

TMR9002

Ultra High Sensitivity, Ultra Low Noise TMR linear sensor

General Description

The TMR9002 linear sensor utilizes a unique push-pull Wheatstone bridge composed of four TMR sensor elements. The TMR9002 is assembled in a 6mm × 5mm × 1.5mm SOP8 package.

Features and Benefits

- Tunneling Magnetoresistance (TMR) Technology
- Ultra High Sensitivity (~100mV/V/Oe)
- Ultra Low Noise Spectral Density (150pT/√Hz@1Hz)
- Very Low Power Consumption
- Excellent Thermal Stability
- Low Hysteresis
- Compatible with Wide Range of Supply Voltages
- No need for set/reset calibration

Applications

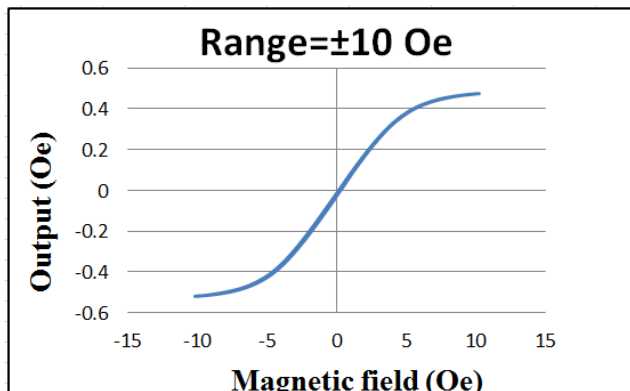
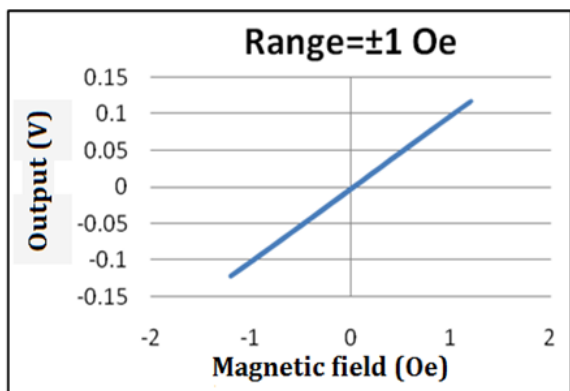
- Weak Magnetic Field Sensing
- Current Sensors
- Position and Displacement Sensing
- Bio-medical Sensing
- Magnetic Communication



