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.

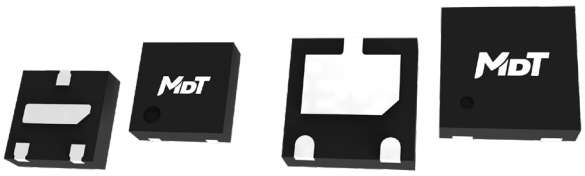
The sensor is either available as TMR2615D-AAC in a DFN3L (2 mm × 2 mm × 0.55 mm) package or as TMR2615F-AAC in DFN3L (1.6 mm × 1.6 mm × 0.5 mm) package. The sensor complies with RoHS standards.

Features and Benefits

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

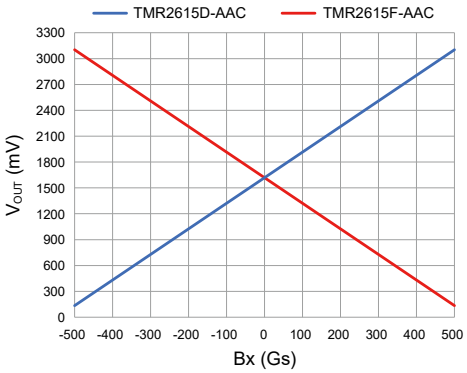
Applications

- Joystick controller
- Magnetic keyboard
- Consumer electronics



DFN3L
(1.6 × 1.6 × 0.5)

DFN3L
(2 × 2 × 0.55)



TMR2615x-AAC ±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

TMR2615x — X X X — X.XXX — XXX

- **TMR2615x**: Package
  D: DFN3L(2×2×0.55)
  F: DFN3L(1.6×1.6×0.5)
- **X**: A: Factory calibrated sensitivity and offset voltage
  B: Customer programming sensitivity and offset voltage
- **X**: A: N/A
  B: Attribute 1
  C: Attribute 2
- **X**: C: Consumption
  I: Industrial
- **X.XXX**: Sensitivity: 0.500~7.000 (Unit: mV/V/Gs)
- **XXX**: Offset voltage: 300~700 (Unit: mV/V)

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

1. Functional Block Diagram

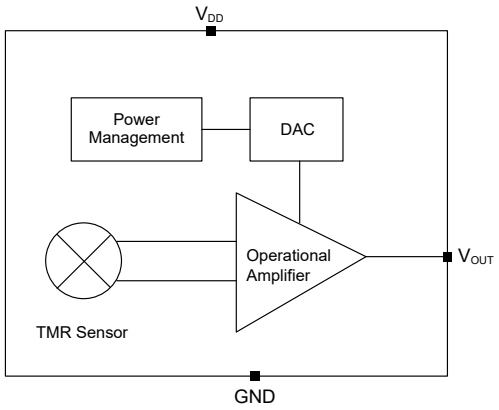


Figure 1. Block Diagram

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

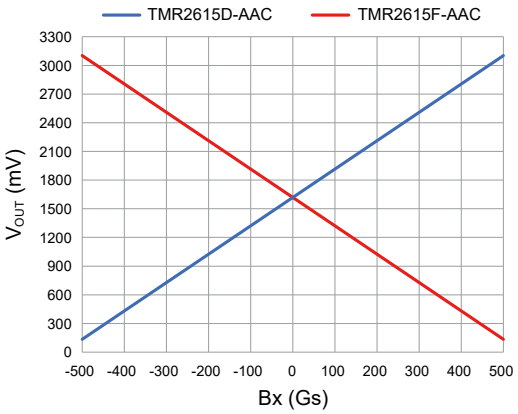


Figure 3. TMR2615x-AAC output curve

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.

