

TMR2623

High Frequency Response Programmable TMR Linear Magnetic Sensor

Description

The TMR2623 is a tunneling magnetoresistance (TMR) linear sensor with a dedicated signal conditioning circuit built in. The integrated signal conditioning circuit of TMR2623 is able to calibrate zero-offset, gain, temperature coefficient of sensitivity (TCS) and temperature coefficient of zero offset (TCO) of the TMR bridge circuit, and outputs the conditioned voltage signals.

In addition to TMR's intrinsic advantages of high resolution, high signal-to-noise ratio, and low power consumption, TMR2623 series linear sensors also provide the following characteristics:

- 1. Fixed voltage output range in linear range
- 2. Excellent sensitivity consistency
- 3. Minimal zero drift
- 4. Low temperature coefficient of sensitivity
- 5. Low temperature coefficient of offset

This improvement greatly enhances the convenience of design and use of TMR linear sensor products.

TMR2623 is available in DFN6L (3mm×2mm×0.75mm) package with P/N of TMR2623D.

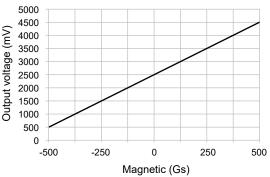
Features and Benefits

- Tunneling magnetoresistance (TMR) technology
- High frequency response: DC~2 MHz
- Large dynamic range: ±500 Gs
- Wide range supply voltages: 3 V to 5.5 V
- Nonlinearity: 0.2%
- Programmable sensitivity and zero offset
- Programmable temperature compensation
- RoHS & Reach compliant

Applications

- Current sensor
- Linear position sensor
- Gaussmeter
- Encoder





TMR2623D output transfer curve





Selection Guide

| Part Number | Supply Voltage(V) | Zero Offset(V) | Reference Voltage(V) | Package | Packing Form |
|-------------|-------------------|----------------|----------------------|---------|-----------------|
| TMR2623D-P5 | 5 | 2.5 | 2.5 | DFN6L | Tape & Reel |
| TMR2623D-P3 | 3 | 1.65 | 1.65 | DFN6L | Tape & Reel |

Catalogue

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1. Functional Block Diagram

TMR2623 integrates a linear TMR magnetic sensor and a dedicated signal conditioning chip with a single-ended analog voltage output signal. The V_{OUT} pin can be reused as the OWI(One-Wire-Interface) protocol programming interface, to adjust zero-point, sensitivity, reference voltage V_{REF} and other parameters in a targeted manner.

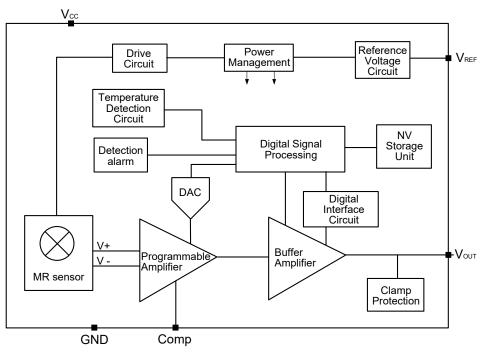
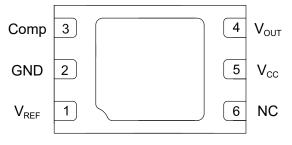


Figure 1. Block Diagram

2. Pin Configuration



| Pin Number | Name | Function | | |
|------------|------------------|--------------------------|--|--|
| 1 | V_{REF} | Reference voltage output | | |
| 2 | GND | Ground | | |
| 3 | Comp | Analog voltage | | |
| 4 | V _{OUT} | Analog output | | |
| 5 | V _{cc} | Power supply | | |
| 6 | NC | Not connected | | |
| | EP | Center Pad | | |

Figure 2. Pin Configuration (DFN6L)

