

# TMR2615x-AAC

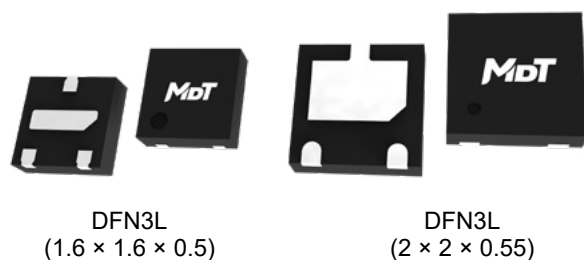
## Low Power Large Range TMR Linear Magnetic Sensor

### 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.

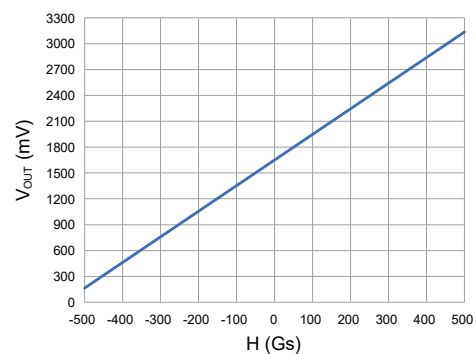


### Features and Benefits

- Tunneling magnetoresistance (TMR) technology
- Supply voltage: 1.71 V to 5 V
- Static current consumption < 300  $\mu$ 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
- Magnetic keyboard
- Consumer electronics



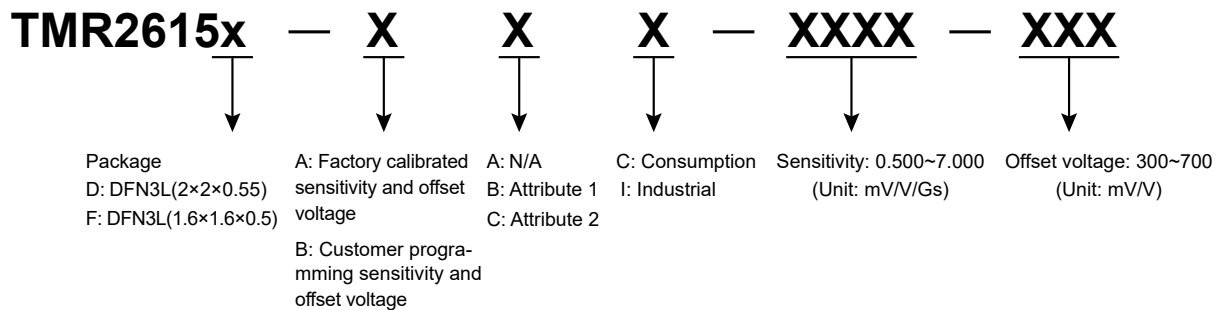
TMR2615x-AAC  $\pm$ 500 Gs Output curve

## Selection Guide

Part Number*	Supply Voltage	Linear Range	Operating temperature	Static Current Consumption	Package	Packing Form
TMR2615D-AAC-XXXX-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-XXXX-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



## Catalogue

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## 1. Functional Block Diagram

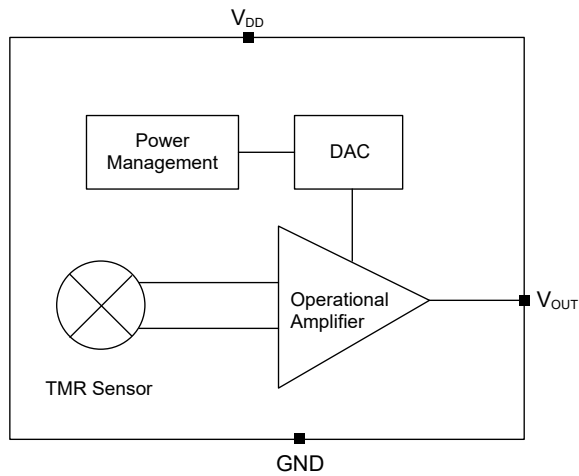


Figure 1. Block Diagram

## 2. Sensing Direction

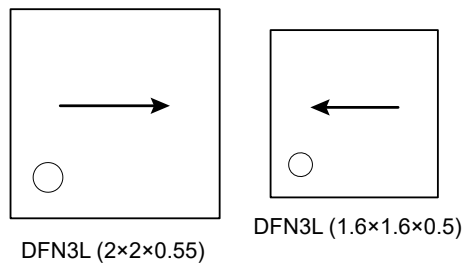
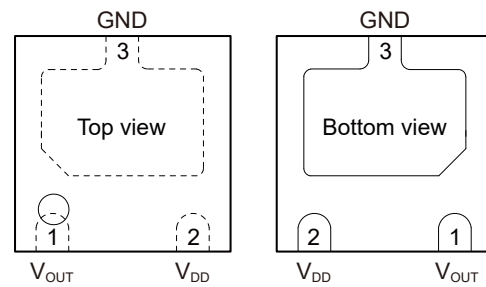
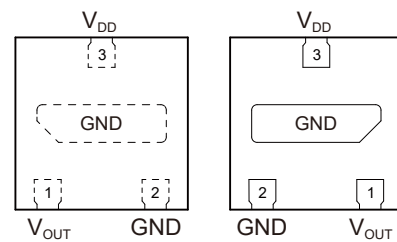


