

TMR2615x-AAC

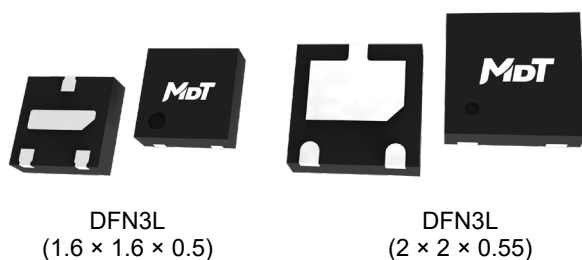
Low Power Large Range TMR Linear Magnetic Sensor

Description

The TMR2615x-AAC is a low-power, wide-linear-range, programmable TMR linear sensor IC by MultiDimension Technology. The IC integrates tunnel magnetoresistance (TMR) sensor, programmable operational amplifier, and DAC circuits to provide a linear relationship between analog output voltage and external magnetic field.

The IC can be widely used in various position sensing applications and supports customers' demands for low voltage, high resolution, high signal-to-noise ratio, and wide linear range.

The sensor is either available as TMR2615D-AAC in a DFN3L (2 mm × 2 mm × 0.55 mm) package or as TMR2615F-AAC in DFN3L (1.6 mm × 1.6 mm × 0.5 mm) package. The sensor complies with RoHS standards.

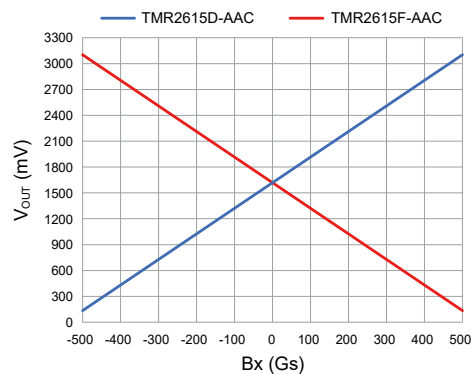


Features and Benefits

- Tunneling magnetoresistance (TMR) technology
- Supply voltage: 1.71 V to 5 V
- Static current consumption < 300 μ A
- Output voltage: 5% to 95% V_{DD}
- Output voltage follows V_{DD} changes
- Low noise
- Sensitivity with high consistency
- Low hysteresis
- RoHS & Reach compliant

Applications

- Joystick controller
- Magnetic keyboard
- Consumer electronics



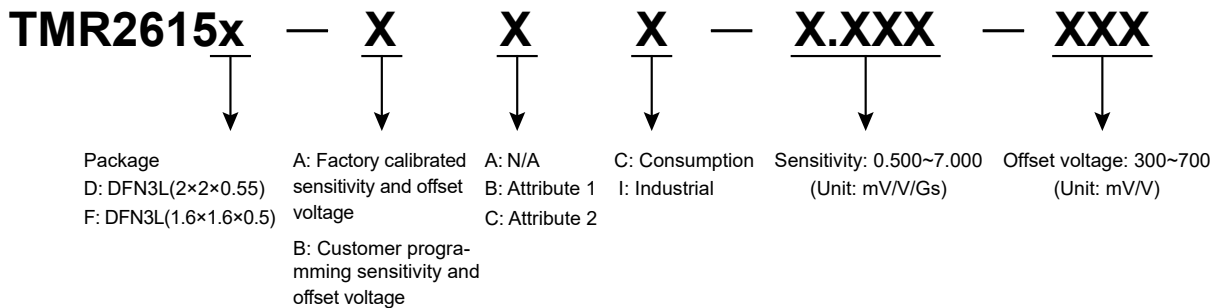
TMR2615x-AAC \pm 500 Gs Output curve

Selection Guide

| Part Number* | Supply Voltage | Linear Range | Operating temperature | Static Current Consumption | Package | Packing Form |
|------------------------|----------------|--------------|-----------------------|----------------------------|---------------------|--------------|
| TMR2615D-AAC-X.XXX-XXX | 1.71 V to 5 V | ±500 Gs | -40 °C to 85 °C | < 300 μA | DFN3L (2×2×0.55) | Tape & Reel |
| TMR2615F-AAC-X.XXX-XXX | 1.71 V to 5 V | ±500 Gs | -40 °C to 85 °C | < 300 μA | DFN3L (1.6×1.6×0.5) | Tape & Reel |

Note: Sensitivity and offset voltage can be customized according to customer requirements.

