

# TMR2625D-AAC

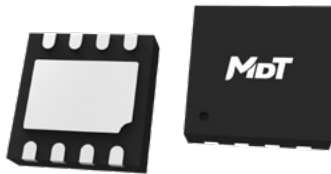
## Low Power Programmable Dual Axis TMR Linear Magnetic Sensor

### Description

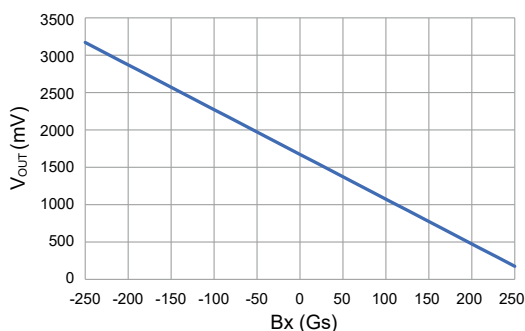
The TMR2625D-AAC is a low-power, dual axis, programmable TMR linear sensor IC by MultiDimension Technology. The IC integrates tunnel magnetoresistance (TMR) sensor, programmable operational amplifier, and DAC circuits to provide a linear relationship between analog output voltage and external magnetic field. The TMR unit includes two unique push-pull Wheatstone full bridges, sensitive in the X-axis and Y-axis directions.

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.

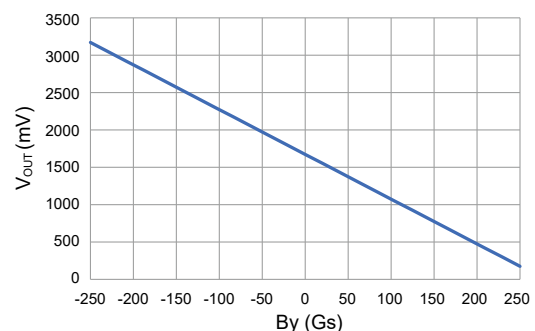
The sensor is available in a DFN8L (3 mm × 3 mm × 0.75 mm) package. The sensor complies with RoHS standards.



DFN8L



TMR2625D-AAC X-axis output curve



TMR2625D-AAC Y-axis output curve

### Features and Benefits

- Tunneling magnetoresistance (TMR) technology
- Supply voltage: 1.71 V to 5 V
- Static current consumption < 600  $\mu$ 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

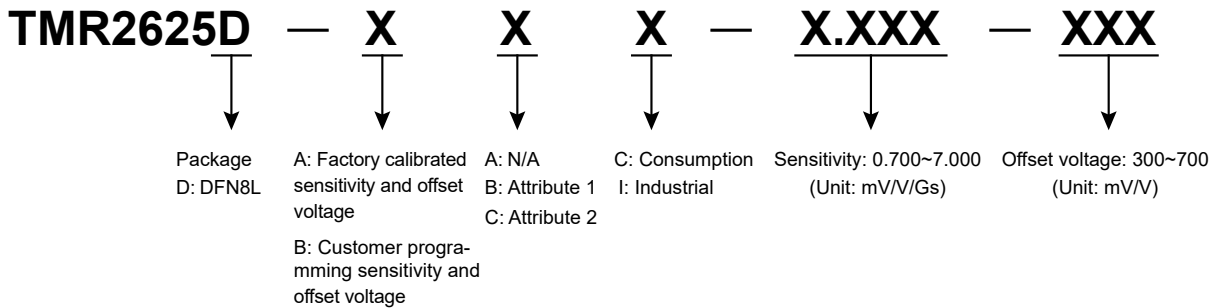
### Applications

- Joystick controller
- Consumer electronics

## Selection Guide

Part Number	Supply Voltage	Linear Range	Operating Temperature	Static Current Consumption	Package	Packing Form
TMR2625D-AAC-X.XXX-XXX	1.71 V to 5 V	±250 Gs	-40 °C to 85 °C	< 600 μA	DFN8L	Tape & Reel

## Product Model Description



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

## Catalogue

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## 1. Functional Block Diagram

