TMR9003

Ultra High Sensitivity，Ultra Low Noise TMR linear sensor

General Description

The TMR9003 linear sensor utilizes a unique push-pull Wheatstone bridge composed of four TMR sensor elements. The unique bridge design provides a high sensitivity differential output that is linearly proportional to a magnetic field applied parallel to the surface of the sensor package, and it provides superior temperature compensation of the output. The TMR9003 is assembled in a 6mm×5mm×1.5mm SOP8 package.

Features and Benefits

- Tunneling Magnetoresistance (TMR) Technology
- High Sensitivity(~30mV/V/Oe)
- Ultra-low Noise Spectral Density(750pT/$\sqrt{\text{Hz}}$@1Hz)
- Very-low Power Consumption
- Excellent Thermal Stability
- Low Hysteresis
- Compatible with Wide Range of Supply Voltages
- No need for set/reset calibration



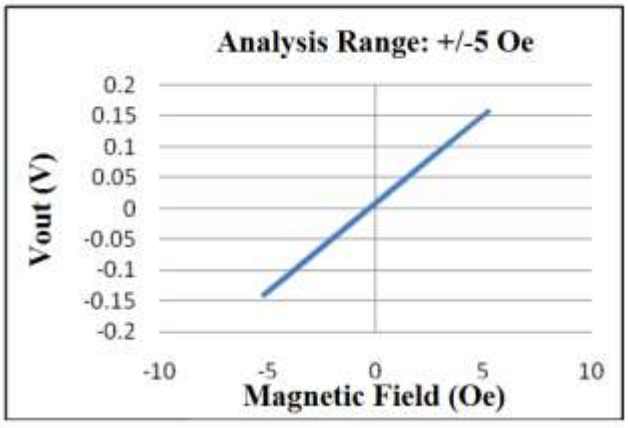
TMR9003

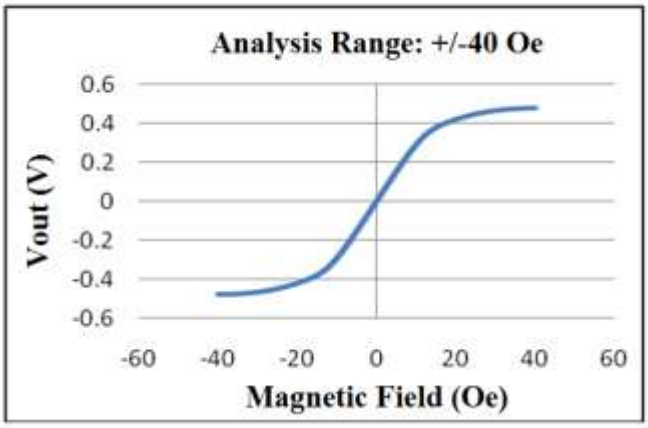
Applications

- Weak Magnetic Field Sensing
- Current Sensors
- Position and Displacement Sensing
- Biomedical Sensing
- Magnetic Communication

