

# TMR2103

## Large Dynamic Range TMR Linear Sensor

### Description

The TMR2103 linear sensor utilizes a unique push-pull Wheatstone bridge composed of four unshielded 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.

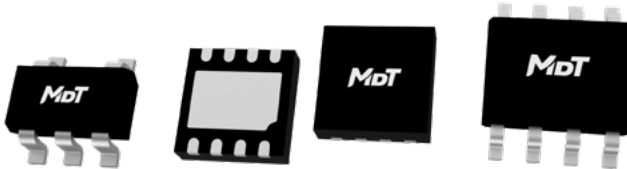
This TMR2103 magnetic linear sensor are available in SOT23-5, SOP8 and DFN8L (3 mm × 3 mm × 0.75 mm) package with compact size and easy to weld.

### Features and Benefits

- Tunneling magnetoresistance (TMR) technology
- High sensitivity
- Large dynamic range
- Low power consumption
- Excellent temperature stability
- Very low hysteresis
- Compatible with wide range of supply voltages
- RoHS & REACH compliant

### Applications

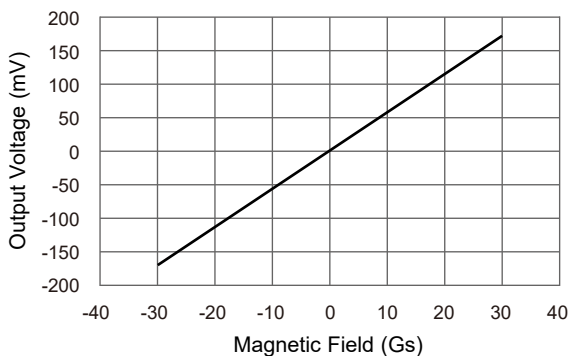
- Magnetometer
- Current sensor
- Position sensor
- Rotation sensor



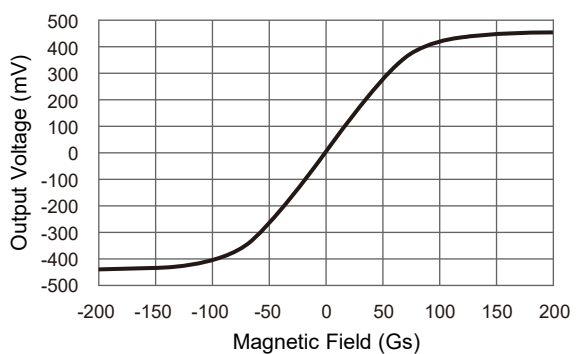
SOT23-5

DFN8L

SOP8



TMR2103 ±30 Gs Output Curve



TMR2103 ±200 Gs Output Curve

## Selection Guide

| Part Number | Resistance | Linear Range | Sensitivity | Package | Packing Form |
|-------------|------------|--------------|-------------|---------|--------------|
| TMR2103P    | 50 kΩ      | ±30 Gs       | 6.0 mV/V/Gs | SOP8    | Tape & Reel  |
| TMR2103D    | 50 kΩ      | ±30 Gs       | 6.0 mV/V/Gs | DFN8L   | Tape & Reel  |
| TMR2103S    | 50 kΩ      | ±30 Gs       | 6.0 mV/V/Gs | SOT23-5 | Tape & Reel  |

## Catalogue

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### 1. Functional Block Diagram

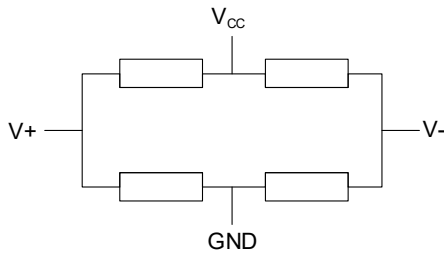


Figure 1. Block Diagram

| Pin Number | Name            | Function                     |
|------------|-----------------|------------------------------|
| 1          | V <sub>CC</sub> | Power supply                 |
| 2          | N/A             | Not connected                |
| 3          | V+              | Analog differential output 1 |
| 4          | V-              | Analog differential output 2 |
| 5          | GND             | Ground                       |

