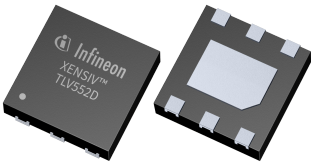
XENSIV™ magnetic TMR-based linear sensor

Features



RoHS

Lead-free

- 2D linear sensor using the Tunnel Magnetoresistive effect (TMR)
- Magnetic measurement range of ±80 mT
- Large ratiometric output sensitivity of 2.1 mV/V/mT
- High Crossfield immunity due to Vortex Technology
- Small package footprint 1.5 x 1.5 x 0.4 mm^3
- Wide operating temperature range from -40°C to 85°C

Potential applications

- Human-machine interface (HMI) application such as joysticks
- 2D (x/y-in-plane) linear position sensing
- Gimbals
- Rotor position sensing
- Robotics
- Industrial automation

Product validation

The product is validated according to JEDEC JESD47.

Description

The TLV552D uses the TMR effect to measure the magnetic field applied in the sensor plane along the y- and x- directions using a dual Wheatstone bridge design. The sensor provides an analogue voltage output proportional to the external magnetic field strength.

Product type	Marking	Ordering code	Package
TLV552D	Jxx 1xx	SP006134467	PG-XQFN-7-1

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1 Functional block diagram

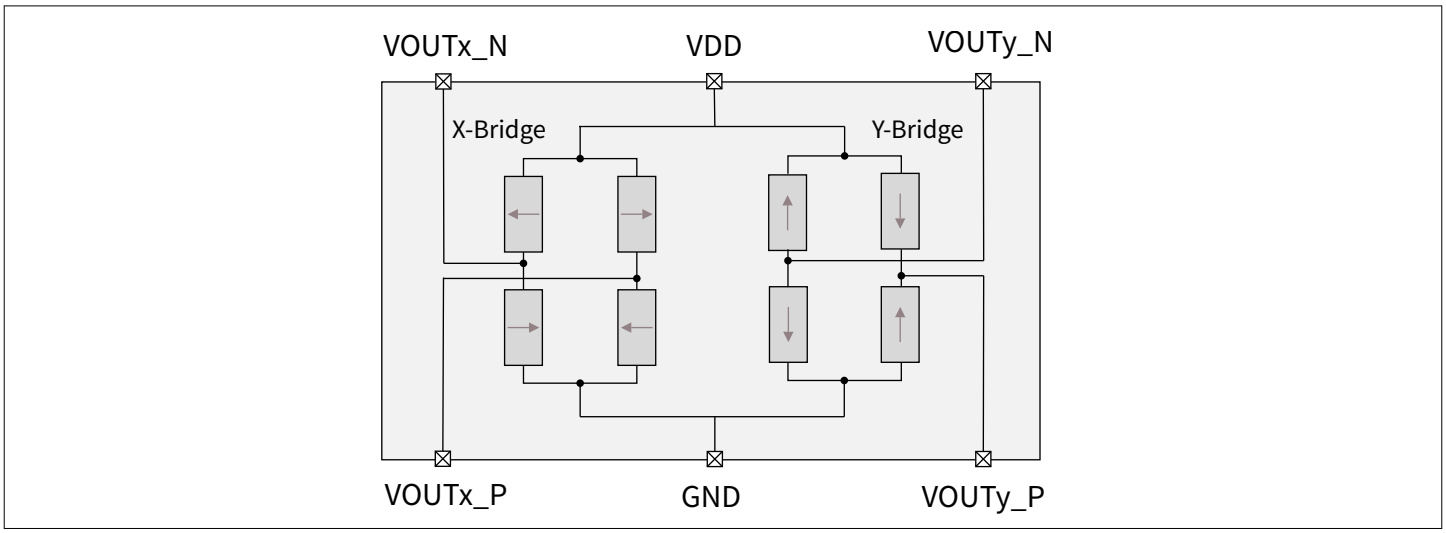


Figure 1 Block diagram - Two Wheatstone bridges with TMR reference layer magnetization