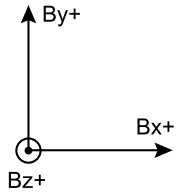


Figure 2-1. Definition of axis

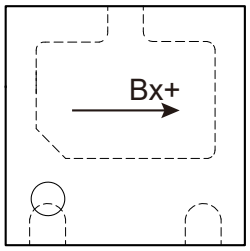


Figure 2-2. Axial diagram (DFN3L(2×2) top view)

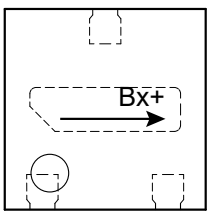
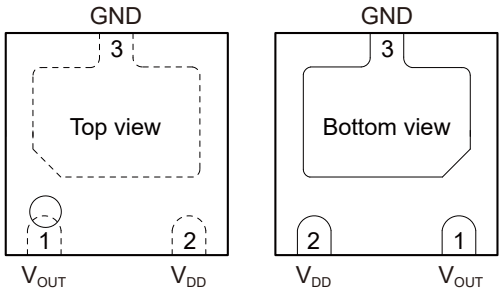


Figure 2-3. Axial diagram (DFN3L(1.6×1.6) top view)

3. Pin Configuration



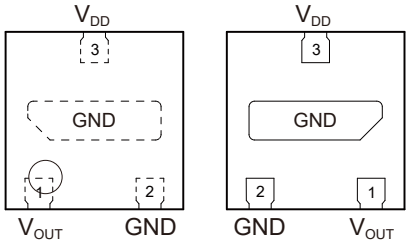


Figure 4. Pin Configuration

Pin Number		Name	Function
DFN3L (2×2×0.55)	DFN3L (1.6×1.6×0.5)		
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 V to 5 V, T_A = 25 °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 V	-	200	-	μA
		V_{DD} = 3.3 V	-	240	-	μA
Bandwidth	BW	-3 dB	-	-	30	kHz
Load resistance	R_L	-	10	-	-	kΩ
Load conductance	C_L	-	-	-	10	nF
Sensitivity	SEN	Bx: ±500Gs	User programmable			mV/V/Gs
Temperature coefficient of sensitivity	TCS	T_A = -40 °C to 85 °C	-	1000	-	PPM/°C
Offset voltage	V_{OFFSET}	-	User programmable			mV/V
Temperature coefficient of offset	TCO	T_A = -40 °C to 85 °C	-	-0.12	-	mV/°C
Nonlinearity	NONL	Bx: ±500Gs	-	2	-	%FS
Hysteresis	HYS	Bx: ±500Gs	-	2	-	%FS
Noise	V_N	V_{DD} = 3.3 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.

