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.

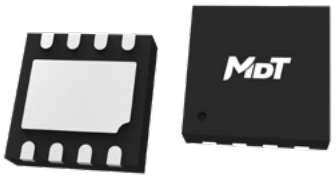
The sensor is available in a DFN8L (3 mm × 3 mm × 0.75 mm) package. The sensor complies with RoHS standards.

Features and Benefits

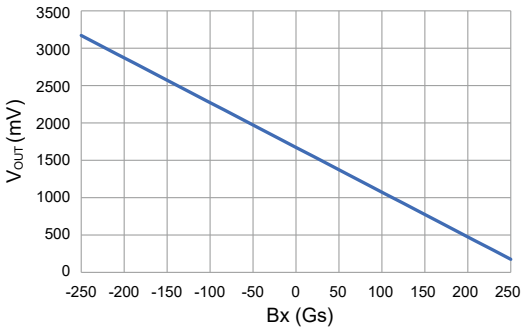
- Tunneling magnetoresistance (TMR) technology
- Supply voltage: 1.71 V to 5 V
- Static current consumption < 600 μA
- Output voltage: 5% to 95% V_{DD}
- Output voltage follows V_{DD} changes
- Low noise
- Sensitivity with high consistency
- Low hysteresis
- RoHS & Reach compliant

Applications

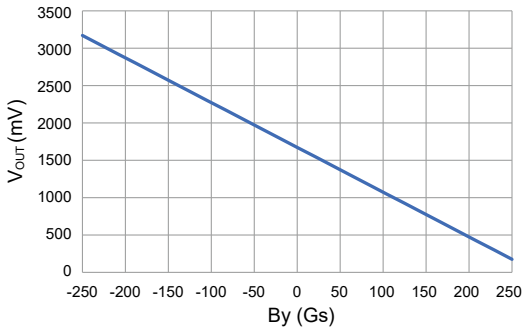
- Joystick controller
- Consumer electronics



DFN8L



TMR2625D-AAC X-axis output curve

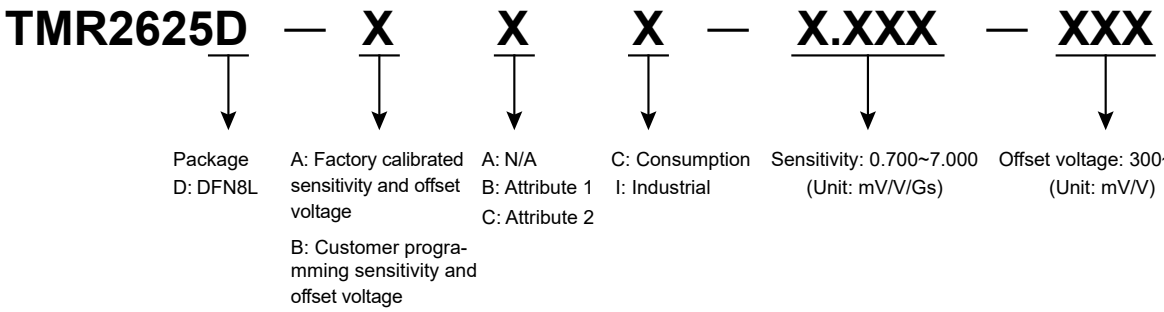


TMR2625D-AAC Y-axis output curve

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

1. Functional Block Diagram

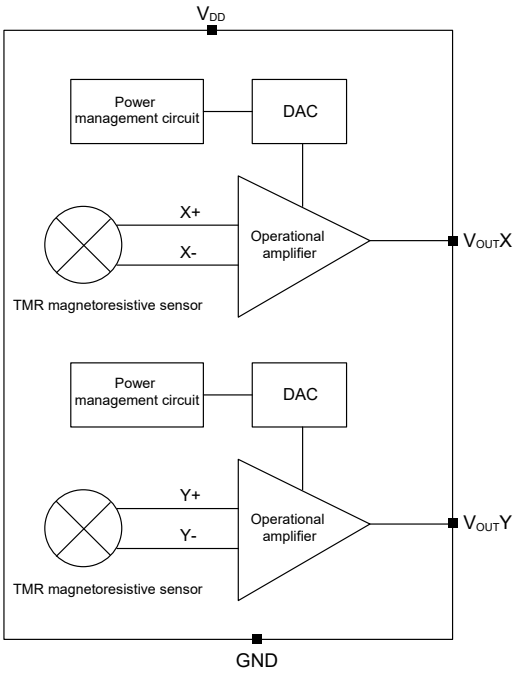


Figure 1. Block diagram

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.