TMR9002

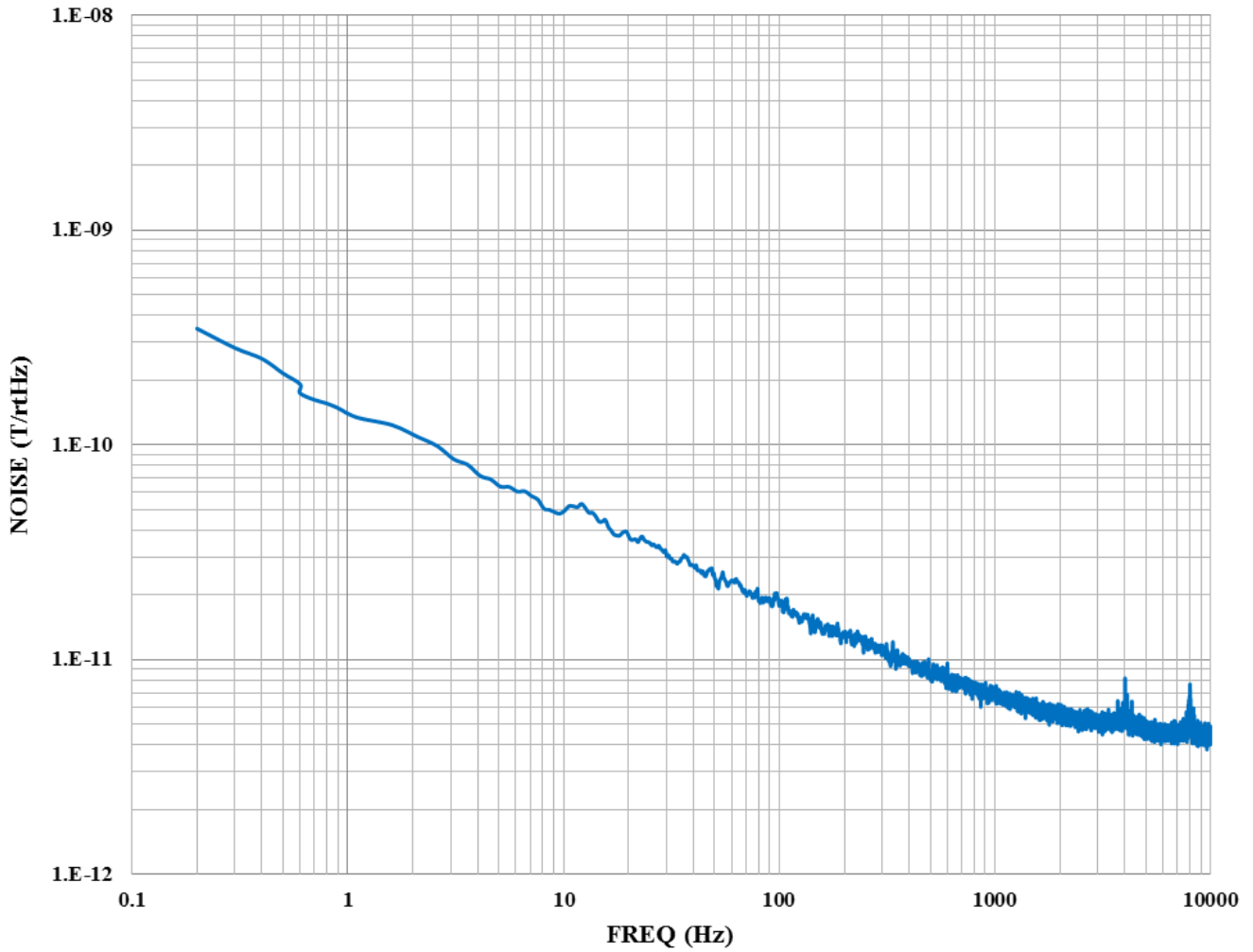
Transfer Curve

The following figure shows the response of the TMR9002 to an applied magnetic field in the range of ±1 Oe and ±10 Oe when the TMR9002 is biased at 1 V. The following specifications are calculated over an analysis range of ±1 Oe .



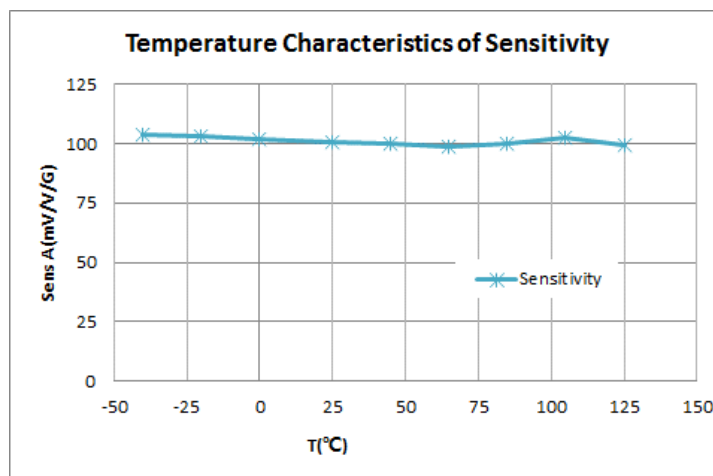
Sensor Noise

The following figure illustrates the Power SpectralDensity (PSD) of the TMR9002 self noise (M). The $1/f$ noise is approximately $150 \text{ pT}/\sqrt{\text{Hz}}$ @ 1Hz, and the white noise is approximately $4.5 \text{ pT}/\sqrt{\text{Hz}}$ @ 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.)

The diagram shows a top view of a square sensor package with a circular sensing area. The top edge has four pins labeled 8, 7, 6, and 5 from left to right, corresponding to GND, V-, V+, and VCC. The bottom edge has four pins labeled 1, 2, 3, and 4 from left to right, all marked as N/A. A red arrow points from the right towards the center of the sensor, indicating the direction of the applied magnetic field.

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

(Top View)

Absolute Maximum Ratings

Parameter	Symbol	Limit	Unit
Supply Voltage	V _{CC}	3	V
Reverse Supply Voltage	V _{RCC}	3	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	3	V
Supply Current	I _{CC}	Output Open		20 ⁽²⁾		μA
Resistance	R			50		kOhm
Sensitivity	SEN	Fit ±1Oe		100		mV/V/Oe
Saturation Field	H _{sat}			±8		Oe
Non -Linearity	NONL	Fit ±1Oe		0.5		%FS
Offset Voltage	V _{offset}			15		mV/V
Hysteresis	Hys	Fit ±1Oe		0.02		Oe
Resistance temperature coefficient	TCR	-40 °C ~125 °C		-541		PPM/°C
Sensitivity temperature coefficient.	TCS	-40 °C ~125 °C		-287		PPM/°C
Self Noise	N _i	@1Hz		150		pT/√Hz