Transfer Curve

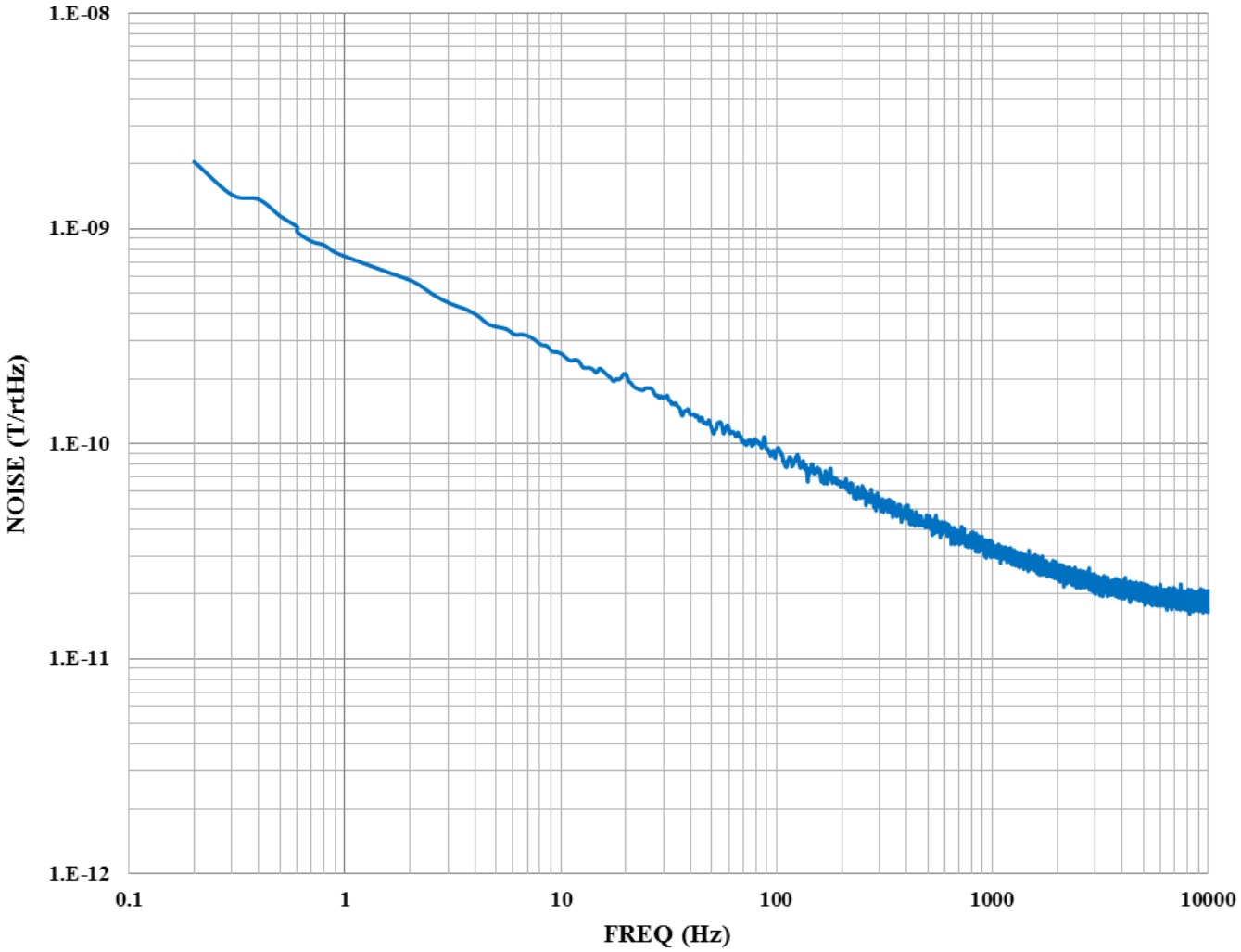
The following figure shows the response of the TMR9003 to an applied magnetic field in the range of ±5 Oe and ±40 Oe when the TMR9003 is biased at 1 V. The following specifications are calculated over an analysis range of ±5 Oe .





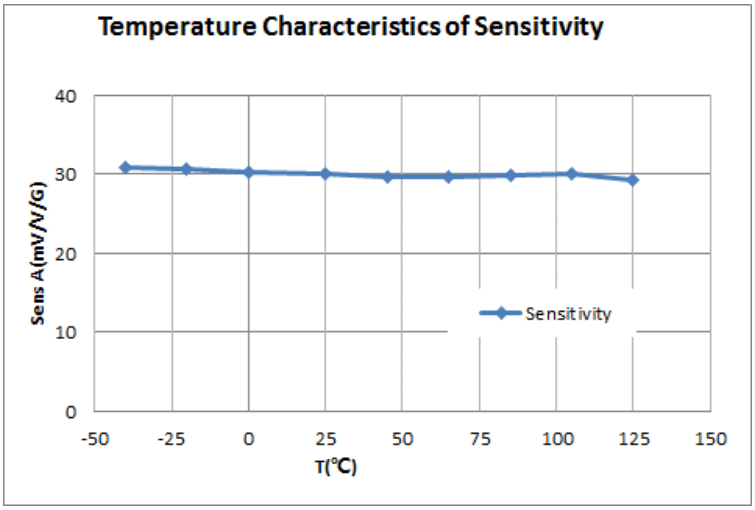
Sensor Noise

The following figure illustrates the Power SpectralDensity (PSD) of the TMR9003 self noise (*Ni*). The 1/*f*noise is approximately750 pT/ $\sqrt{\sqrt{\text{Hz}}}$ @ 1Hz, and the white noise is approximately 20pT/$\sqrt{\text{Hz}}$ @ 10kHz.



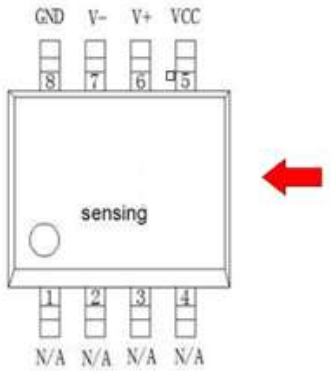
Sensitivity temperature characteristic curve.