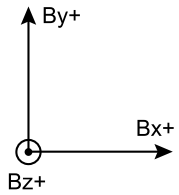


Figure 2-1. Definition of magnetic field sensing axes

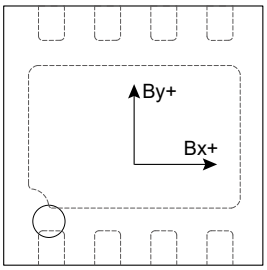


Figure 2-2. Sensor sensing axes (DFN8L top view)

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.

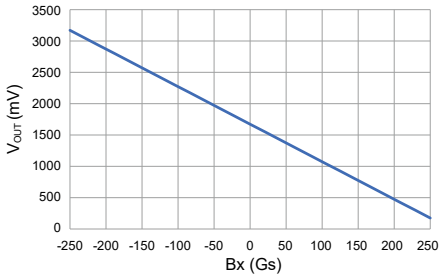


Figure 3. TMR2625D-AAC x-axis output characteristics

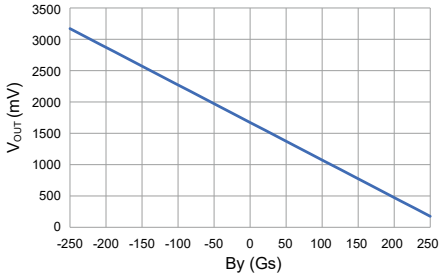


Figure 4. TMR2625D-AAC y-axis output characteristics

3. Pin Configuration

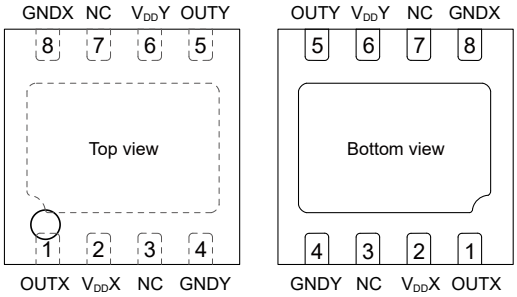


Figure 5. Pin configuration (DFN8L)

Pin Number	Name	Function
1	OUTX	X axis output
2	V_{DD}X	X axis supply voltage
3	NC	Not Connected
4	GNDY	Y axis Ground
5	OUTY	Y axis output
6	V_{DD}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[1)]	SEN	Bx / By: ±250 Gs	-7.000	-	-0.700	mV/V/Gs
Temperature coefficient of sensitivity	TCS	T_A = -40 °C to 85 °C	-	1000	-	PPM/°C
Offset voltage[1)]	V_{OFFSET}	-	-	V_{DD} / 2	-	-
Temperature coefficient of offset	TCO	T_A = -40 °C to 85 °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 V, BW = 5 kHz	-	-	10	mV_{PP}
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}.

