

TF921

1D Linear Field TMR Sensor

The TF921 is a highly sensitive TMR sensor. It contains a half bridge with a TMR element. The output of the TF921 is proportional to the applied magnetic field that is parallel to the sensing direction of sensor.

The TF921 is a one dimensional magnetic field sensor with a high signal output of more than 15 mV/V/mT and long linear range of more than 16 mT. Any source, which can generate a magnetic field could drive this sensor to work. With a matching magnetic design, the sensor will have the best performance to detect current, magnetic field, position, etc. The featured application is battery powered keyboard readout.



The TF921 is available in a SOT23-3L and DFN package. Two different resistances are available.

Product Overview of TF921

Article description	Package	Delivery Type
TF921ANA-AE	SOT23-3L	Tape on Reel
TF921AIA-AE	DFN	Tape on Reel
TF921BNA-AE	SOT23-3L	Tape on Reel
TF921BIA-AE	DFN	Tape on Reel

Quick Reference Guide

Symbol	Parameter	min.	typ.	max.	Unit
S_{Lh}	Sensitivity	15.0	20.0	25.0	mV/V/mT
V_{CC}	Supply voltage	1.0	3.3	5.5	V
V_{off}	Offset voltage per V_{CC}	-20.0	0.0	+20.0	mV/V
B_{Lh}	Linear magnetic range	-16	-	+16	mT
R_s	Bridge resistance		20.0		k Ω
$R_{s,B}$	Bridge resistance ¹⁾		200.0		k Ω

1) For type B sensors TF921Bxx-xx.

Absolute Maximum Ratings

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

Symbol	Parameter	Min.	Max.	Unit
V_{CC}	Supply voltage	-	6	V
ESD	Human body model	-	4	kV
T_{amb}	Ambient temperature	-40	125	$^{\circ}$ C
T_{stg}	Storage temperature	-50	130	$^{\circ}$ 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 Tunnel Magneto-Resistive (TMR) effect
- Wide Power Supply Range
- Low Hysteresis
- Fast Frequency Response
- Excellent Temperature Stability

Advantages

- Contactless position measurement in one direction
- High sensitivity
- Compact design
- High resistance for low power consumption

Applications

- Magnetic Field Sensor
- Magnet position detection
- Current detection
- Keyboard



Magnetic Data

Symbol	Parameter	Conditions	min.	typ.	max.	Unit
B _{Lh}	Linear magnetic flux range ¹⁾		-16.0	-	+16.0	mT
Hys	Hysteresis	H _{ext} = 2.5 mT	-	0.1	-	mT

1) Working field range is defined as when the sensitivity dropped to the 20% of S_{Lh}

Electrical Data

T_{amb} = +25°C; V_{CC} = 3.3 V; unless otherwise specified.

Symbol	Parameter	Conditions	min.	typ.	max.	Unit
V _{CC}	Supply voltage		1.0	3.3	5.5	V
I _{CC}	Current		-	82.5	330.0	μA
V _{off}	Offset temperature coefficient		-	0.015	-	mV/V/°C
T _{CO}	Offset voltage per V _{CC}		-20.0	0.0	+20.0	mV/V
R _S	Bridge resistance		-	20.0	-	KΩ
R _{S,B}	Bridge resistance ²⁾		-	200.0	-	KΩ
S _{Lh}	Sensitivity	H _{ext} = 2.5 mT	14.0	16.0	20.0	mV/V/mT
T _{CS}	Sensitivity temperature coefficient		-	1500	-	PPM/°C

2) For type B sensors TF921Bxx-xx.

Accuracy

T_{amb} = +25°C, V_{CC} = 3.3 V; unless otherwise specified.

Symbol	Parameter	Conditions	min.	typ.	max.	Unit
E _{lin}	Linearity error		-	3	-	%

General Data

Symbol	Parameter	Conditions	min.	typ.	max.	Unit
T _{amb}	Ambient temperature		-40	-	125	°C
f	Frequency response		-	1	-	MHz