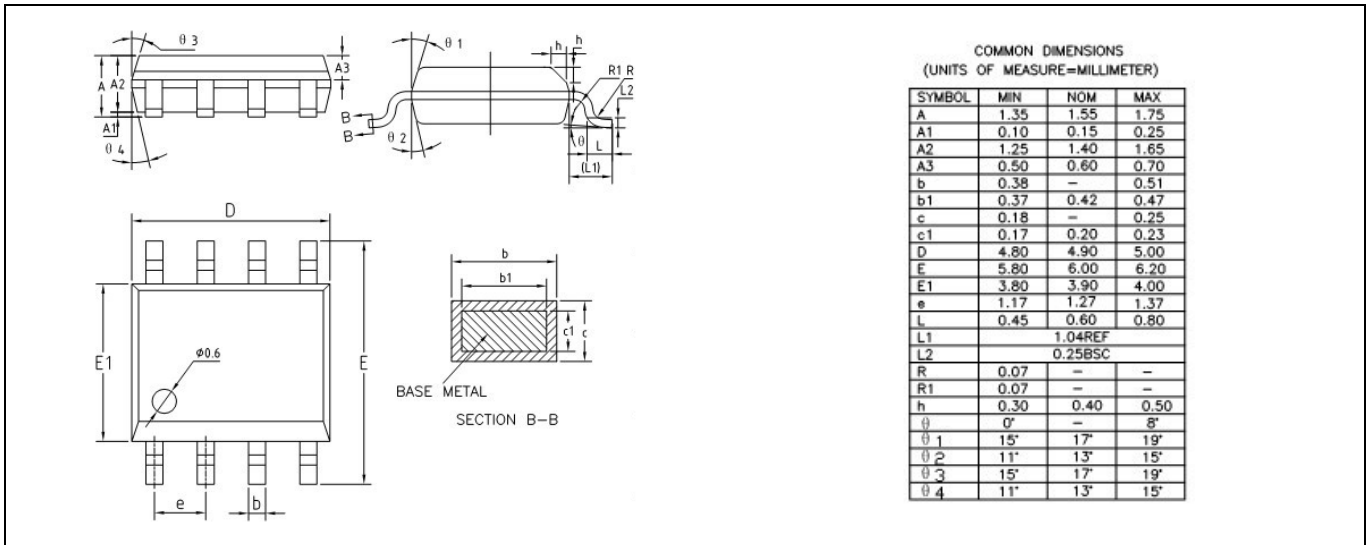
Note:

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

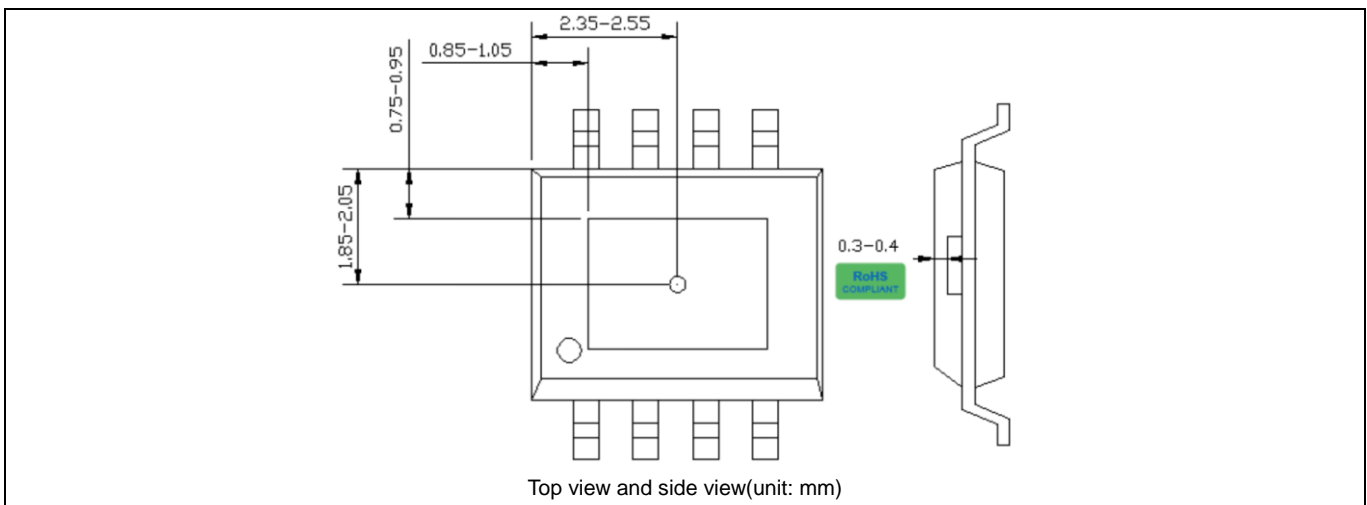
(2) I_{CC} = V_{CC}/R, I_{CC} will vary under different R in practice and it can be customized accordingly.

Package Information

SOP8 package drawing



TMR Sensor Position





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