



We are the link
between the real and
the digital world.

Vintage Arcade Game

Infineon's virtual show 2020



Vintage Arcade Game – It's a Maker's world



Infineon's Solution

3D Magnetic Sensor TLE493D-W2B6

- › Detecting 3-dimensional joystick movement
- › Ultra-low power consumption

Magnetic Hall switch TLE4964-3M

- › Designed for high precision applications with superior temperature stability

Audio Amplifier MA12070P

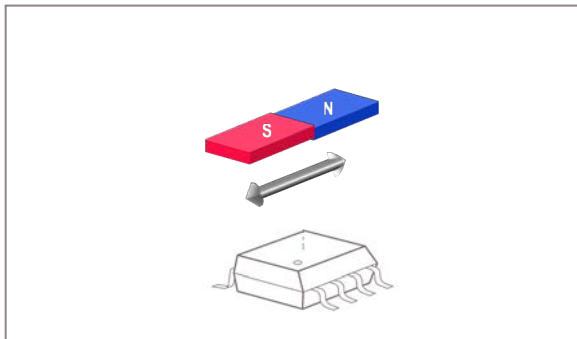
- › Multi-level amplifier

Benefits

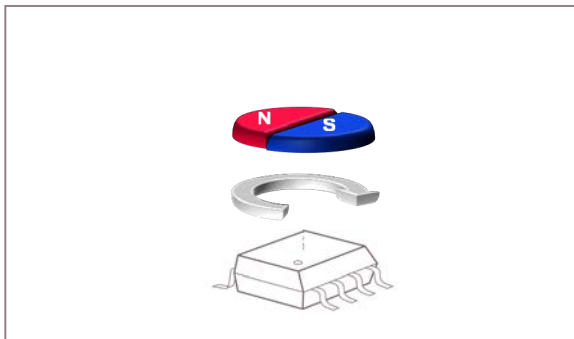
- › Ease-of-use approach with prototyping concept Shield2Go
- › Standardized form factor and pinlayout
- › Software libraries for Arduino and Raspberry Pi available
- › Merus Audio Amplifier Hat ZW for Raspberry Pi

XENSIV™ 3D Magnetic Sensors

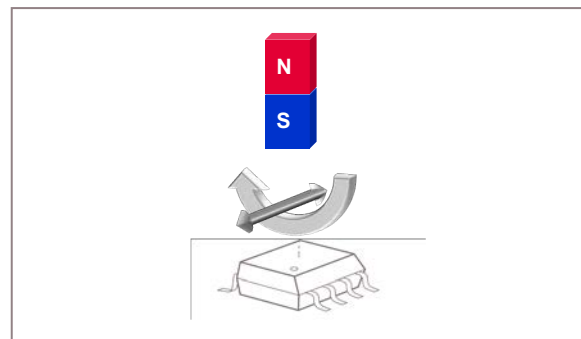
Linear Position



Angular Position



3D movement



Overview

- › Based on Hall-technology
- › Detects the strength of a magnetic field in all three dimensions, i.e. x-, y- and z-axis
- › In addition able to detect linear movements & the angular position of a rotating magnetic field
- › Is available for consumer, industrial and automotive applications

3D Hall Sensor

Our 3D sensors in a nutshell

PRODUCTS

| Industrial & Consumer | | | Automotive | |
|-----------------------|-------------------------------------------|--------------|--------------|---------------------------------------------------|
| TLV493D-A1B6 | TLI493D-A2B6 JESD47 Qualified Products | TLI493D-W2BW | TLE493D-A2B6 | TLE493D-W2B6 A0-A3 AEC-Q100 Qualified Products |

How to read 3D-Sensors nomenclature?