Product Model Description



Note: A sensitivity value of 1.000 corresponds to 1.000 mV/V/Gs, please refer to the X axis output curve diagram on the home page. and a zero-offset output voltage value of 500 corresponds to 500 mV/V.

Catalogue

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1. Functional Block Diagram

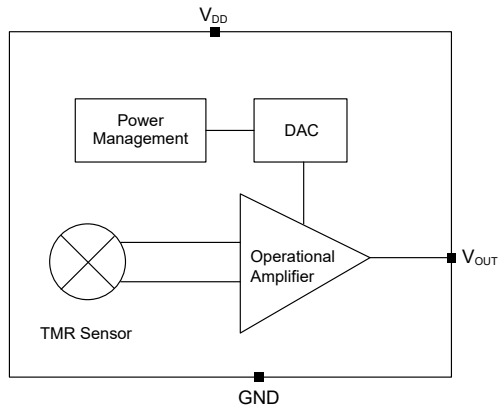


Figure 1. Block Diagram

The TMR2615x-AAC output voltage varies linearly with the magnetic field along the sensing axis.

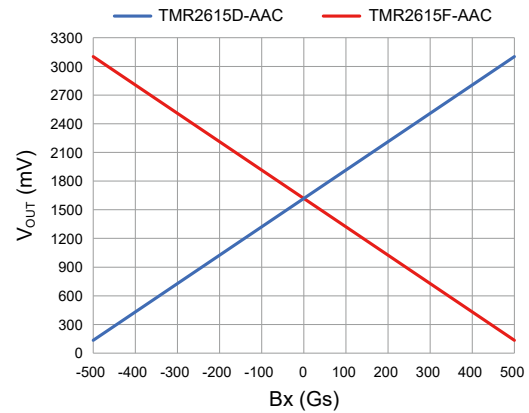


Figure 3. TMR2615x-AAC output curve

2. Operating Principle

The TMR2615x-AAC sensing axis is parallel to the package top-marking surface; the sensing axis is defined from the N pole toward the S pole, as indicated by the arrow in the figure below.

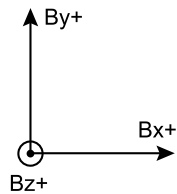


Figure 2-1. Definition of axis

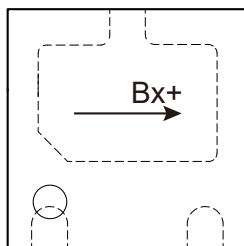


Figure 2-2. Axial diagram (DFN3L(2x2) top view)

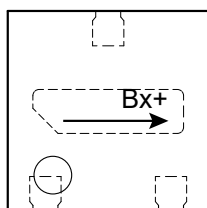
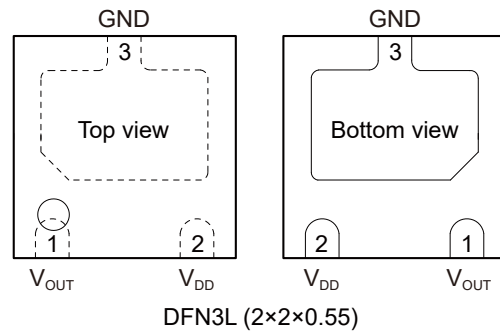
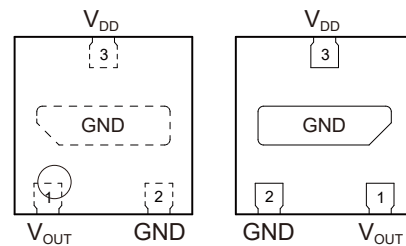


Figure 2-3. Axial diagram (DFN3L(1.6x1.6) top view)

3. Pin Configuration



DFN3L (2x2x0.55)



DFN3L (1.6x1.6x0.5)

Figure 4. Pin Configuration

| Pin Number | | Name | Function |
|------------------|---------------------|------------------|----------------|
| DFN3L (2x2x0.55) | DFN3L (1.6x1.6x0.5) | | |
| 1 | 1 | V _{OUT} | Output voltage |
| 2 | 3 | V _{DD} | Supply voltage |
| 3 | 2 | GND | Ground |

4. Absolute Maximum Ratings

| Parameters | Symbol | Min. | Max. | Unit |
|-------------------------|-----------|------|------|------|
| Supply voltage | V_{DD} | -0.3 | 6 | V |
| External magnetic field | B | - | 4000 | Gs |
| V_{OUT} current drive | - | - | 1.5 | mA |
| Operating temperature | T_A | -40 | 85 | °C |
| Storage temperature | T_{STG} | -50 | 150 | °C |
| ESD (HBM) | V_{ESD} | - | 4000 | V |

Note: The maximum value in the limit parameter only ensures that the IC is not permanently damaged, please refer to the “Electrical Performance Parameters” for normal operating conditions of the IC.