### 2. Sensing Direction

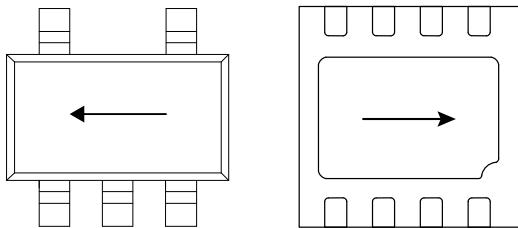


Figure 2-1. Sensing Direction (SOT23-5) and (DFN8L)

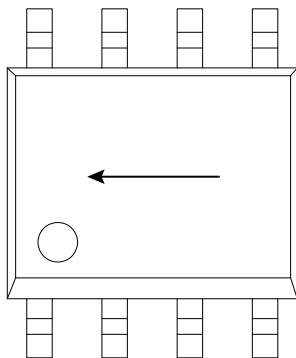


Figure 2-2. Sensing Direction (SOP8)

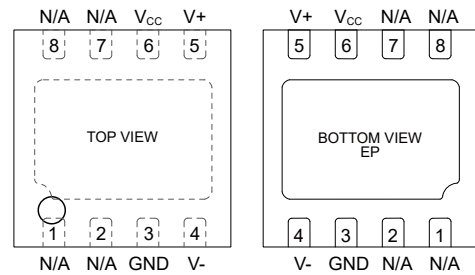


Figure 3-2. Pin Configuration (DFN8L)

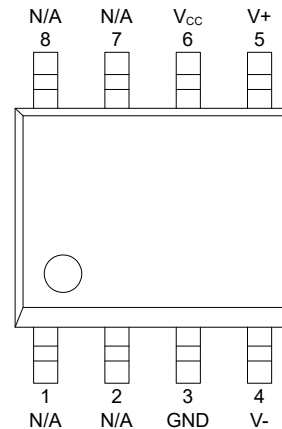


Figure 3-3. Pin Configuration (SOP8)

### 3. Pin Configuration

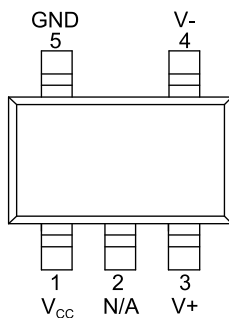


Figure 3-1. Pin Configuration (SOT23-5)

| Pin Number | Name            | Function                     |
|------------|-----------------|------------------------------|
| 3          | GND             | Ground                       |
| 4          | V-              | Analog differential output 2 |
| 5          | V+              | Analog differential output 1 |
| 6          | V <sub>CC</sub> | Power supply                 |
| 1, 2, 7, 8 | N/A             | Not connected                |

## 4. Absolute Maximum Ratings

| Parameters                    | Symbol    | Min. | Max. | Unit |
|-------------------------------|-----------|------|------|------|
| Supply Voltage                | $V_{CC}$  | -    | 7    | V    |
| Reverse Supply Voltage        | $V_{RCC}$ | -    | 7    | V    |
| External Magnetic Field       | B         | -    | 4000 | Gs   |
| ESD Performance (HBM)         | $V_{ESD}$ | -    | 4    | kV   |
| Operating Ambient Temperature | $T_A$     | -40  | 125  | °C   |
| Storage Ambient Temperature   | $T_{STG}$ | -50  | 150  | °C   |

## 5. Electrical Specifications

$V_{CC} = 1.0\text{ V}$ ,  $T_A = 25\text{ °C}$ , differential output unless otherwise specified

| Parameters                          | Symbol       | Condition   | Min. | Typ. | Max. | Unit    |
|-------------------------------------|--------------|-------------|------|------|------|---------|
| Supply Voltage                      | $V_{CC}$     | Operating   | -    | 1    | 7    | V       |
| Supply Current <sup>1)</sup>        | $I_{CC}$     | Output Open | -    | 60   | -    | μA      |
| Resistance <sup>1,2)</sup>          | $R_B$        | -           | -    | 50   | -    | kΩ      |
| Sensitivity                         | SEN          | B in ±30 Gs | -    | 6.0  | -    | mV/V/Gs |
| Saturation Magnetic Field           | $H_{SAT}$    | -           | -    | ±75  | -    | Gs      |
| Nonlinearity                        | NONL         | B in ±30 Gs | -    | 0.5  | -    | %FS     |
| Offset                              | $V_{OFFSET}$ | -           | -15  | -    | 15   | mV/V    |
| Hysteresis                          | HYS          | B in ±30 Gs | -    | 0.3  | -    | Gs      |
| Resistance Temperature Coefficient  | TCR          | B = 0 Gs    | -    | -640 | -    | PPM/°C  |
| Sensitivity Temperature Coefficient | TCS          | -           | -    | -13  | -    | PPM/°C  |

1)  $I_{CC} = V_{CC} / R_B$ , and supply current changes linearly with supply voltage.