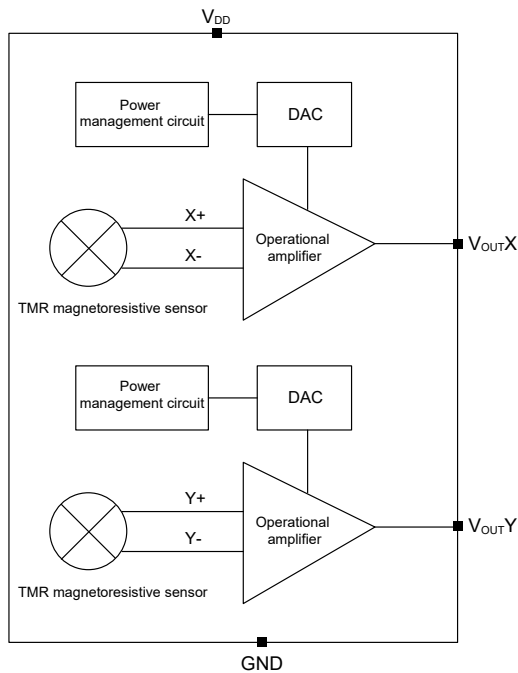


Figure 1. Block diagram

## 2. Operating Principle

The TMR2625D-AAC sensing axes are parallel to the package top-marking surface. The positive (+) direction of each axis is defined by a magnetic field vector originating at a Magnetic North (N) pole and terminating at a Magnetic South (S) pole.

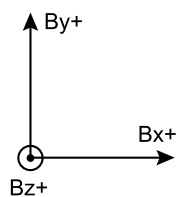


Figure 2-1. Definition of magnetic field sensing axes

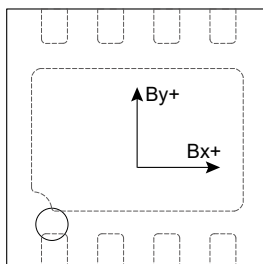


Figure 2-2. Sensor sensing axes (DFN8L top view)

As indicated in Figures 3 and 4, the TMR2625D-AAC exhibits an inverse linear relationship between the magnetic field and the output: when the magnetic flux direction aligns with the sensing axis arrows (Bx+, By+), the output voltage decreases. Conversely, a magnetic field oriented opposite to the arrows results in an increase in output voltage.

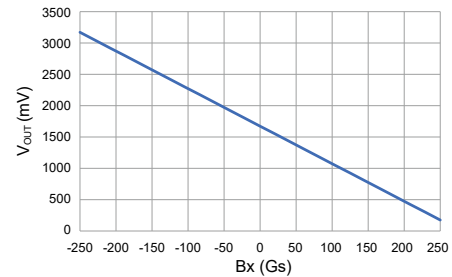


Figure 3. TMR2625D-AAC x-axis output characteristics

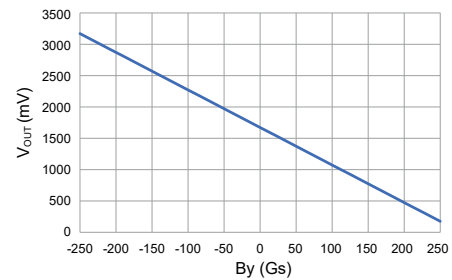


Figure 4. TMR2625D-AAC y-axis output characteristics

## 3. Pin Configuration

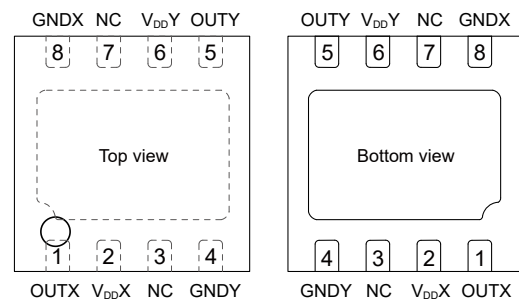


Figure 5. Pin configuration (DFN8L)