5. Electrical Specifications

$V_{DD} = 1.71\text{ V to }5\text{ V}$, $T_A = 25\text{ °C}$, a 100nF capacitor connected between the power and ground

| Parameter | Symbol | Condition | Min. | Typ. | Max. | Unit |
|--|--------------|---------------------------------------|-------------------|-------|------|------------------|
| Supply voltage | V_{DD} | - | 1.71 | 3.3 | 5 | V |
| Operating current | I_{CC} | $V_{DD} = 1.8\text{ V}$ | - | 200 | - | μA |
| | | $V_{DD} = 3.3\text{ V}$ | - | 240 | - | μA |
| Bandwidth | BW | -3 dB | - | - | 30 | kHz |
| Load resistance | R_L | - | 10 | - | - | k Ω |
| Load conductance | C_L | - | - | - | 10 | nF |
| Sensitivity | SEN | Bx: $\pm 500\text{Gs}$ | User programmable | | | mV/V/Gs |
| Temperature coefficient of sensitivity | TCS | $T_A = -40\text{ °C to }85\text{ °C}$ | - | 1000 | - | PPM/°C |
| Offset voltage | V_{OFFSET} | - | User programmable | | | mV/V |
| Temperature coefficient of offset | TCO | $T_A = -40\text{ °C to }85\text{ °C}$ | - | -0.12 | - | mV/°C |
| Nonlinearity | NONL | Bx: $\pm 500\text{Gs}$ | - | 2 | - | %FS |
| Hysteresis | HYS | Bx: $\pm 500\text{Gs}$ | - | 2 | - | %FS |
| Noise | V_N | $V_{DD} = 3.3\text{ V}$, BW = 5 kHz | - | - | 10 | mV _{pp} |
| Power-on time | t_{PO} | - | - | - | 100 | μs |

6. Output Characteristics

As shown in Figure 5, the output voltage of the TMR2615x-AAC IC changes with the external magnetic field intensity. When there is no magnetic field, V_{OUT} outputs $50\% V_{DD}$, and when the magnetic field changes from $-B$ to B , the linear output voltage range of V_{OUT} for TMR2615D-AAC is $5\% V_{DD}$ to $95\% V_{DD}$, the linear output voltage range of V_{OUT} for TMR2615F-AAC is $95\% V_{DD}$ to $5\% V_{DD}$. Customers can modify the linear range through the adjustment provided by the TMR2615x-AAC.

