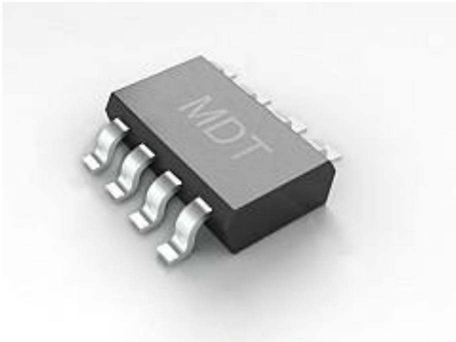
TMR9003 TMR Linear Sensor

Features and Benefits



- Tunneling Magnetoresistance (TMR) Technology
- High Sensitivity (~30mV/V/Oe)
- Ultra-low Noise Spectral Density (750 pT/√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

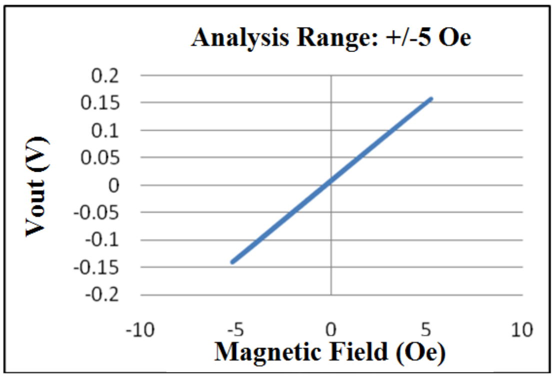
- Weak Magnetic Field Sensing
- Current Sensors
- Position and Displacement Sensing
- Biomedical Sensing
- Magnetic Communication

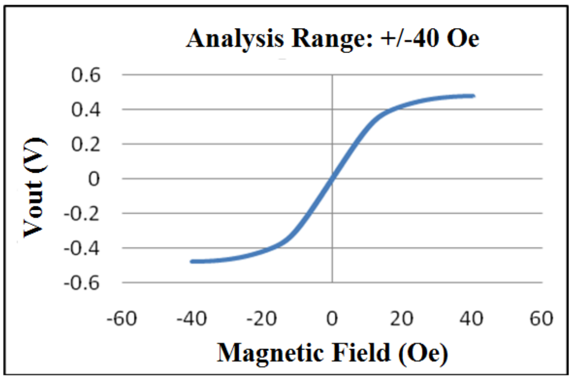
General Description

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.

Transfer Curve

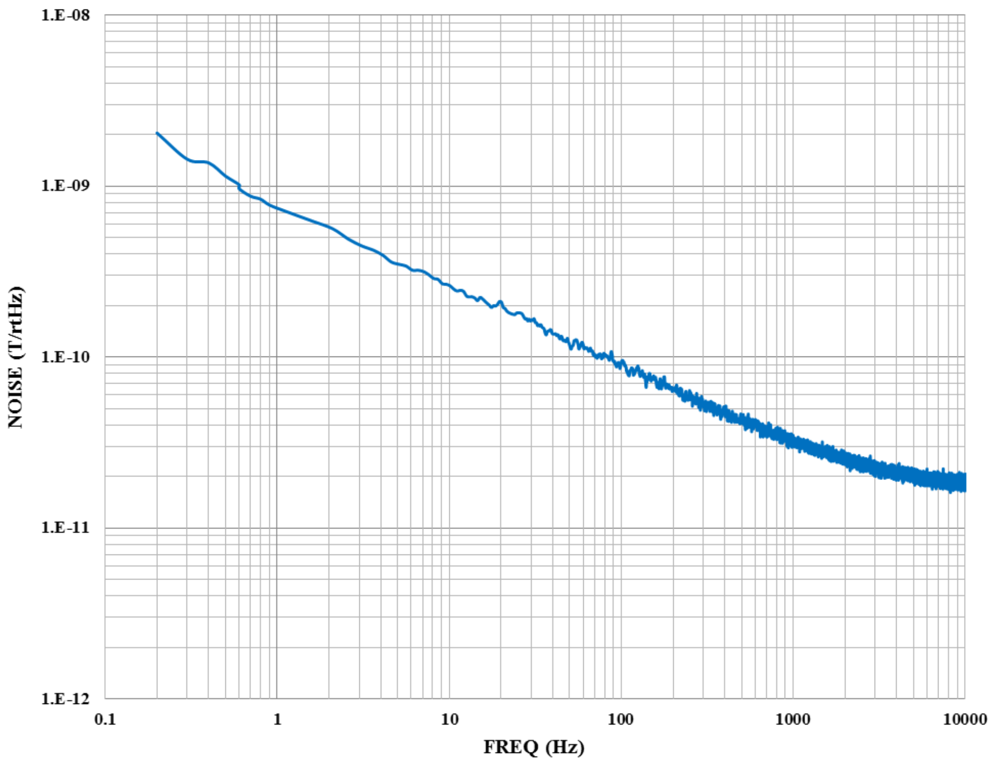
The following figure shows the response of the TMR9003 to an applied magnetic field in the range of ±5 Oe and ±40 Oe when the TMR9003 is biased at 1 V. The following specifications are calculated over an analysis range of ±5 Oe.



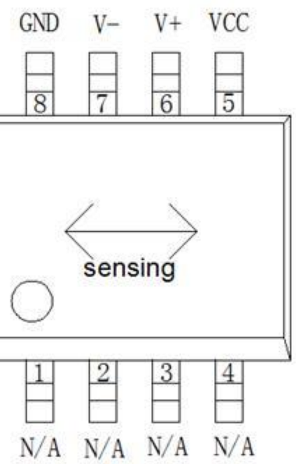


Sensor Noise

The following figure illustrates the Power Spectral Density (PSD) of the TMR9003 self noise (N_i). The 1/f noise is approximately 750 pT/√Hz @ 1Hz, and the white noise is approximately 20 pT/√Hz @ 10kHz.