| TLE | 49 | 3D | - | A | 1 | B | 6 | - | A0 |
|-------------------------------------------------------------------------------|-------------------------|----------------------------------------------------------------------|---|---------------------------------------------------|--------------------------------------------------------------------------------------------------|-------------------------------------------|-------------------------------|---|--------------------------|
| Qualification: TLE: Automotive TLI: Industrial TLV: Consumer (Value) | Technology: 49: Hall | Sensor Product Number 3D: 3D technology - using three hall plates | - | Variant A: Standard (Common Use) W: Wake-Up | Generation 1: 1 st generation 3D sensor 2: 2 nd generation 3D sensor | Interface B: I ² C Protocol | Package 6: TSOP6 W: WLB | - | Initial Bus ID: A0-A3 |

KEY FEATURES AND BENEFITS

| TLV493D-A1B6 | TLI493D-A2B6 | TLE493D-W2BW Ax | TLE493D-A2B6 | TLE493D-W2B6 Ax |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> Reduced update frequency and field range Power down mode (7nA) Low current consumption Integrated temperature sensing | <ul style="list-style-type: none"> Increased update frequency and field range Power down mode (7nA) Component reduction Sensor address read back | <ul style="list-style-type: none"> Small WLB package Wake-up upon magnetic field mode Power down mode (7nA) Integrated temperature sensing | <ul style="list-style-type: none"> Variable update frequencies and power modes Power down mode (7nA) Integrated temperature sensing | <ul style="list-style-type: none"> Wake-up upon magnetic field mode Power down mode (7nA) Integrated temperature sensing ISO ready |

USE CASES

| | | | | | | | | | | |
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| | | | | | | | | | | |
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SOP
August 2020

+ A global support structure with 3D magnetic sensor experts that can address customer's requirements

3D Sensors Product Portfolio

Overview and Key Features

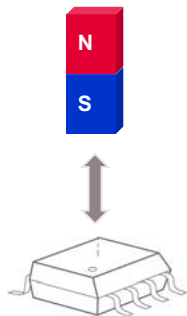


| Hall Sensor | TLV493D-A1B6 | TLI493D-A2B6 | TLI493D-W2BW (A0-A3) | TLE493D-A2B6 | TLE493D-W2B6 (A0-A3) |
|-----------------------|----------------------------------------------|------------------------------------------------------------------------|---------------------------------------------------------|---------------------------------------------------------|---------------------------------------------------------|
| Production Samples | Available | Available | Available August 2020 | Available | Available |
| Temperature Range | -40 to 125°C | -40 to 105°C | -40 to 125°C | -40 to 125°C | -40 to 125°C |
| Magnetic Linear Range | typ. $\pm 130\text{mT}$ | min. $\pm 160\text{mT}$ min. $\pm 100\text{mT}^{1)}$ | min. $\pm 160\text{mT}$ min. $\pm 100\text{mT}^{1)}$ | min. $\pm 160\text{mT}$ min. $\pm 100\text{mT}^{1)}$ | min. $\pm 160\text{mT}$ min. $\pm 100\text{mT}^{1)}$ |
| Resolution | 98 $\mu\text{T/LSB}$ | 130uT/LSB 65uT/LSB ¹⁾ | 130uT/LSB 65uT/LSB ¹⁾ | 130uT/LSB 65uT/LSB ¹⁾ | 130uT/LSB 65uT/LSB ¹⁾ |
| Offset drift | $\pm 1\text{mT}$ | X,Y: $\pm 0.45\text{mT}$ Z: $\pm 1.6\text{mT}$ | X,Y: $\pm 0.45\text{mT}$ Z: $\pm 0.45\text{mT}$ | X,Y: $\pm 0.45\text{mT}$ Z: $\pm 1.6\text{mT}^{2)}$ | X,Y: $\pm 0.45\text{mT}$ Z: $\pm 0.45\text{mT}$ |
| Matching drift | X/Y: typ. $\pm 5\%$ XY/Z: typ. $\pm 20\%$ | X/Y: $\pm 3.5\%$ XY/Z: $\pm 15\%$ | X/Y: $\pm 3.5\%$ XY/Z: $\pm 15\%$ | X/Y: $\pm 3.5\%$ XY/Z: $\pm 15\%$ | X/Y: $\pm 3.5\%$ XY/Z: $\pm 15\%$ |
| Safety | No | No | No | No | Yes |
| Wake up | No | No | Yes | No | Yes |
| Package | TSOP6 | TSOP6 | WLB ³⁾ | TSOP6 | TSOP6 |
| Comment | › Low Power | › Higher Up. Frequency › Master Ctrl Mode › Ultra Low Power Mode | › Pre-defined Startup ID: A0-A3 | › Flex Speed | › Pre-defined Startup ID: A0-A3 |