1.1 Pin configuration

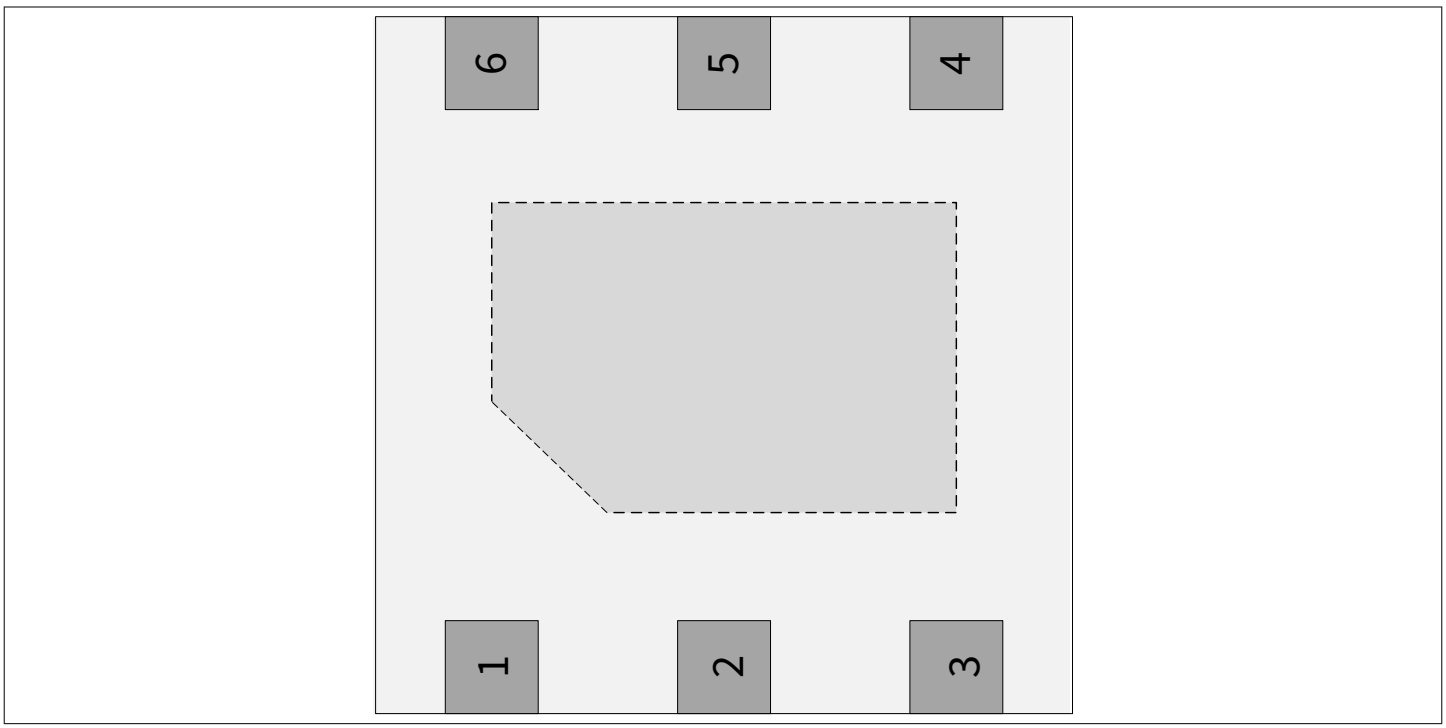


Figure 2 Pinout (top view)

Table 1 Pin configuration

Pin	Name	Description
1	VOUTx_P	Sensor output X terminal P
2	VDD	Sensor bias input
3	VOUTy_P	Sensor output Y terminal P

(table continues...)

Table 1 (continued) Pin configuration

Pin	Name	Description
4	VOUTy_N	Sensor output Y terminal N
5	GND	Ground (bias return)
6	VOUTx_N	Sensor output X terminal N

