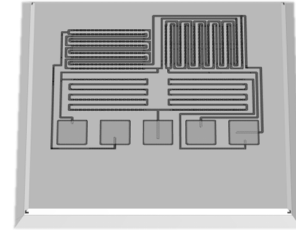# TF958

Magneto Resistive Magnetic 3D-Switch / Linear Field TMR Half-Bridge Sensor

The TF958 is an TunnelMagnetoResistive (TMR) position sensor. The sensor contains three Half-Bridges. Each half bridge output has a voltage signal, which is linearly dependant from the applied magnetic field in the corresponding direction.

The bond version of TF958 is available as bare die. The currently available version has preliminary die sizes. Final version will have a reduced die size.

Product Overview of TF958

Article description	Package	Delivery Type
TF958ABA-AB [1]	Wafer	Waferbox

[1] minimum order quantities apply.

Quick Reference Guide

Symbol	Parameter	min.	typ.	max.	Unit
S_{Lh}	Sensitivity (x,y,z)	3.5	4.0	4.5	mV/V/mT
V_{CC}	Supply voltage	-	5.0	5.5	V
V_{off}	Offset voltage per V_{CC}	490	500	510	mV/V
B_{Lh}	Minor linear magnetic flux range	-10	-	+10	mT
R_S	Sensor resistance	1.0	1.5	2.0	MΩ

Absolute Maximum Ratings

In accordance with the absolute maximum rating system (IEC60134).

Symbol	Parameter	Min.	Max.	Unit
V_{CC}	Supply voltage	-5.5	+5.5	V
T_{amb}	Ambient temperature	-40	+125	°C
$T_{stg(Die)}$	Storage temperature (Die)	-65	+125	°C

Stresses beyond those listed under "Absolute 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 beyond those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Features

- Based on the TunnelMagneto-Resistive (TMR) effect
- Contains three half-bridges on the chip
- X-,Y– and Z-output
- Ambient temperature ranges from -40 °C to +125 °C

Advantages

- Contactless position measurement of all three directions
- High sensitivity
- Low cross talk between the individual axis
- High resistance for low power consumption

Applications

- Switch sensor for three different axis
- Wakeup sensor (recognizes the presence of a magnetic field)

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Magnetic Data

Symbol	Parameter	Conditions	min.	typ.	max.	Unit
B_{sat}	Saturation magnetic flux density		-	± 30	-	mT
B_{Lh}	Linear magnetic flux range[1]		-10	-	+10	mT
Hc_{Lh}	Coercivity field		-	-	0.1	mT

1) By exceeding the value of B_{Lh} the output signal is no longer unique and the sensor has to be reset by turning off the magnetic field

Electrical Data

T_{amb} = +25°C, H_{ext} = 25 kA/m; V_{CC} = 5.0 V; unless otherwise specified.

Symbol	Parameter	Conditions	min.	typ.	max.	Unit
V_{CC}	Supply voltage		-	5.0	5.5	V
V_{off}	Offset voltage per V_{CC}		490	500	510	mV/V
R_S	Sensor resistance [2]		1.0	1.5	2.0	MΩ
S_{Lh}	Sensitivity for x,y,z		3.5	4.0	4.5	mV/V/mT
M_{Lh}	Sensitivity missmatch between x,y,z		-10	0	+10	%

2) Sensor resistance between V_{CC} and GND.

Accuracy

T_{amb} = +25°C, V_{CC} = 5.0 V; unless otherwise specified.