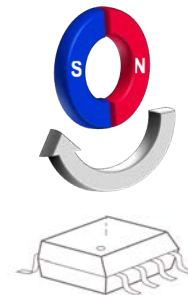
¹⁾ Short range mode ²⁾ With Z Hall spin test ³⁾ SG-WFWLB 5-2: Silicon Green - very, very thin profile Fine pitch Wafer Level Ball grid array

XENSIV™ Magnetic Hall Switches

Proximity



Rotational speed and direction



Overview

- › Based on Hall-technology
- › Detects the strength of a magnetic field
- › Is used for proximity as well as rotational speed and direction detection
- › Available for consumer, industrial and automotive applications

Hall Switches

Our Hall Switches in a nutshell



PRODUCTS

| Automotive <small>AEC-Q100 Qualified Products</small> | | | Industrial & Consumer <small>JEDEC47 Qualified Products</small> | |
|-------------------------------------------------------|----------------------------|--------------------------------------|-----------------------------------------------------------------|-------------------------------|
| TLE496x Hall Switch and Latch Family | TLE4966 Double Hall Family | TLE49x6 Hall Switch and Latch Family | TLI/TLV496x Hall Switch and Latch Family | TLE4913 Low Power Hall Switch |

How to read the Hall Switches nomenclature?

| TLE | 49 | 61 | - | 1 | M |
|-----------------------------------------------------|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Qualification: | Technology: | Family and switch characteristic: 06: Unipolar Switch 13: Low power 46: Latch 66: Dual Hall 61/63: Latch 64/65: Unipolar Switch 68: Bipolar Switch 76: Current interface | | | Package Variant |
| TLE: Automotive TLI: Industrial TLV: Consumer | 49: Hall | 1: Reference to magnetic threshold | | | G: PG-TSOP6 (SMD Package) M: PG-SOT23 (SMD Package) K: PG-SC59 (SMD Package) L: PG-SSO3 (leadless) TA: PG-TO92S (narrow pitch) TB: PG-TO92S (wide pitch) |

KEY FEATURES AND BENEFITS

| TLx496x – Hall Switch and Latch | TLx49x6 – Hall Switch and Latch | TLE4966x – Double Hall Latch | TLE4913 – Low power Switch |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> Available packages: <ul style="list-style-type: none"> PG-SSO-3-2 PG-SOT23 PG-TO92S (consumer only) Energy-efficient Hall switch family for up to 32 V | <ul style="list-style-type: none"> Available packages: <ul style="list-style-type: none"> PG-SC59 PG-SSO-3-2 Available with open collector or current interface | <ul style="list-style-type: none"> Available packages: <ul style="list-style-type: none"> PG-TSOP6 PG-SSO-4-1 Direction and speed information Index counting | <ul style="list-style-type: none"> Available package: <ul style="list-style-type: none"> PG-SC59-3 Operating voltage: 2.4 to 5.5 V Only industrial version available |

USE CASES

| | | | | | | | | | | | |
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| | | | | | | | | | | | |
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A global support structure with Hall Switch experts to address customer's requirements

XENSIV™ Evaluation Tool Environment

2GO Kits and Shield2Go



2GO kits

- › One Infineon sensor IC combined with an ARM® Cortex™-M0 CPU
- › USB connection for fast evaluation
- › On board debugging



Shield2Go

- › Comprise **one board with one single Infineon IC**
- › Comes with solderless connectors
- › The **Software** for the Shield2Go is based on **Arduino**