Pin Configuration



(SOP8 top view)

Pin No	Pin Name	Pin Function
5	Vcc	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
Magnetic Field	H	5000	Oe[(1)]
ESD Voltage	V_{ESD}	4000	V
Operating Temperature	T_A	-40 ~ 125	°C
Storage Temperature	Tstg	-50 ~ 150	°C

Specification (V_{CC}=1.0V, T_A=25 °C, Differential Output)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Supply Voltage	V_{CC}	Normal Operation		1	7	V
Supply Current	I_{CC}	Output Open		20[(2)]		μ A
Resistance	R			50		kOhm
Sensitivity	SEN	Fit±5 Oe		30		mV/V/Oe
Saturation Field	H_{sat}			±15		Oe
Non-Linearity	NONL	Fit±5 Oe		0.5		%FS
Offset Voltage	V_{offset}			10		mV/V
Hysteresis	Hys	Fit±5 Oe		0.1		Oe
Self Noise	N_i	@1Hz		750		pT/ √ Hz

Note：

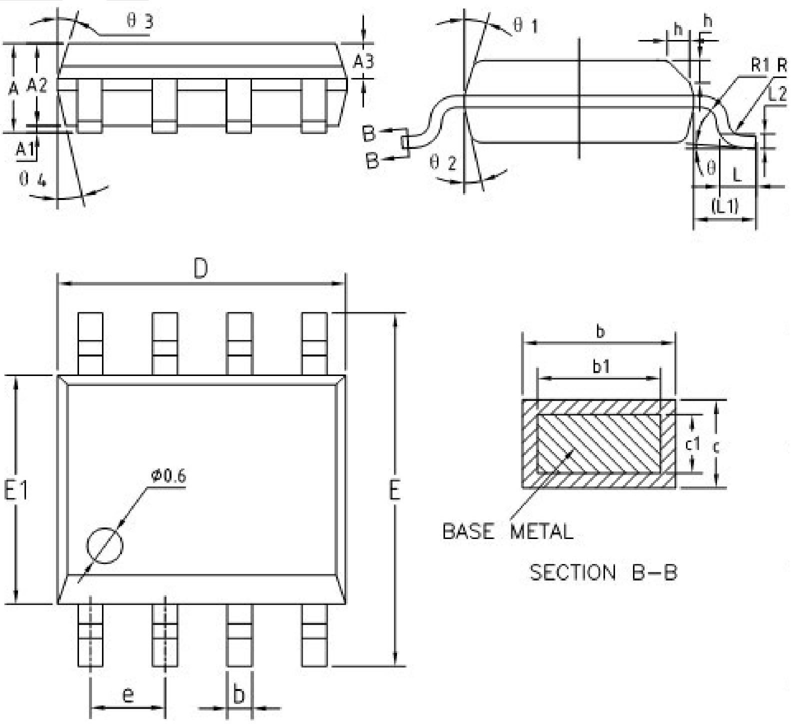
（1）1 Oe (Oersted) = 1 Gauss in air = 0.1 millitesla = 79.8 A/m.

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

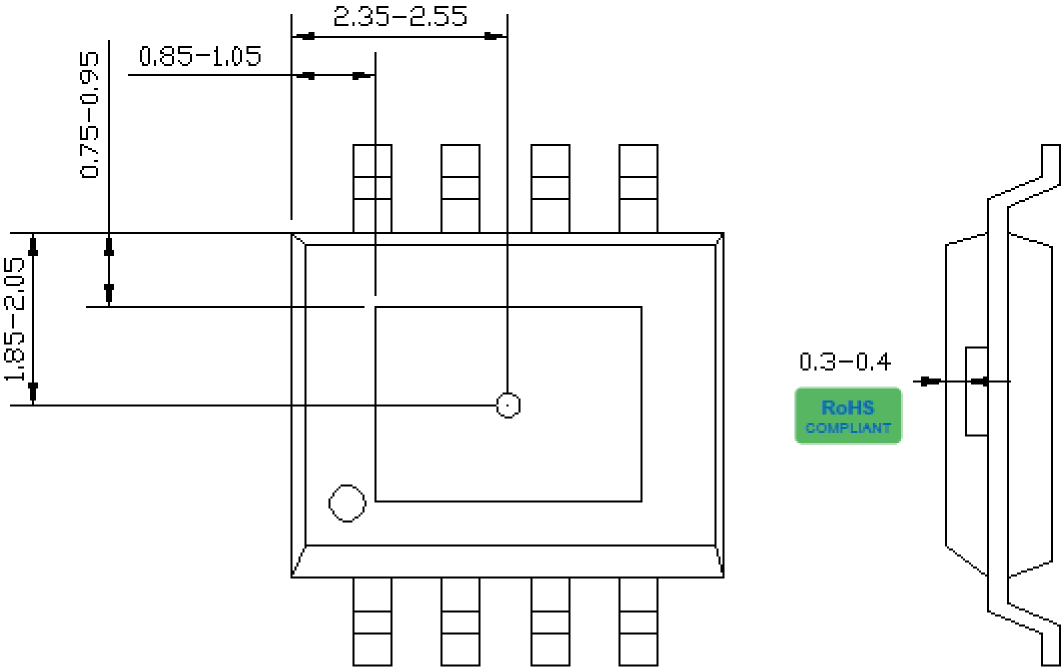
Package information

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°



Sensor Position



(unit: mm)