3. Sensing Direction

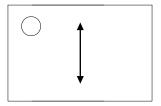


Figure 3. Sensing Direction





4. Absolute Maximum Ratings

| Parameters | Symbol | Min. | Max. | Unit |
|-------------------------------|-------------------------------|------|------|------|
| Supply voltage | V _{cc} | 3 | 5.5 | V |
| Supply current | I _{CC} ¹⁾ | - | 8 | mA |
| Magnetic flux density | В | - | 4000 | Gs |
| ESD performance (HBM) | V _{ESD} | - | 4 | kV |
| Operating ambient temperature | T _A | -40 | 125 | °C |
| Storage ambient temperature | T _{STG} | -50 | 150 | ٦° |

1) Supply current I refers to the current to operate after calibration.

5. Electrical Specifications

| Parameter | Symbol | Condition | Min. | Тур. | Max. | Unit | Applicable Part Number |
|---|---------------------|---|---------|--------------------|------|--------|------------------------|
| Supply voltage | V _{cc} | T _A =25°C | 3 | 5 | 5.5 | V | TMR2623D-P5 |
| | | | 3 | 3.3 | 5.5 | V | TMR2623D-P3 |
| | I _{cc} | V _{cc} =5V, T _A =25°C | - | 5 | 8 | mA | TMR2623D-P5 |
| Supply current | | V _{CC} =3.3V, T _A =25°C | - | 5 | 8 | mA | TMR2623D-P3 |
| Power-on time | T _{PO} | T _A =25°C | - | 40 | - | ms | All porto |
| Magnetic range | H_{SAT} | T _A =25°C | -500 | - | 500 | Gs | All parts |
| Consitivity | 05N ²) | V _{cc} =5V, T _A =25°C | 2 | - | 100 | mV/Gs | TMR2623D-P5 |
| Sensitivity | SEN ²⁾ | V _{cc} =3.3V, T _A =25°C | 1 | - | 65 | mV/Gs | TMR2623D-P3 |
| Zero offset | V _{OFFSET} | V _{cc} =5V, T _A =25°C | - | 2.5 | - | V | TMR2623D-P5 |
| Zero oliset | | V _{cc} =3.3V, T _A =25°C | - | 1.65 | - | V | TMR2623D-P3 |
| | V_{REF} | V _{cc} =5V, T _A =25°C | - | 2.5 | - | V | TMR2623D-P5 |
| Reference voltage | | V _{cc} =3.3V, T _A =25°C | - | 1.65 | - | V | TMR2623D-P3 |
| | | V _{cc} | - | V _{cc} /2 | - | V | TMR2623D-P3 |
| Liveteracia | HYS | T _A =25°C, +/-100Gs | - | 0.1 | - | Gs | |
| Hysteresis | | T _A =25°C, +/-500Gs | - | 0.5 | - | Gs | |
| Nonlinearity | NONL | T _A =25°C | - | 0.2 | - | %FS | |
| Temperature coefficient of sensitivity | TCS ³⁾ | -40°C to 125°C | - | - | 100 | PPM/°C | All parts |
| Temperature coefficient of offset | TCO ⁴⁾ | -40°C to 125°C | - | - | 50 | PPM/°C | |
| Response frequency | F | Minimum gain | DC~2MHz | | | | |

2) The typical value of sensitivity is programmable via OWI protocol.

3) The TCS is programmable through OWI protocol for multi-point temperature calibration to obtain better results.

4) The TCO is programmable through OWI protocol for multi-point temperature calibration to obtain better results.