Pin Number	Name	Function
1	OUTX	X axis output
2	V <sub>DD</sub> X	X axis supply voltage
3	NC	Not Connected
4	GNDY	Y axis Ground
5	OUTY	Y axis output
6	V <sub>DD</sub> Y	Y axis supply voltage
7	NC	Not Connected
8	GNDX	X axis Ground

## 4. Absolute Maximum Ratings

Parameters	Symbol	Min.	Max.	Unit
Supply voltage	$V_{DD}$	-0.3	6	V
External magnetic field	B	-	4000	Gs
VOUT 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

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Supply voltage	$V_{DD}$	-	1.71	3.3	5	V
Supply current	$I_{CC}$	-	-	-	600	μA
Bandwidth	BW	-3 dB	-	-	30	kHz
Load resistance	$R_L$	-	10	-	-	kΩ
Load conductance	$C_L$	-	-	-	10	nF
Sensitivity <sup>1)</sup>	SEN	Bx / By: ±250 Gs	-7.000	-	-0.700	mV/V/Gs
Temperature coefficient of sensitivity	TCS	$T_A = -40\text{ °C to }85\text{ °C}$	-	1000	-	PPM/°C
Offset voltage <sup>1)</sup>	$V_{OFFSET}$	-	-	$V_{DD} / 2$	-	-
Temperature coefficient of offset	TCO	$T_A = -40\text{ °C to }85\text{ °C}$	-	-0.12	-	mV/°C
Nonlinearity	NONL	Bx / By: ±250 Gs	-	2	-	%FS
Sensitivity X/Y	K	Bx / By: ±250 Gs	85	100	115	%
Hysteresis	HYS	Bx / By: ±250 Gs	-	2	-	%FS
Noise	$V_N$	$V_{DD} = 3.3\text{ V, BW} = 5\text{ kHz}$	-	-	10	mV <sub>PP</sub>
Power-on time	$t_{PO}$	-	-	-	100	μs

1) Please contact local sales for customizing sensitivity and offset voltage.

## 6. Output Characteristics

As shown in Figure 6, the output voltage of the TMR2625D-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  $-B$  Gs to  $B$  Gs, the linear output voltage range of  $V_{OUT}$  is  $95\% V_{DD}$  to  $5\% V_{DD}$ .