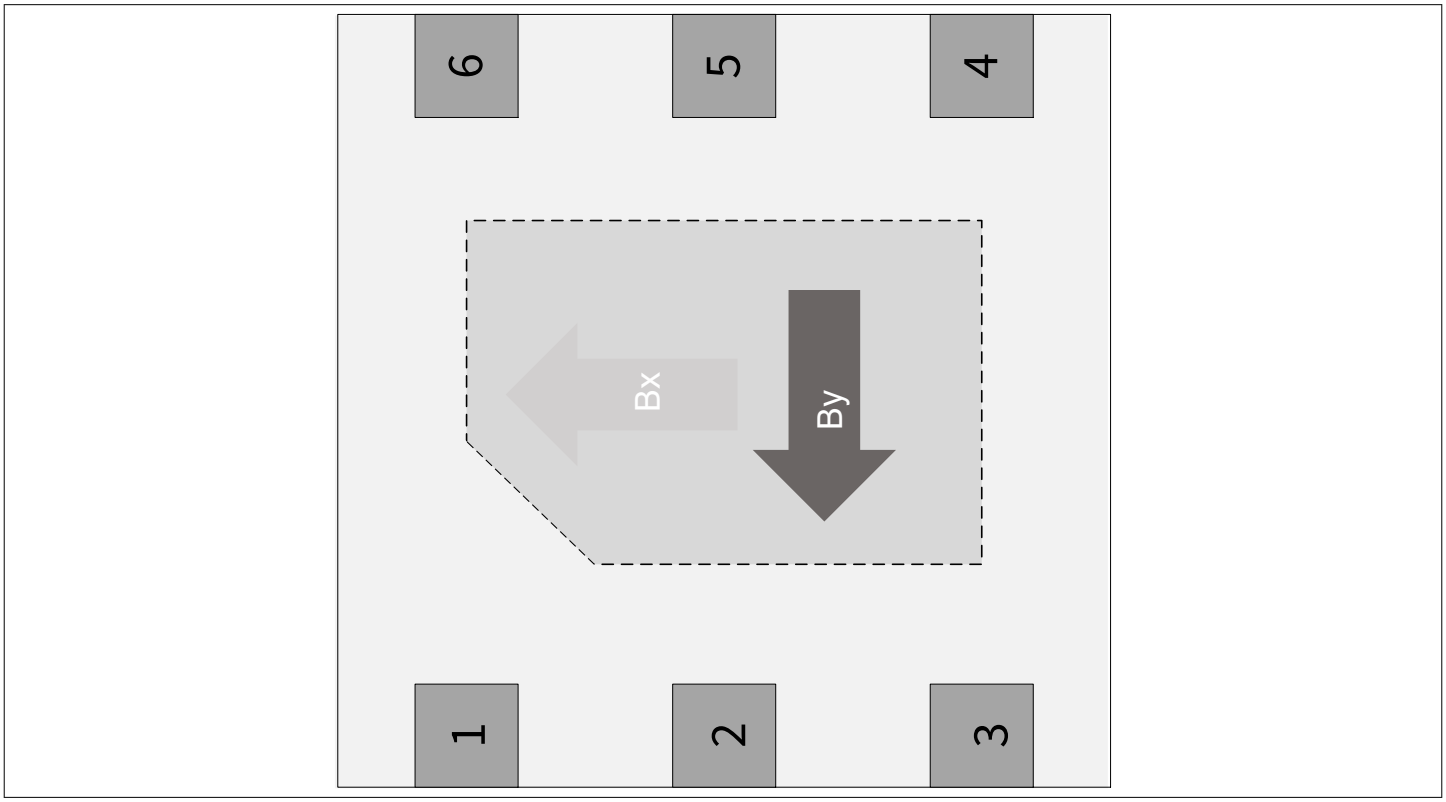


Figure 3 Sensing directions relative to package top view

2 General product characteristics

2.1 Absolute maximum ratings

Table 2 Absolute maximum ratings

All voltages with respect to ground, positive current flowing into pin (unless otherwise specified).

Parameter	Symbol	Values			Unit	Note or condition
		Min.	Typ.	Max.		
Max. supply voltage	$V_{DD,max}$ $V_{OUT1,max}$ $V_{OUT2,max}$ $V_{GND,max}$	-6.5	–	6.5	V	
Max. storage temperature	T_{a_max}	-30	–	125	°C	For storage conditions see [1]
Max. magnetic field range	B_{max}	-120	–	120	mT	Higher fields may cause parameter deviations during sensor operation. Maximum resulting in-plane magnetic-field vector
ESD HBM	V_{HBM}	-1.5	–	1.5	kV	Human Body Model (HBM)

1) See Application Note "Storage of Products Supplied by Infineon Technologies"

Stresses above the maximum values listed here may cause permanent damage to the device. Exposure to absolute maximum rating conditions for extended periods may affect device reliability. Maximum ratings are absolute ratings; exceeding only one of these values may cause irreversible damage to the device.

2.2 Functional range

Table 3 Functional range

All voltages with respect to ground, positive current flowing into pin (unless otherwise specified).

Parameter	Symbol	Values			Unit	Note or condition
		Min.	Typ.	Max.		
Supply voltage	V_{DD}	1	–	3.6	V	$I_{DD,typ}$ = 0.5 mA at V_{DD} = 1 V
Operating ambient temperature	T_A	-40	–	85	°C	
Magnetic field range Bx	B_x	-80	–	80	mT	
Magnetic field range By	B_y	-80	–	80	mT	

3 Product features

The sensor is sensitive in x- and y-directions.