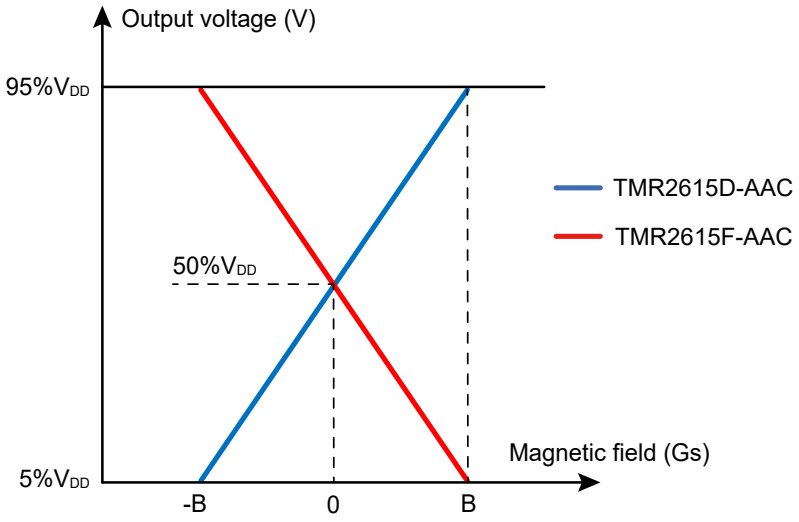


Figure 5. Output voltage versus magnetic field

7. Application Circuit

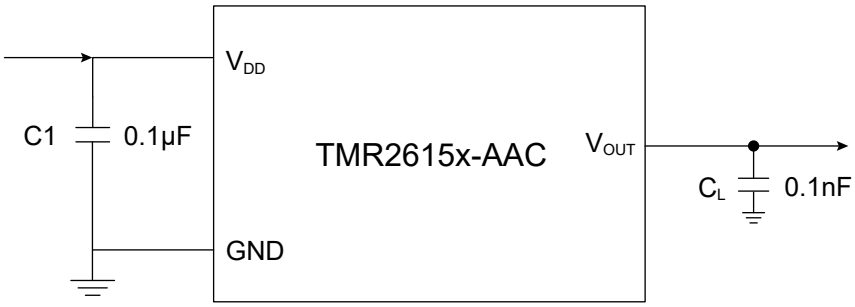


Figure 6. Application circuit diagram

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

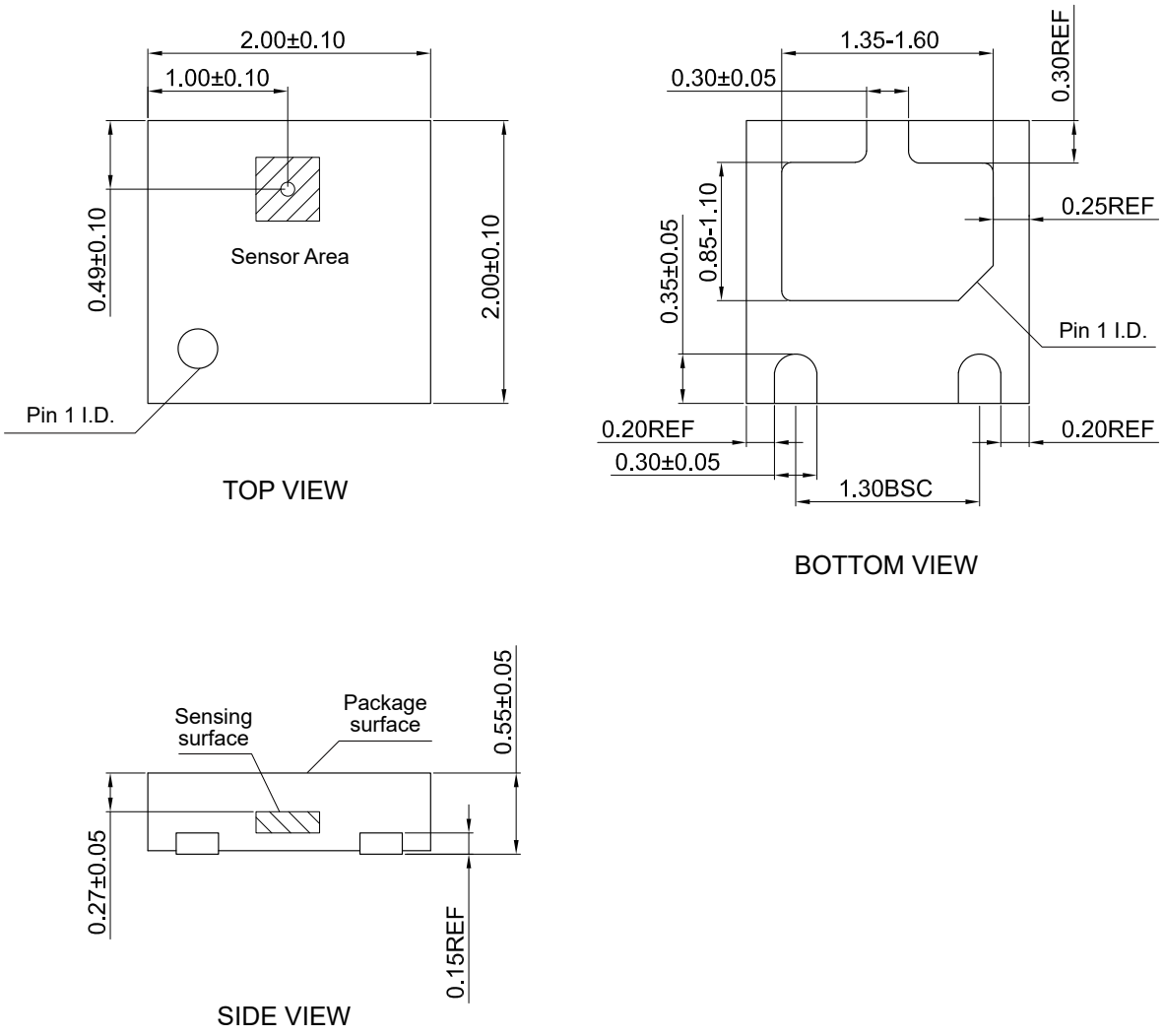


Figure 7. Package outline of DFN3L (2×2×0.55) (unit: mm)