Performance Graphs

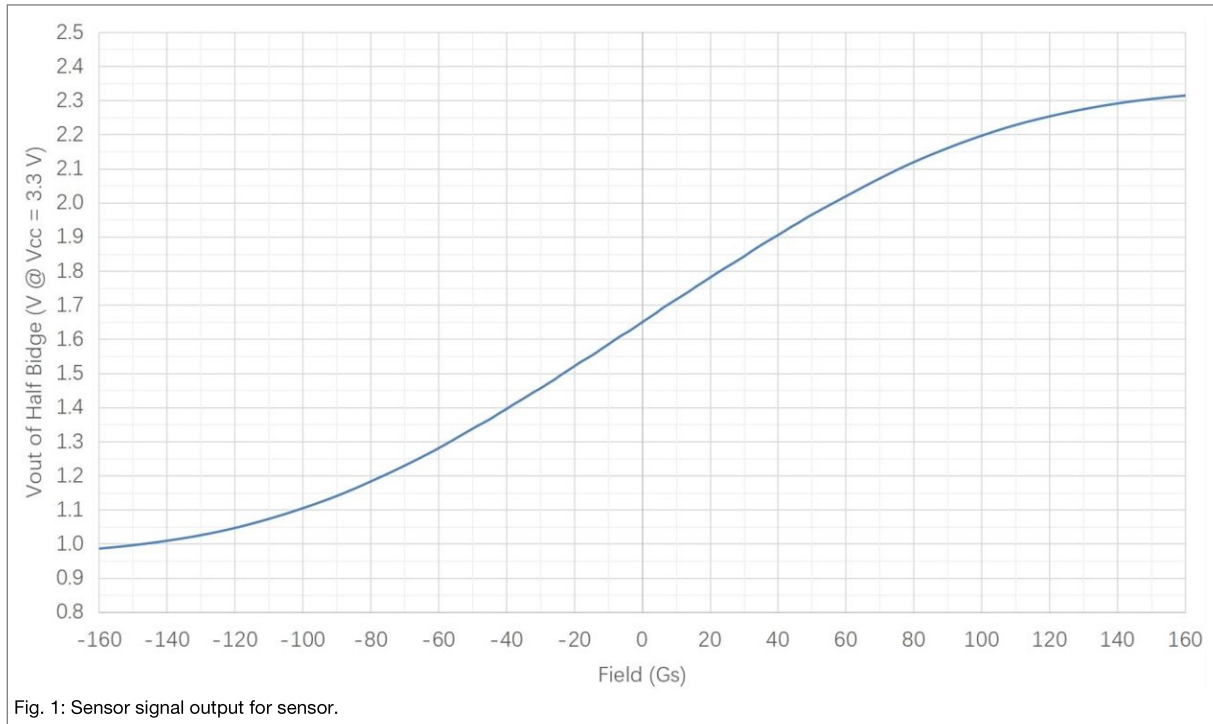


Fig. 1: Sensor signal output for sensor.