Symbol	Parameter	Conditions	min.	typ.	max.	Unit
E_{lin}	Linearity error	Minor loop	-	-	3	%

General Data

Symbol	Parameter	Conditions	min.	typ.	max.	Unit
T_{amb}	Ambient temperature		-40	-	+125	°C

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Performance Graphs

Sensor Output

*Z-Axis measurements are limited by device resolution. Actual sensor output does not contain the shown signal noise
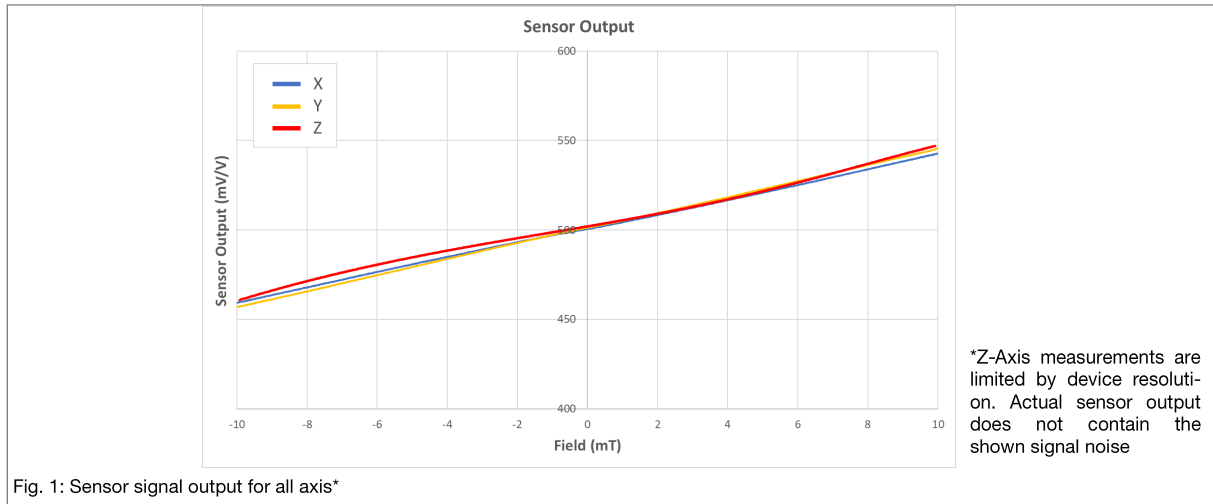
Fig. 1: Sensor signal output for all axis*

Sensor Non Linearity

*Z-Axis measurements are limited by device resolution. Actual sensor output does not contain the shown signal noise
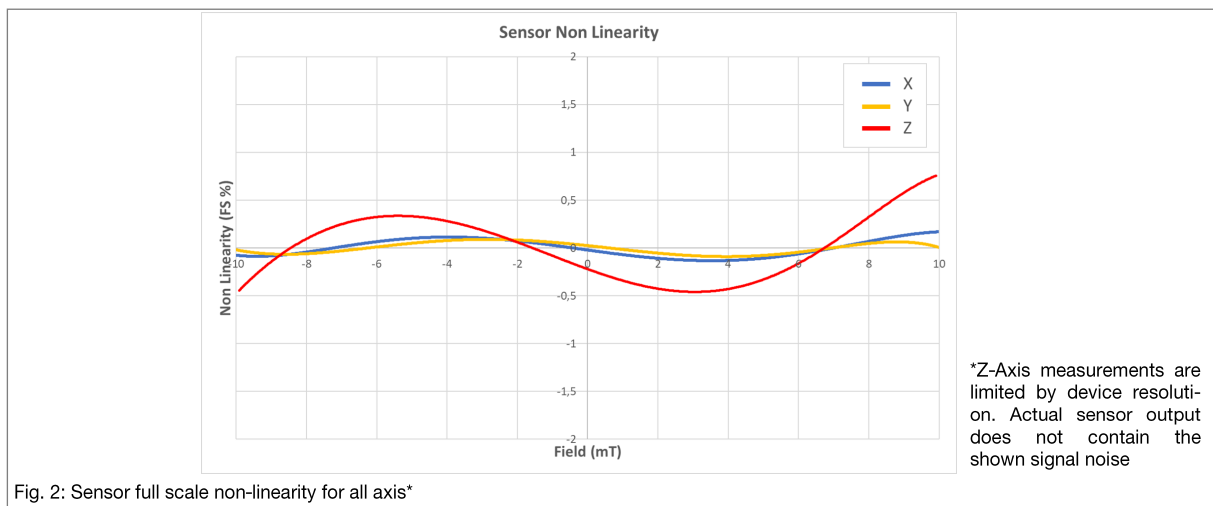
Fig. 2: Sensor full scale non-linearity for all axis*