2) Bridge resistance is customizable. Contact MultiDimension Technology for details.

## 6. Dimensions

### SOT23-5 Package

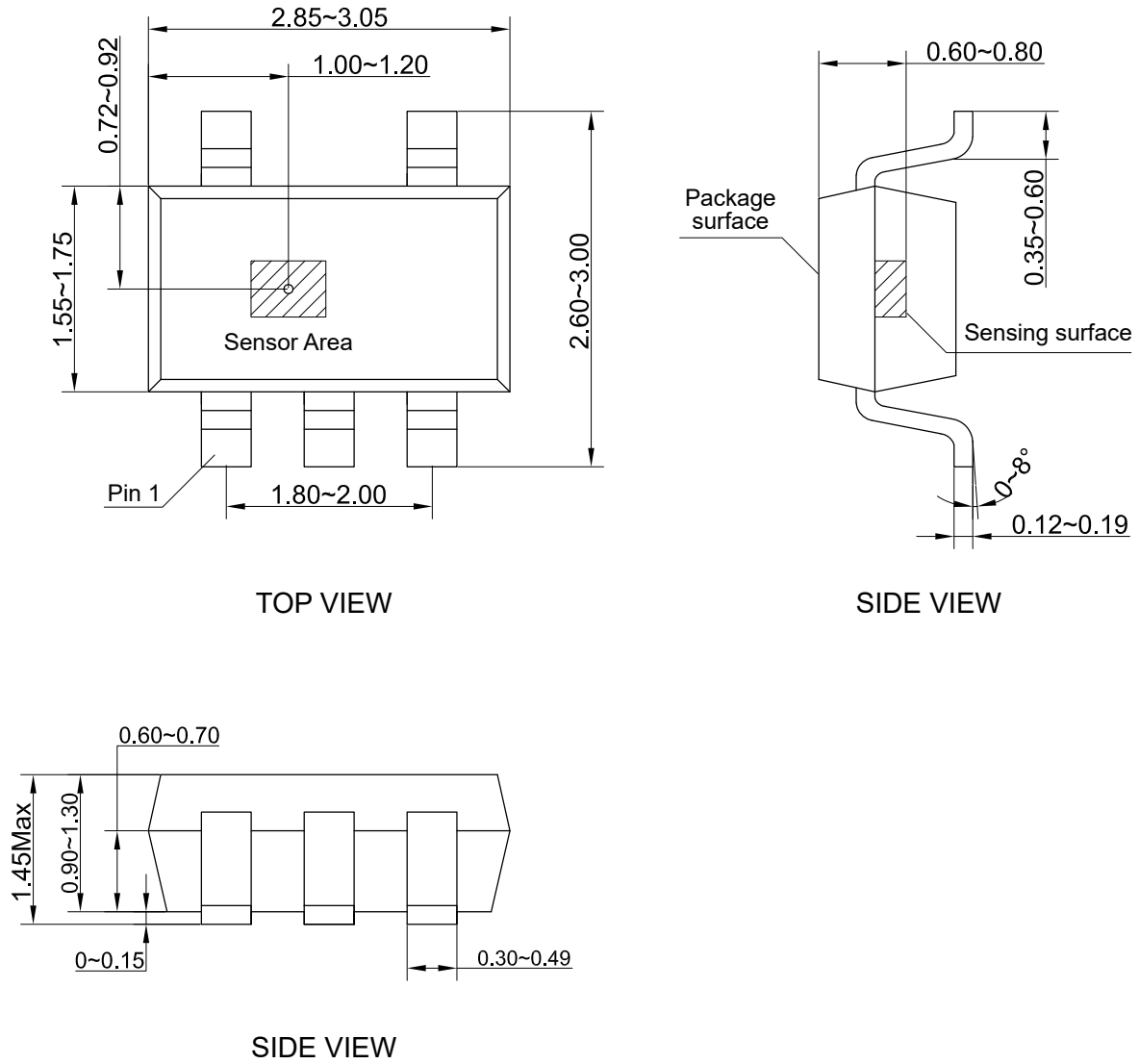


Figure 4. Package outline of SOT23-5 (unit: mm)