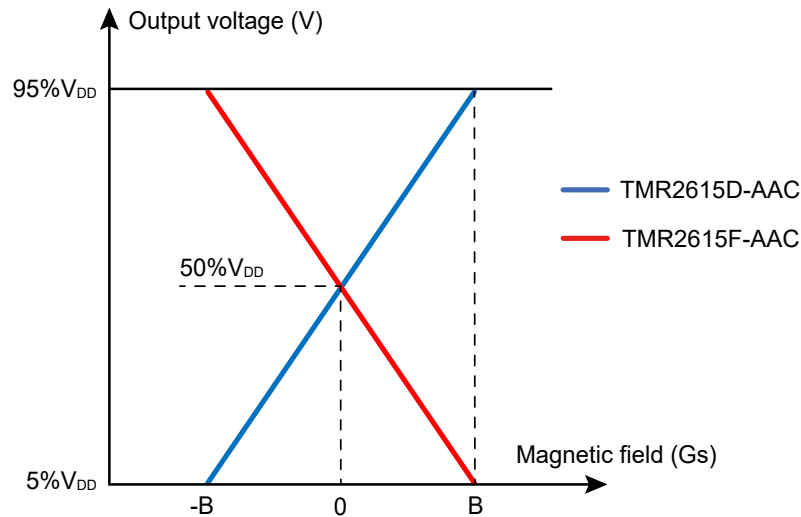


Figure 5. Output voltage versus magnetic field

7. Application Circuit

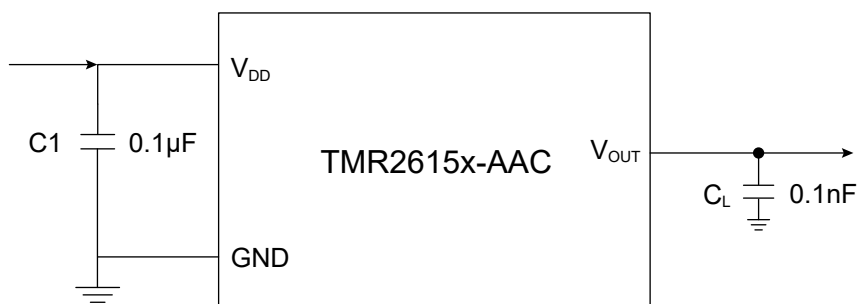


Figure 6. Application circuit diagram

Note: C1 should be as close as possible to the V_{DD} and GND pins. For detailed pin definitions, please refer to section 3 Pin Configuration.

8. Dimensions

DFN3L (2×2×0.55) Package

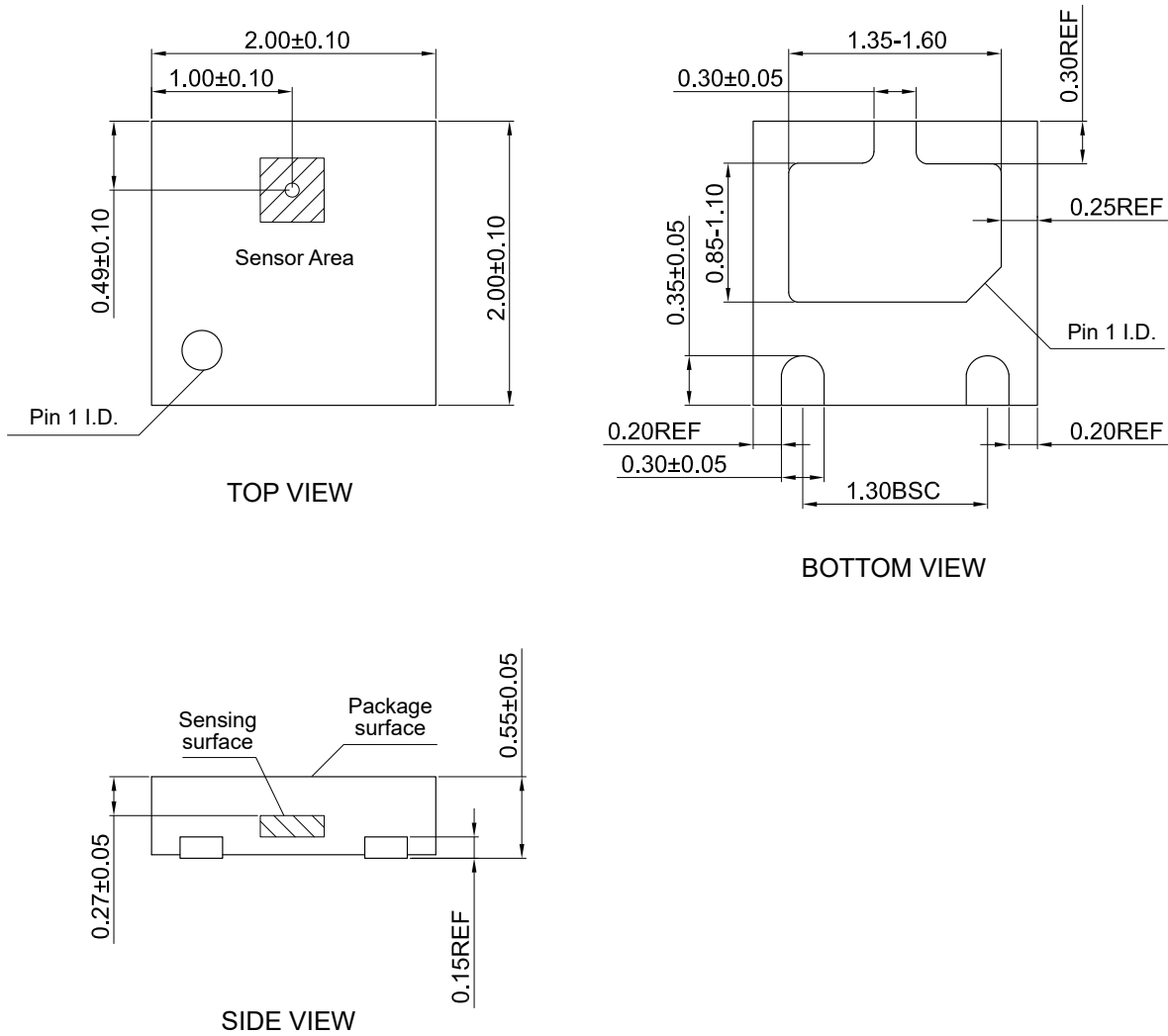


Figure 7. Package outline of DFN3L (2×2×0.55) (unit: mm)