DFN3L (1.6×1.6×0.5) Package

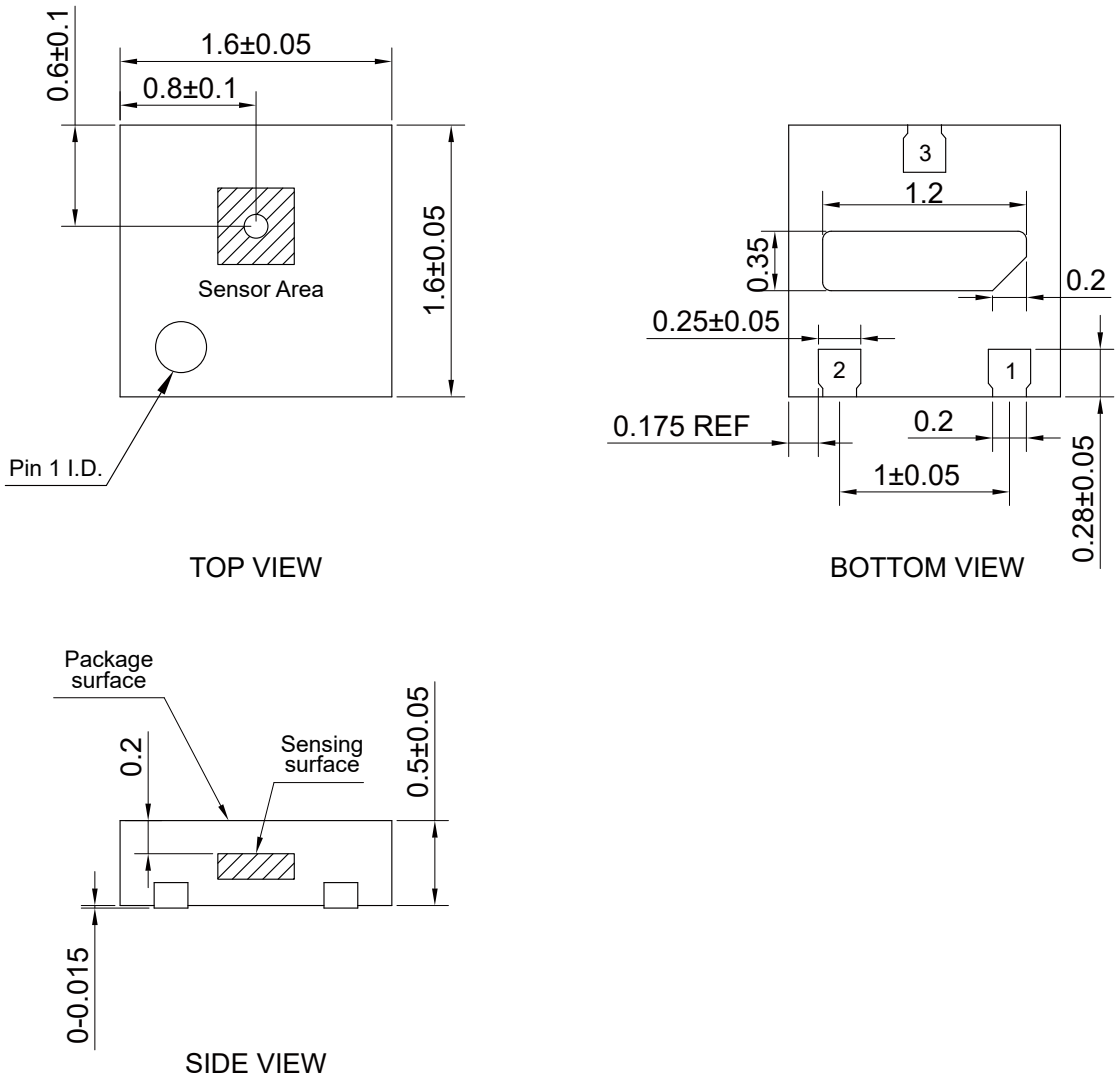


Figure 8. Package outline of DFN3L (1.6×1.6×0.5) (unit: mm)

Recycling

The product(s) in this document need to be handed over to a qualified solid waste management services company for recycling in accordance with relevant regulations on waste classification after the end of the product(s) life.

MULTIDIMENSION
MultiDimension Technology Co., Ltd.
No.2 Guangdong Road, Zhangjiagang Free Trade Zone, Jiangsu, China
Web：www.dowaytech.com/en E-mail：info@dowaytech.com