TF921xNA-AE

Pinout

Pad	Symbol	Parameter
1	V _{CC}	Power supply
2	V _{out}	Output
3	GND	Ground

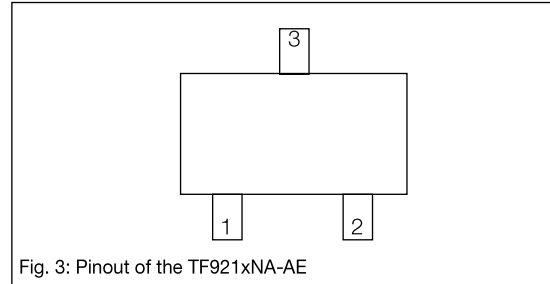


Fig. 3: Pinout of the TF921xNA-AE

Dimensions

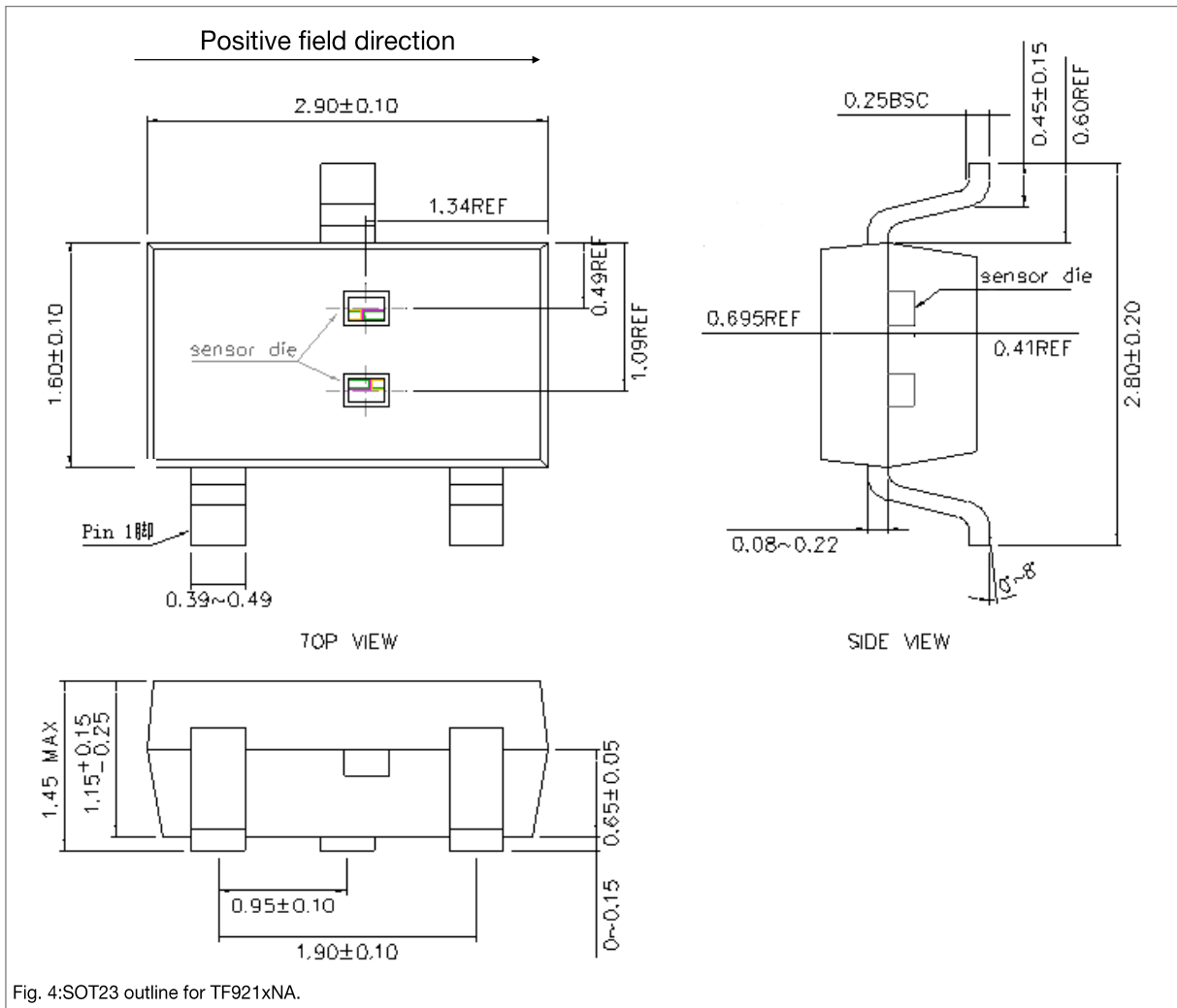
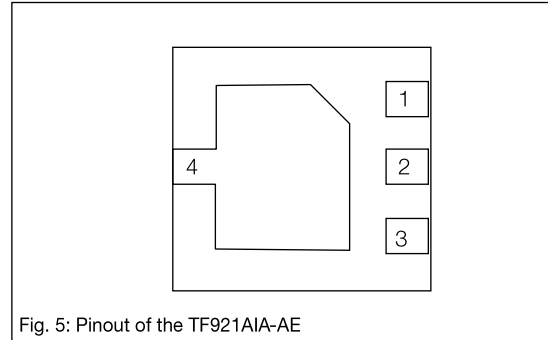


Fig. 4: SOT23 outline for TF921xNA.