DNF8L Package

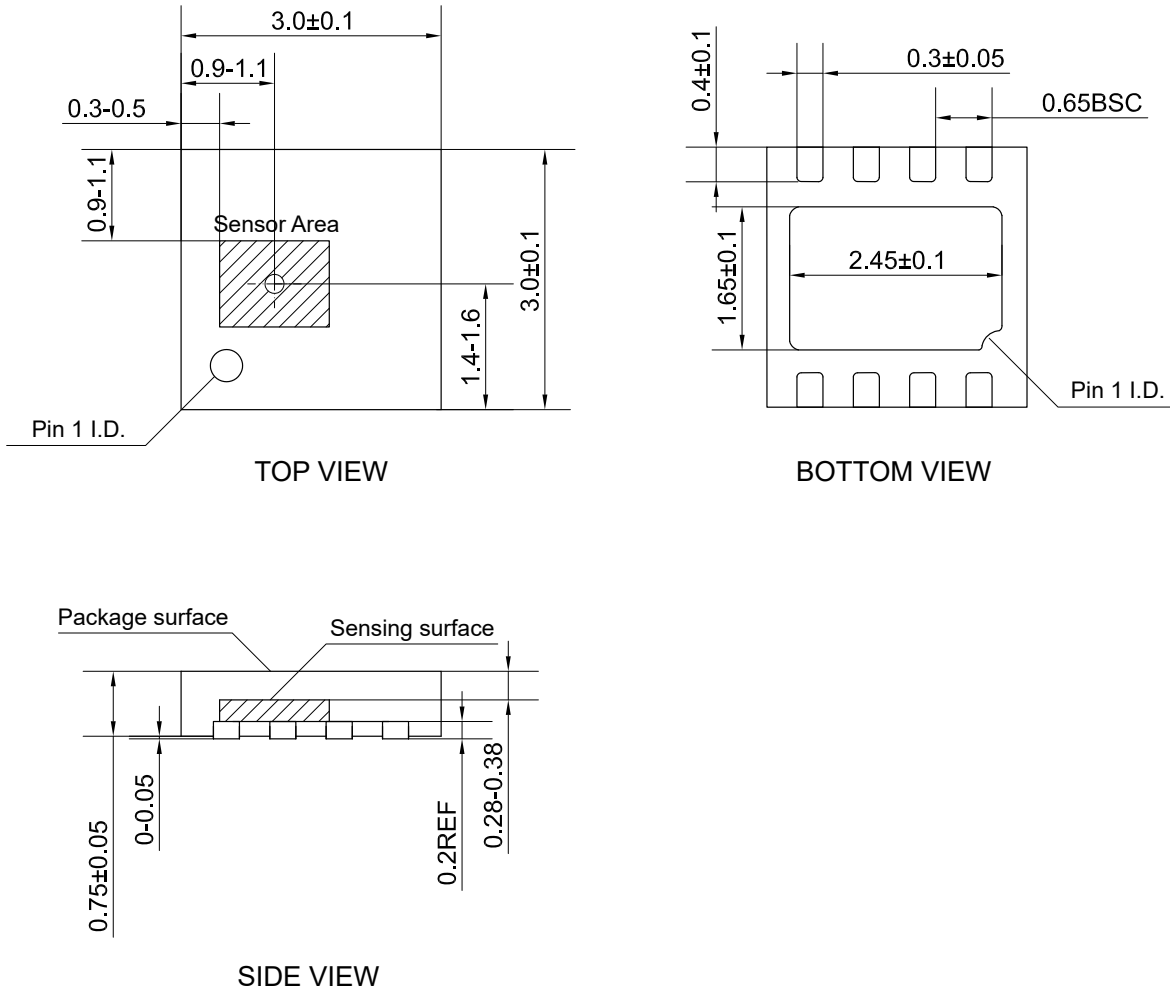


Figure 5. Package outline of DNF8L (unit: mm)