6. Typical Characteristics

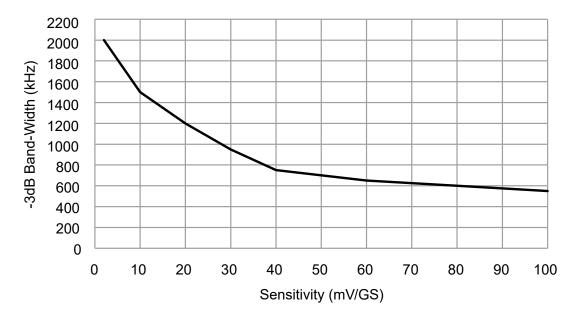
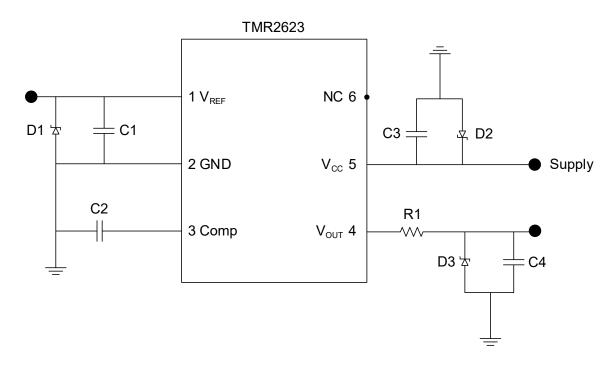


Figure 4. Sensitivity VS Band-width





7. Application Information



Device description in Figure 5:

| R1 | | R1/C4: for output pin RC filtering |
|----|----------------|---|
| C1 | 20pF | Connects $V_{\mbox{\tiny REF}}$ to GND for reference voltage filtering |
| C2 | 20pF | Connects Comp to GND for output voltage filtering |
| C3 | 0.1µF | Connects V_{cc} to GND for supply voltage filtering |
| C4 | | R1/C4: for output pin RC filtering |
| D1 | ESD5341N_5V/NA | Dual lead bidirectional 5V transient voltage suppression devices for ESD/surge protection |
| D2 | ESD5341N_5V/NA | Dual lead bidirectional 5V transient voltage suppression devices for ESD/surge protection |
| D3 | ESD5341N_5V/NA | Dual lead bidirectional 5V transient voltage suppression devices for ESD/surge protection |

Figure 5. Typical Application Circuit

Please contact MDT regional sales representative to obtain "Product Application Manual" for more information about TMR2623 product application, including programming methods (OWI programming instructions) for sensor sensitivity, temperature coefficient of sensitivity, zero offset, temperature coefficient of zero offset, nonlinearity, etc.





8. Dimensions

DFN6L Package

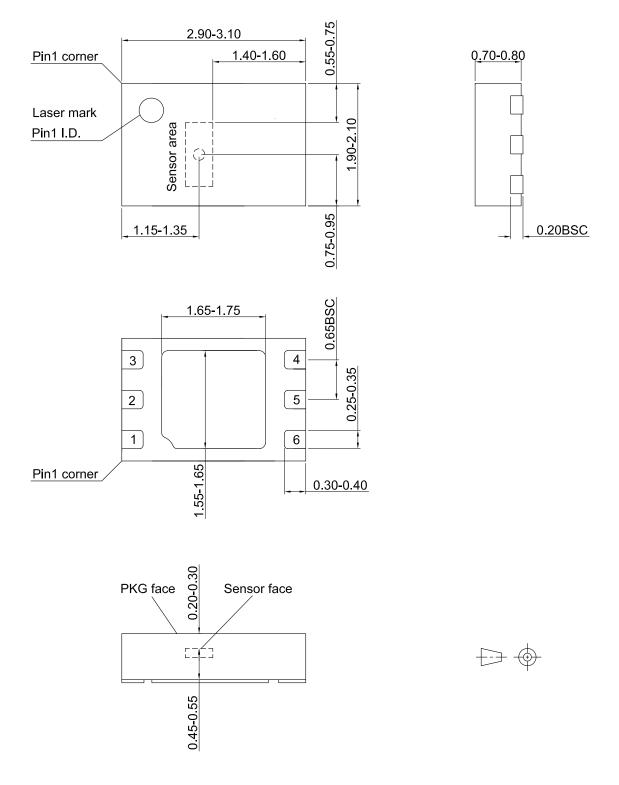


Figure 6. Package outline of DFN6L (unit: mm)



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