DFN3L (1.6×1.6×0.5) Package

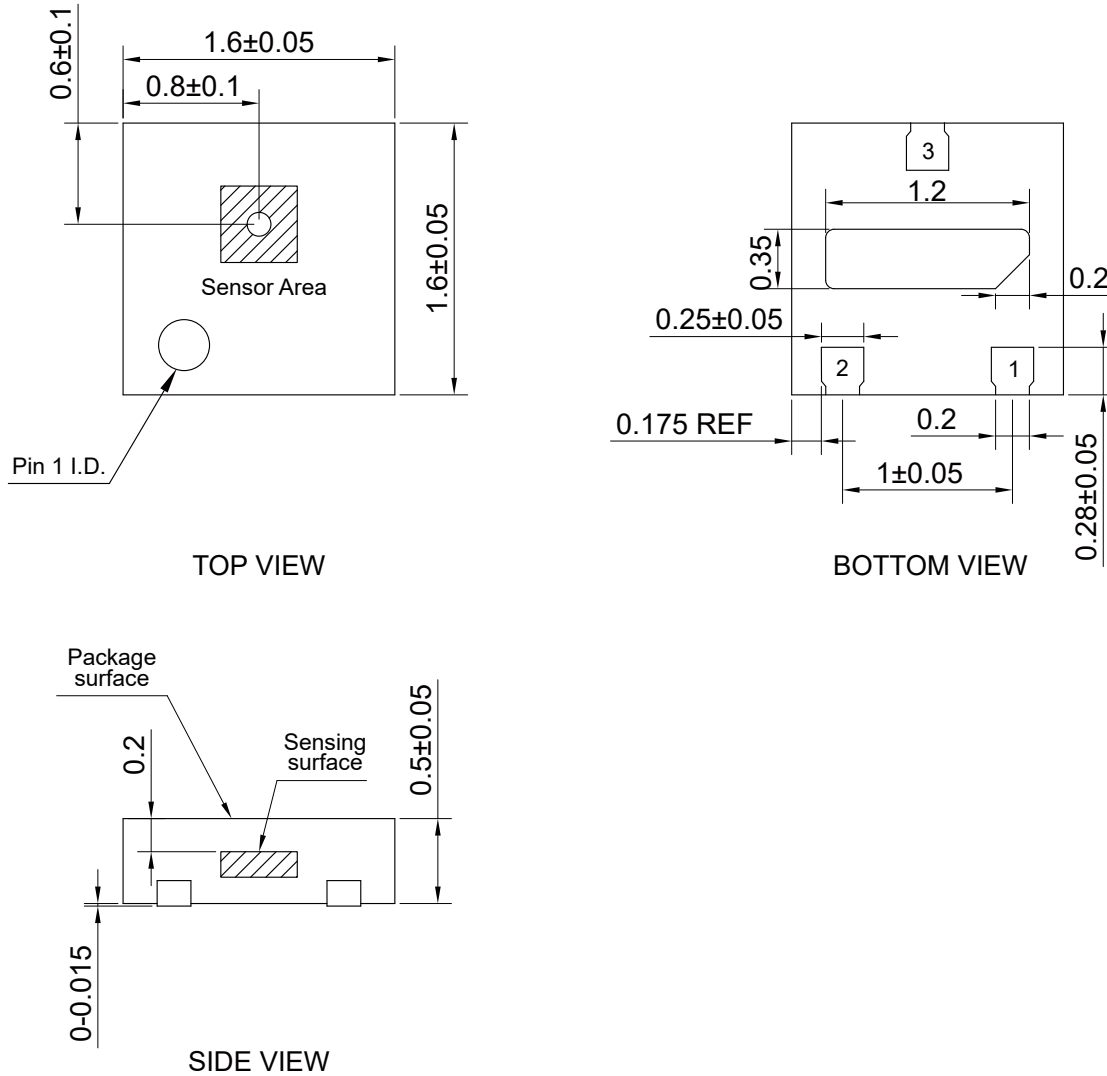


Figure 8. Package outline of DFN3L (1.6×1.6×0.5) (unit: mm)

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