SOP8 Package

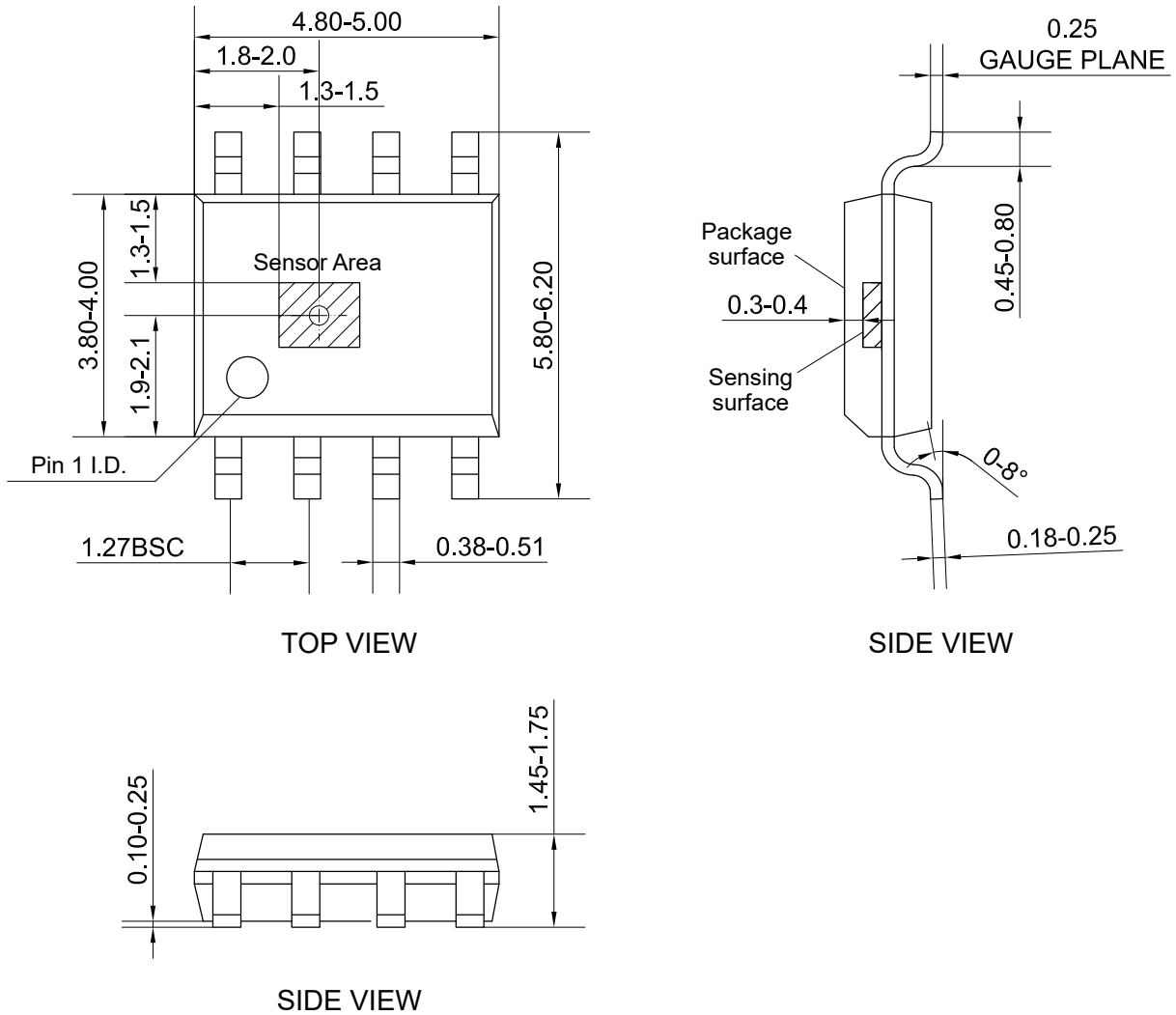


Figure 6. Package outline of SOP8 (unit: mm)

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