Sensor Hysteresis

*Z-Axis measurements are limited by device resolution. Actual sensor output does not contain the shown signal noise
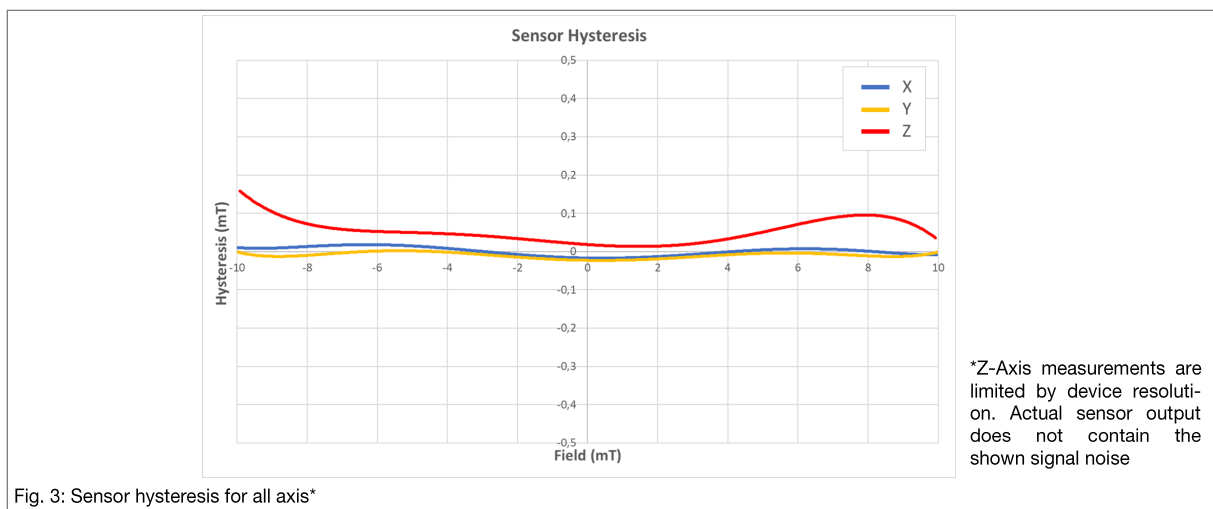
Fig. 3: Sensor hysteresis for all axis*

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TF958 Bare Die

Pinout

Pad	Symbol	Parameter
1	V_{CC}	Supply voltage
2	Y	Output voltage Y
3	Z	Output voltage Z
4	X	Output voltage X
5	GND	Ground
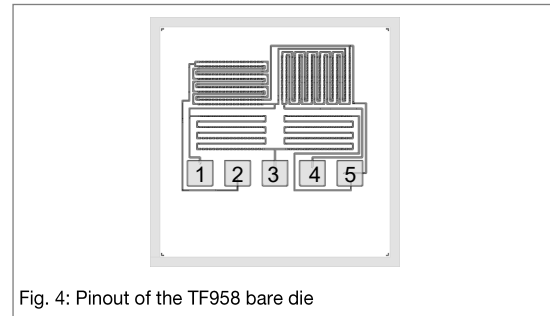
Fig. 4: Pinout of the TF958 bare die