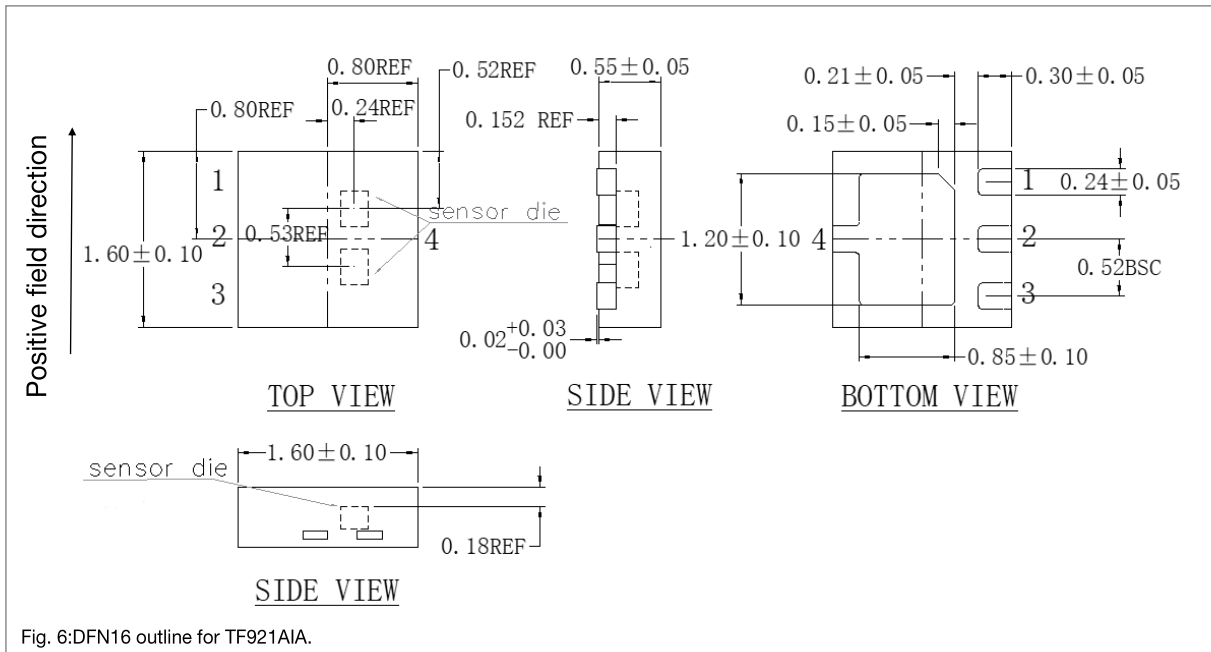
TF921AIA-AE

Pinout

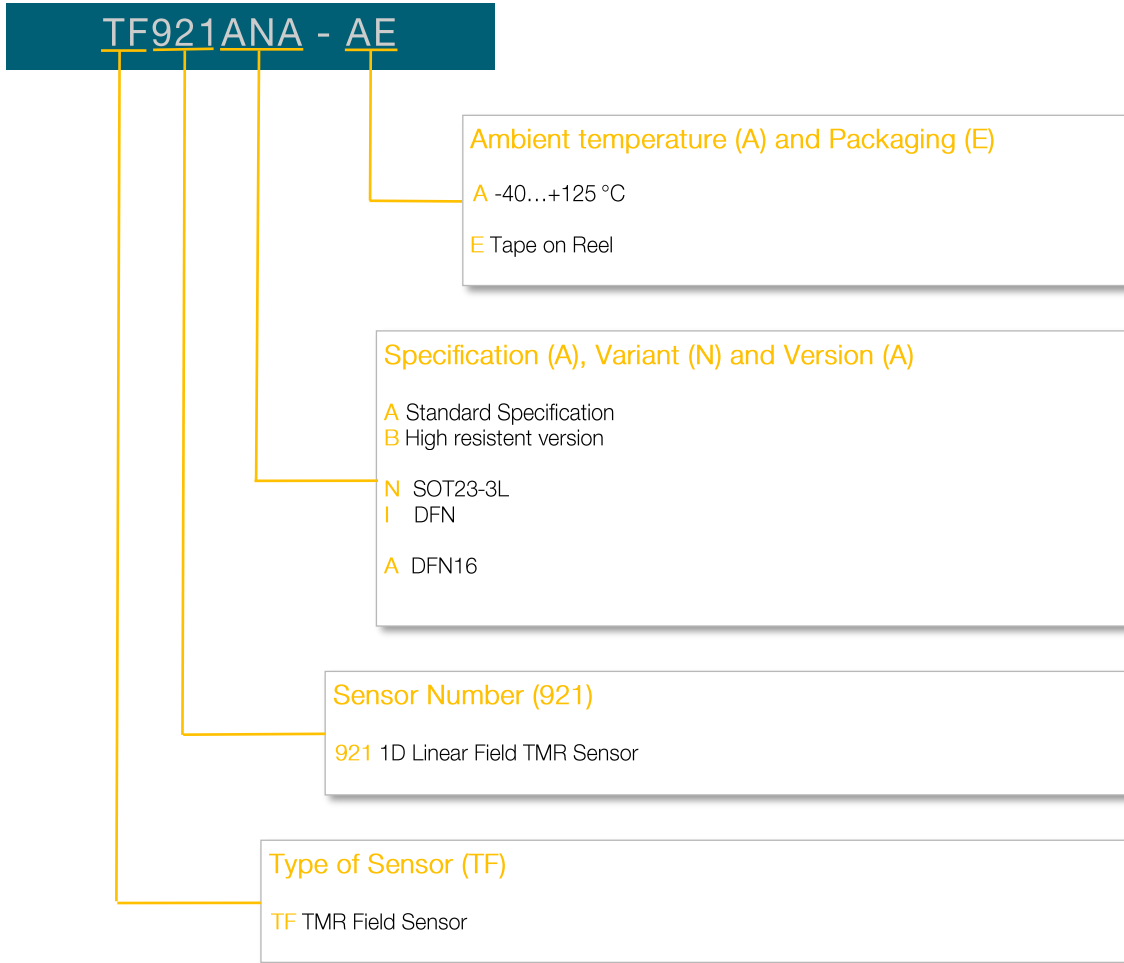
Pad	Symbol	Parameter
1	V _{CC}	Power supply
2	NC	Not connected
3	V _{out}	Output
4	GND	Ground