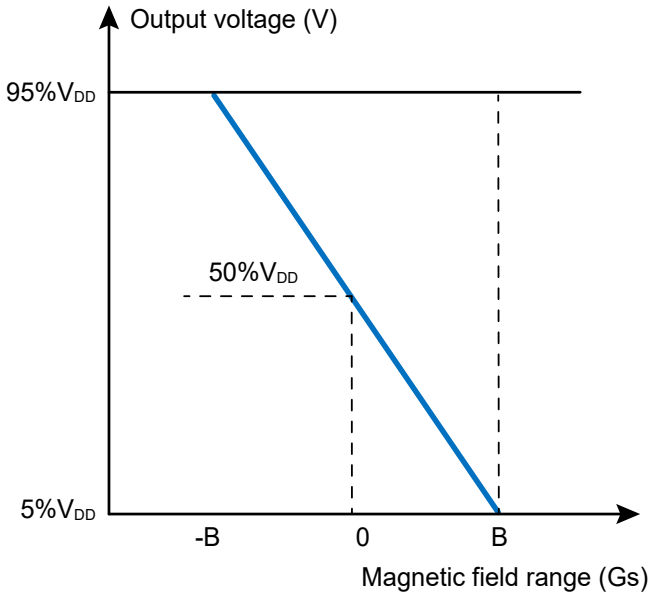


Figure 6. Output voltage versus magnetic field

7. Application Circuit

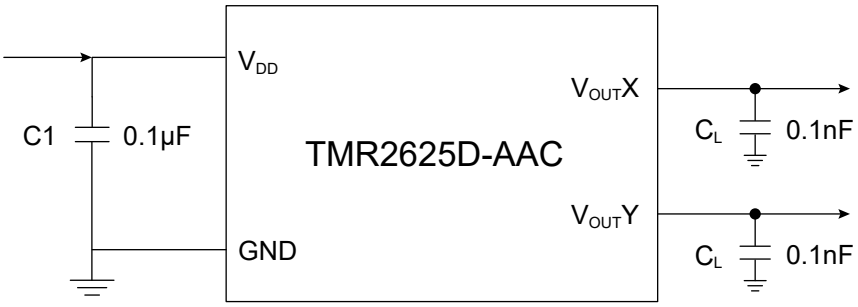


Figure 7. Application circuit diagram

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

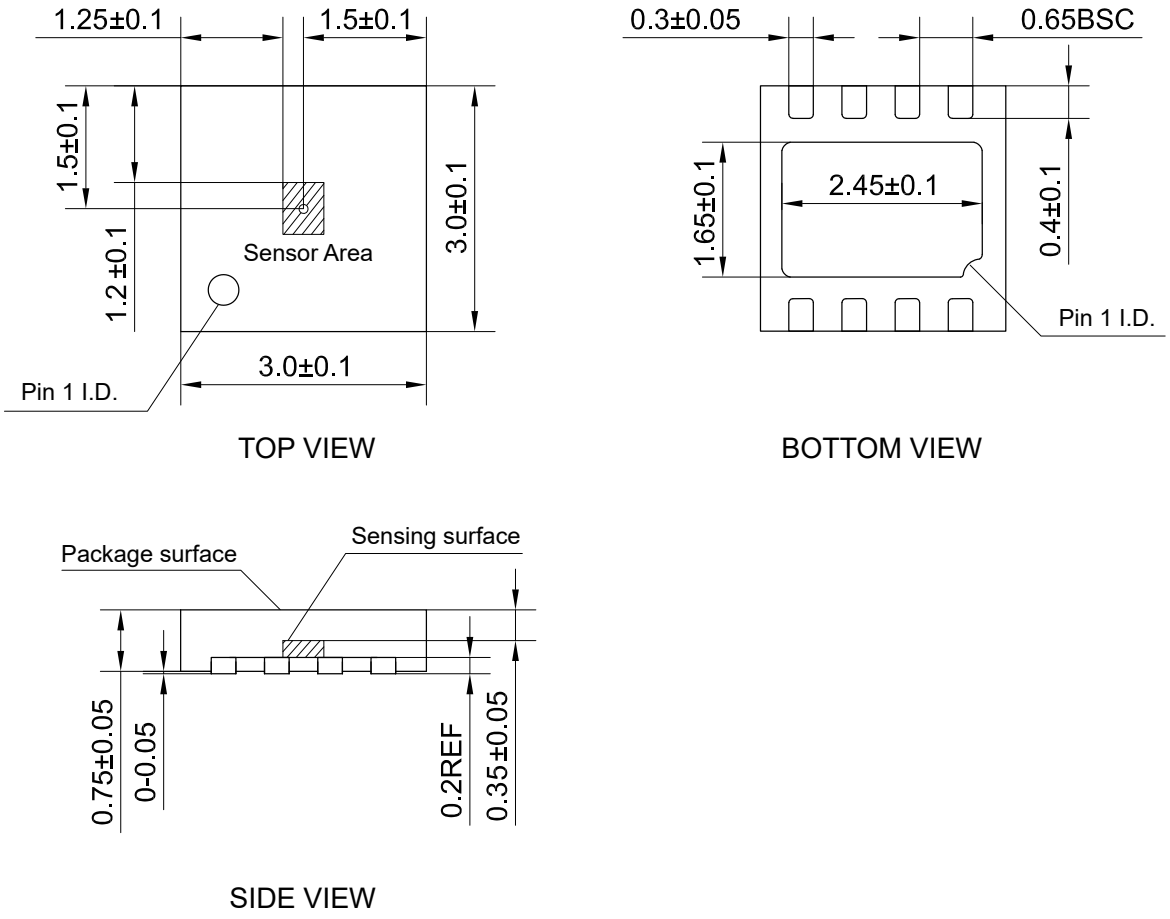


Figure 8. Package outline of DFN8L (unit: mm)

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.

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