Dimensions

Pad	a x b
1	95 x 95
2	95 x 95
3	95 x 95
4	95 x 95
5	95 x 95

Notes:
- All Dimensions in μm
- Active area is shaded
- This chip size corresponds to the available samples. Final product will have reduced chip size.
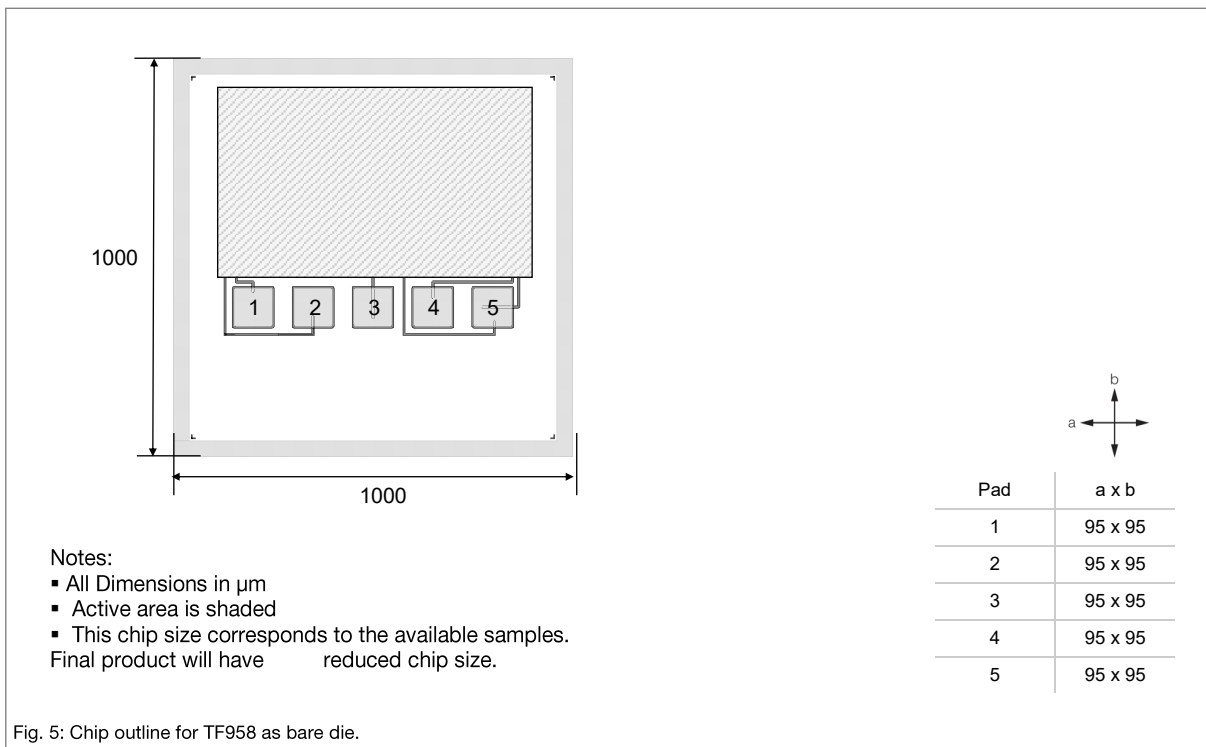
Fig. 5: Chip outline for TF958 as bare die.

Data for Packaging and Interconnection Technologies

Parameter	Value	Unit
Chip area [1]	4.2 x 0.8	mm^2
Chip thickness	625 ± 40	μm
Pad size	See Fig. 5	-
Pad thickness	0.8	μm
Pad material	AlCu	-

[1] Tolerances of chip see Fig. 5.

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Additional Information on Ordering Code

TF958ACA - AB

Ambient temperature (A) and Packaging (B)

A -40…+125 °C
B Wafer box

Specification (A), Variant (M) and Version (A)

A Standard Specification
C Tested and sawed wafer
A Standard version

Sensor Number (958)

958 MagnetoResistive Magnetic 3D-Switch / Linear Field TMR Half-Bridge Sensor

Type of Sensor (TF)

TF TMR Field Sensor

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General Information

Product Status

Article	Status
TF958ACA-AB	The product is under development, qualification is on going. Deliverables have a sample status. The datasheet is preliminary.
Note	The status of the product may have changed since this data sheet was published. The latest information is available on the internet at www.sensitec.com.

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General Information

Application Information

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These products are not qualified for use in life support appliances, aeronautical applications or devices or systems where malfunction of these products can reasonably be expected to result in personal injury.

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Changelist

Version	Description of the Change	Date
TF958.DSE.00	Original (pp. 1-7)	04/2025

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