The figure below shows the temperature characteristic curve of the TMR9002 sensor (test temperature range: -40, c ~125)



Pin Configuration

(Arrow indicates direction of applied field that generates a positive output voltage after a SET pulse.)



(Top View)

Pin No.	Pin Name	Pin Function
5	V_{CC}	Supply voltage
6	V+	Analog Differential Output 1
7	V-	Analog Differential Output 2
8	GND	Ground
1、2、3、4	N/A	Not connected

Absolute Maximum Ratings

Parameter	Symbol	Limit	Unit
Supply Voltage	V_{CC}	7	V
Reverse Supply Voltage	V_{RCC}	7	V
Max Exposed Field	H_E	4000	Oe(1)
ESD Voltage	V_{ESD}	4000	V
Operating Temperature	T_A	-40~125	°C
Storage Temperature	T_{stg}	-50 ~150	°C

Specification (V_{CC}=1.0V, T_A=25°C)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Supply Voltage	V_{CC}	Normal Operating		1	7	V
Supply Current	I_{CC}	Output Open		20(2)		μA
Resistance	R			50		kOhm
Sensitivity	SEN	Fit ±5Oe		30		mV/V/Oe
Saturation Field	H_{sat}			±15		Oe
Non -Linearity	NONL	Fit ±5Oe		0.5		%FS
Offset Voltage	V_{offset}			10		mV/V
Hysteresis	Hys	Fit ±5Oe		0.1		Oe
Resistance temperature coefficient	TCR	-40 ºc ~125 ºc		-487		PPM/ºc
Sensitivity temperature coefficient.	TCS	-40 ºc ~125 ºc		-495		PPM/ºc
Self Noise	N_i	@1H_z		750		pT/$\sqrt{Hz}$

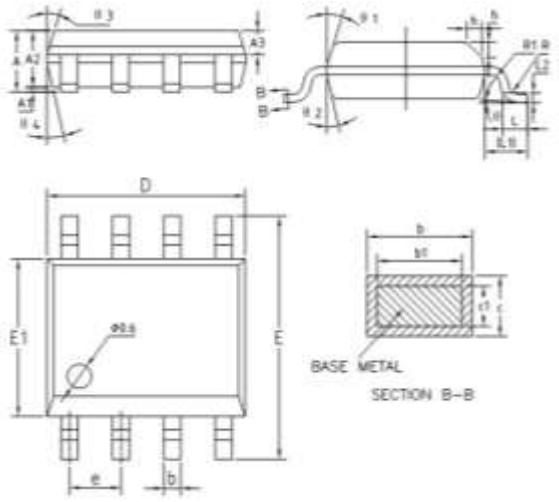
Note:

(1) 1 Oe (Oersted) = 1 Gauss in air = 0.1 millitesla = 79.8 A/m.

(2) ICC= VCC/R, Iccwill vary under different R in practice and it can be customized accordingly。

Package Information

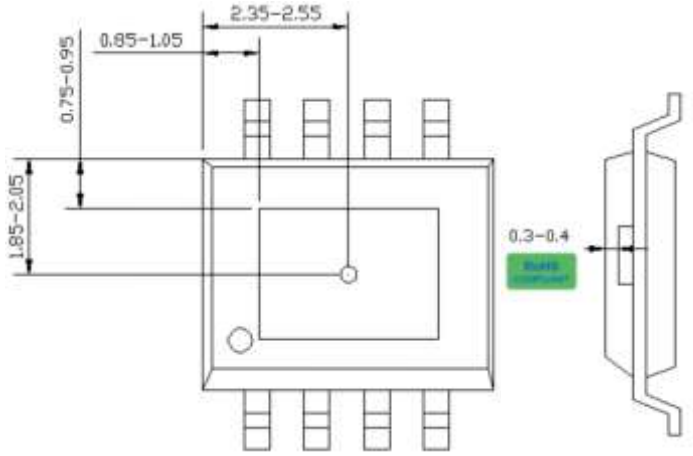
SOP8 package drawing



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	1.35	1.55	1.75
A1	0.10	0.15	0.25
A2	1.25	1.40	1.65
A3	0.50	0.60	0.70
b	0.38	–	0.51
b1	0.37	0.42	0.47
c	0.18	–	0.25
c1	0.17	0.20	0.23
D	4.80	4.90	5.00
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e	1.17	1.27	1.37
L	0.45	0.60	0.80
L1	1.04REF		
L2	0.25BSC		
R	0.07	–	–
R1	0.07	–	–
h	0.30	0.40	0.50
θ	0°	–	8°
θ1	15°	17°	19°
θ2	11°	13°	15°
θ3	15°	17°	19°
θ4	11°	13°	15°

TMR Sensor Position



Top view and side view(unit: mm)

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