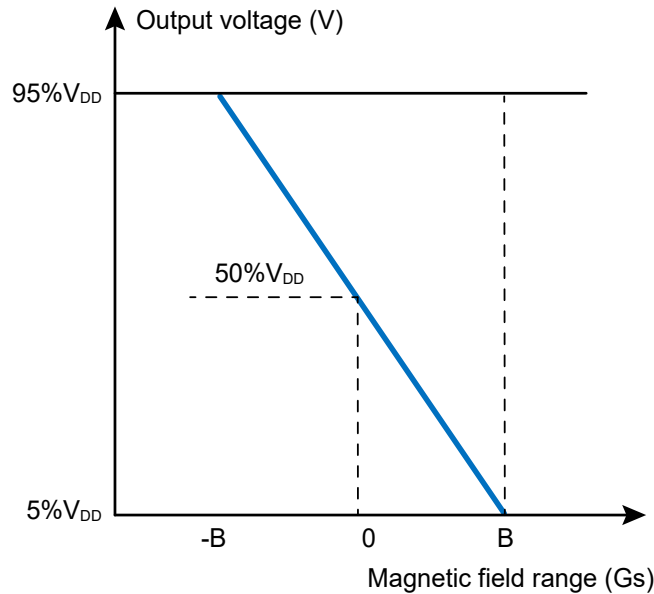


Figure 6. Output voltage versus magnetic field

## 7. Application Circuit

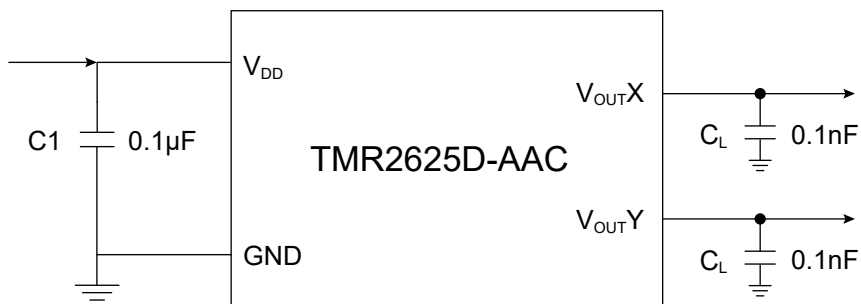


Figure 7. Application circuit diagram

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

### DFN8L Package

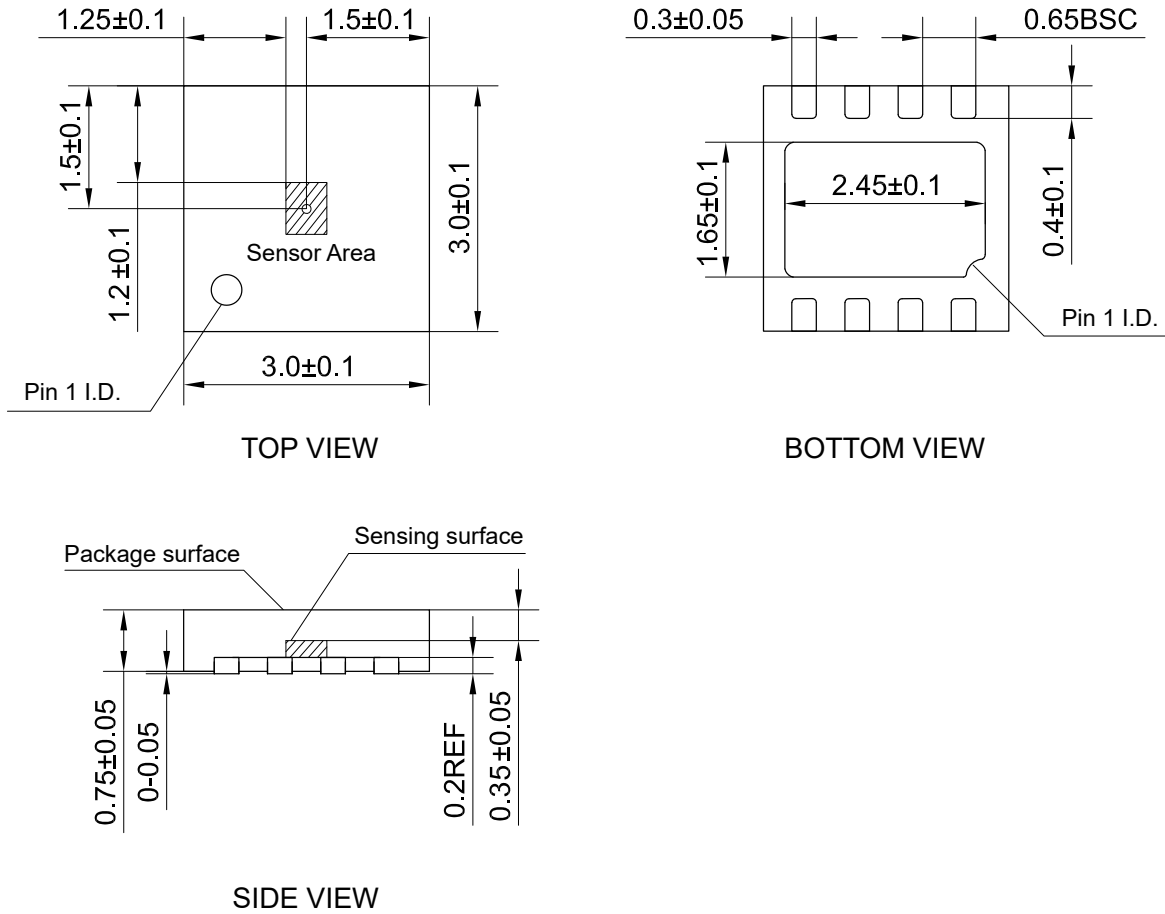


Figure 8. Package outline of DFN8L (unit: mm)

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