Software

Graphical User interface (GUI)

Arduino library

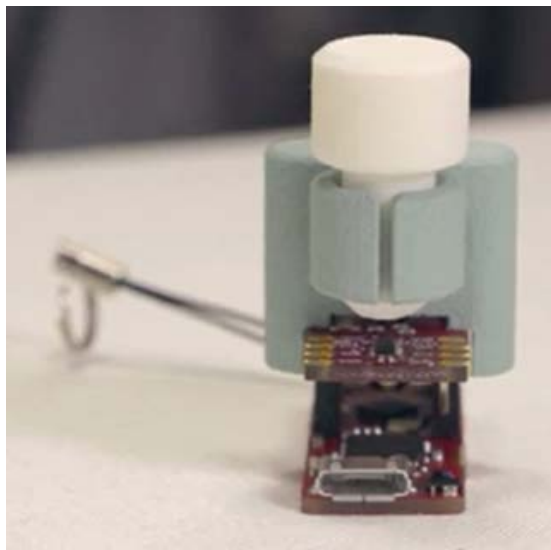
Add on components

Joystick – Rotation knob – Linear slider – Out of shaft adapter – Drill trigger – Mini Control



Unleash your creativity – How is that looking like?

Shield2Go + Infineon XMC™ 2Go



XMCTM 2Go stacked with the TLV493D 3DSense Shield2Go and rotate knob

Shield2Go + My IoT Adapter + XMC™ bootkit






Stacked XMC1100 Boot Kit with My IoT Adapter and Shield2Go

Online Simulation Tools – Fast and Easy Simulation for Hall switches, 3D magnetic and angle sensors

3D Magnetic Sensors




1 Application: Angle Measurement



2 Magnet: Axial Magnetized Cylinder

☐ Pre-Defined ☒ User-Defined Axial Magnetized Cylinder







NEXT STEP

Hall Switches




Prepared Solutions 4

| Diagram | Description | Design It |
|-----------------------------------------------------------------------------------|------------------------------------------------------------------------|---------------------------|
|  | SMD Package / Bar magnet moves parallel to the sensor Hall plate. | Design It |
|  | SMD Package / Bar magnet moves perpendicular to the sensor Hall plate. | Design It |
|  | SSO Package / Bar magnet moves parallel to the sensor Hall plate. | Design It |
|  | SSO Package / Bar magnet moves perpendicular to the sensor Hall plate. | Design It |

Solution Information

SMD Package / Bar magnet moves parallel to the sensor Hall plate.



The magnet moves in a plane parallel to the sensor Hall plate. The B-field is oriented along the direction of motion. Magnet dimensions: 5mm x 10mm x 5mm (Ferrite)

| Group | Parts |
|--------|--------------------------|
| Sensor | Will be searched by tool |
| Magnet | MGLFS-10-S (Shape: Bar) |

Angle Sensors



Magnet Properties (diametrical magnetization)

Magnet Remanence mT
Magnet Thickness mm
Magnet Diameter mm
* 1mT = 10G

Sensor Specification

Brown required mT, @Tambient
Snow required mT, @Tambient
* parameter to be found in appropriate product datasheet

Assembly Tolerances

Alignment mm
Distance between surface of the magnet and sensor

Maximum Bias degree
The angle of magnet with respect to axis of rotation

Maximum Deviation mm
Accuracy of magnet with respect to axis of rotation. System should not show the specified deviation of the location of the disc inside the package.

Maximum Latitude degree
The angle of sensor disc with respect to axis of rotation. System should not show the specified deviation of the location of the disc inside the package.

Maximum Eccentricity mm
Eccentricity of sensor centre with respect to axis of rotation. System should not show the specified deviation of the location of the disc inside the package.

START SIMULATION **SAVE SIMULATION**

One widget for three simulation tools – the guide to identify the most suitable Infineon sensor IC combined with the best-fit magnet <https://www.infineon.com/cms/en/product/sensor/#!simulation>



Part of your life. Part of tomorrow.