Table 4 Electrical characteristics - TMR bridge

T_A = -40 to 85°C; $B_x = B_y = B_z$ = 0 mT; all voltages with respect to ground (unless otherwise specified)

Parameter	Symbol	Values			Unit	Note or condition
		Min.	Typ.	Max.		
Bridge resistance	R_{BR}	3.2	4.8	6.4	kΩ	Resistance of an individual Wheatstone bridge resistance at T = 25°C
Sensor resistance	R_{total}	1.6	2.4	3.2	kΩ	Total resistance of the two parallel Wheatstone bridges at T = 25°C
Output voltage - single-ended	V_{OUT1} V_{OUT2}	–	0.5×V_{VDD}	–	V	
Differential output voltage sensitivity x-axis	$S_{out\ x,diff}$	1.6	2.1	2.5	mV/V/mT	$\|B_x\| \le 80$ mT
Differential output voltage sensitivity y-axis	$S_{out\ y,diff}$	1.6	2.1	2.5	mV/V/mT	$\|B_y\| < 80$ mT
Differential output voltage sensitivity - temperature coefficient	TC_S	-1500	-625	0	ppm/K	$\|Bx\| \le 80$ mT; $\|By\| \le 80$ mT T_A = 25°C to 85°C
Differential output voltage offset	V_{off}	-15	–	15	mV/V	
Differential output voltage offset - temperature coefficient	TC_{off}	-25	0	25	µV/V/K	T_A = 25°C to 85°C
Linearity	L	-1.5	–	1.5	%	Over ±60 mT for B_x and B_y
Noise	$T_{N,RMS}$	–	15	–	µVrms/V	for 5 kHz
Sensitivity mismatch X and Y	S_{MM}	-30	0	30	%	
Orthogonality error	*Ortho*	-5	0	5	°	
Hysteresis	*Hyst*	–	0.3	1	%	Full scale over -80 to 80 mT

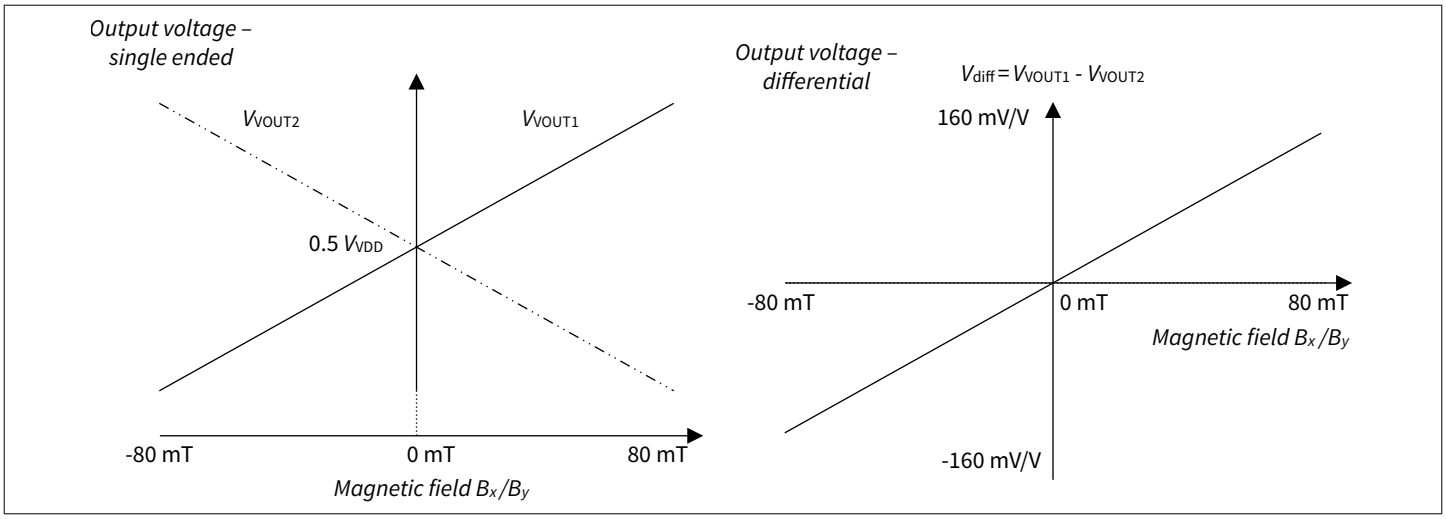


Figure 4 Output characteristics of a Wheatstone bridge measuring a single magnetic axis