Dimensions



Additional Information on Ordering Code



General Information

Product Status

Article	Status
TF921ANA-AE	The product is under development, qualification is on going. Deliverables have a sample status. The datasheet is preliminary.
TF921AIA-AE	The product is under development, qualification is on going. Deliverables have a sample status. The datasheet is preliminary.
TF921-BNA-AE	The product is under development, qualification is on going. Deliverables have a sample status. The datasheet is preliminary.
TF921BIA-AE	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 .

Disclaimer

Sensitec GmbH reserves the right to make changes, without notice, in the products, including software, described or contained herein in order to improve design and/or performance. Information in this document is believed to be accurate and reliable. However, Sensitec GmbH does not give any representations or warranties, expressed or implied, as to the accuracy or completeness of such information and shall have no liability for the consequences of use of such information. Sensitec GmbH takes no responsibility for the content in this document if provided by an information source outside of Sensitec products. In no event shall Sensitec GmbH be liable for any indirect, incidental, punitive, special or consequential damages (including but not limited to lost profits, lost savings, business interruption, costs related to the removal or replacement of any products or re-work charges) irrespective the legal base the claims are based on, including but not limited to tort (including negligence), warranty, breach of contract, equity or any other legal theory. Notwithstanding any damages that customer might incur for any reason whatsoever, Sensitec product aggregate and cumulative liability towards customer for the products described herein shall be limited in accordance with the General Terms and Conditions of Sale of Sensitec GmbH. Nothing in this document may be interpreted or construed as an offer to sell products that is open for acceptance or the grant, conveyance or implication of any license under any copyrights, patents or other industrial or intellectual property rights. Unless otherwise agreed upon in an individual agreement Sensitec products sold are subject to the General Terms and Conditions of Sales as published at www.sensitec.com. The use and/or application of our products in a military end use is explicitly prohibited. In the event of infringements, we reserve the right to take legal action, including but not limited to the assertion of claims for damages and/or the immediate termination of the business relationship.

General Information

Application Information

Applications that are described herein for any of these products are for illustrative purposes only. Sensitec GmbH makes no representation or warranty – whether expressed or implied – that such applications will be suitable for the specified use without further testing or modification. Customers are responsible for the design and operation of their applications and products using Sensitec products, and Sensitec GmbH accepts no liability for any assistance with applications or customer product design. It is customer’s sole responsibility to determine whether the Sensitec product is suitable and fit for the customer’s applications and products planned, as well as for the planned application and use of customer’s third party customer(s). Customers should provide appropriate design and operating safeguards to minimize the risks associated with their applications and products. Sensitec GmbH does not accept any liability related to any default, damage, costs or problem which is based on any weakness or default in the customer’s applications or products, or the application or use by customer’s third party customer(s). Customer is responsible for doing all necessary testing for the customer’s applications and products using Sensitec products in order to avoid a default of the applications and the products or of the application or use by customer’s third party customer(s). Sensitec does not accept any liability in this respect.

Life Critical Applications

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.

Copyright © by Sensitec GmbH, Germany

All rights reserved. No part of this document may be copied or reproduced in any form or by any means without the prior written agreement of the copyright owner. The information in this document is subject to change without notice. Please observe that typical values cannot be guaranteed. Sensitec GmbH does not assume any liability for any consequence of its use.

Changelist

Version	Description of the Change	Date
TF921.DSE.00	Original (pp. 1-8)	04/2025

Sensitec GmbH

Schanzenfeldstr. 2 • 35578 Wetzlar • Germany
 Tel +49 (0) 6441 5291-0 • Fax +49 (0) 6441 5291-117
 sensitec@sensitec.com • www.sensitec.com