4 Application information

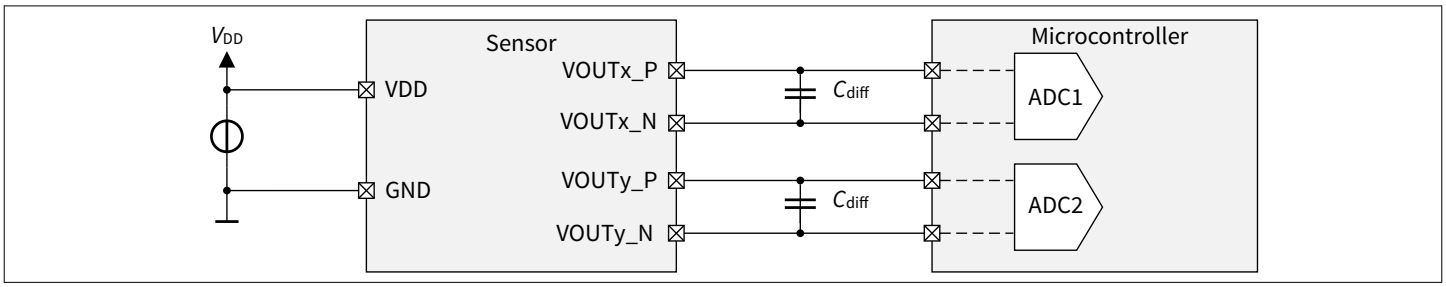
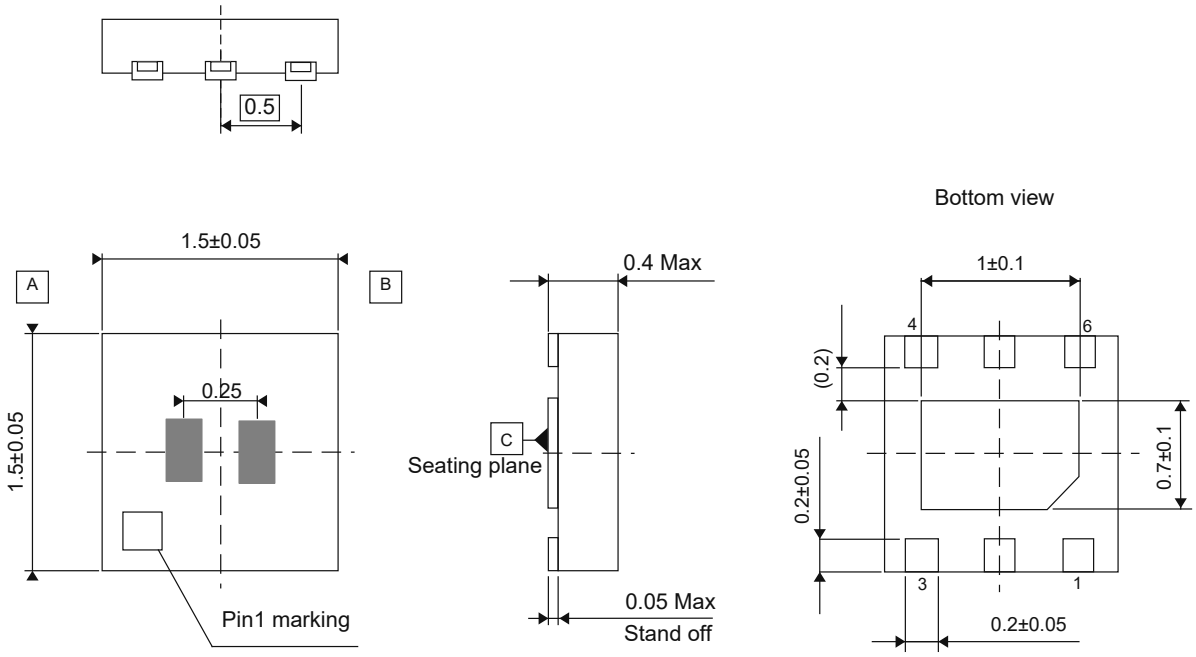


Figure 5 TMR-based linear sensor application diagram

5 Package



All dimensions are in units mm
The drawing is in compliance with ISO 128-30, Projection Method 1 [◁ ⊕]
Drawing according to ISO 8015, general tolerances ISO 2768-mK
Package outline drawing and dimensions in mm

Figure 6 PG-XQFN-7-1 package outline

6 Revision history

Document version	Date of release	Description of changes
1.00	2026-08-28	Initial release

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