Figure 2. Sensing Direction

## 3. Pin Configuration



DFN3L (2x2x0.55)



DFN3L (1.6x1.6x0.5)

Figure 3. Pin Configuration

Pin Number		Name	Function
DFN3L (2x2x0.55)	DFN3L (1.6x1.6x0.5)		
1	1	V <sub>OUT</sub>	Output voltage
2	3	V <sub>DD</sub>	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	-	$\mu\text{A}$
		$V_{DD} = 3.3\text{ V}$	-	240	-	$\mu\text{A}$
Bandwidth	BW	-3 dB	-	-	30	kHz
Load resistance	$R_L$	-	10	-	-	k $\Omega$
Load conductance	$C_L$	-	-	-	10	nF
Sensitivity	SEN	-	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	in $\pm 500\text{ Gs}$ range	-	2	-	%FS
Hysteresis	HYS	in $\pm 500\text{ Gs}$ range	-	2	-	%FS
Noise	$V_N$	$V_{DD} = 3.3\text{ V}$ , BW = 5 kHz	-	-	10	mV <sub>pp</sub>
Power-on time	$t_{PO}$	-	-	-	100	$\mu\text{s}$

## 6. Output Characteristics

As shown in Figure 4, 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  $-500$  Gs to  $500$  Gs, the linear output voltage range of  $V_{OUT}$  is  $5\% V_{DD}$  to  $95\% V_{DD}$ . Customers can modify the linear range through the adjustment provided by the TMR2615x-AAC.

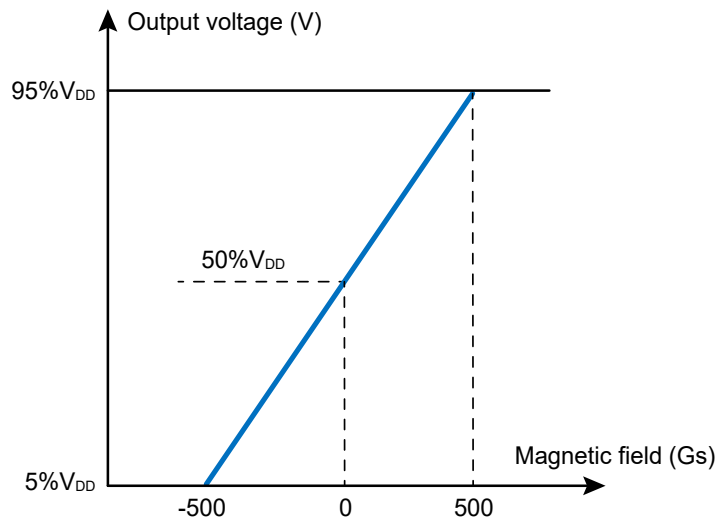


Figure 4. Output voltage versus magnetic field

## 7. Application Circuit

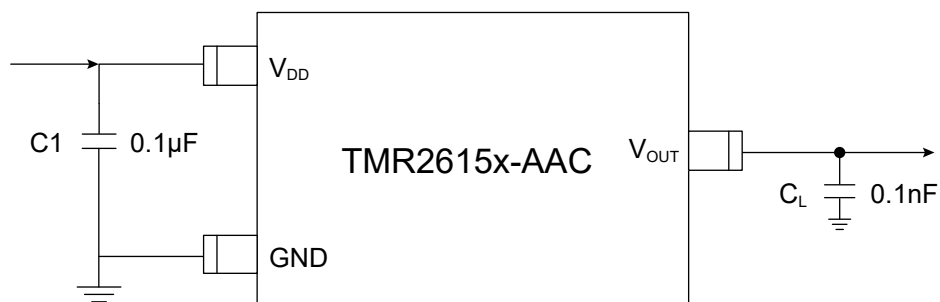


Figure 5. Application circuit diagram

Note: C1 should be as close as possible to the  $V_{DD}$  and GND pins.

## 8. Dimensions

### DFN3L (2×2×0.55) Package

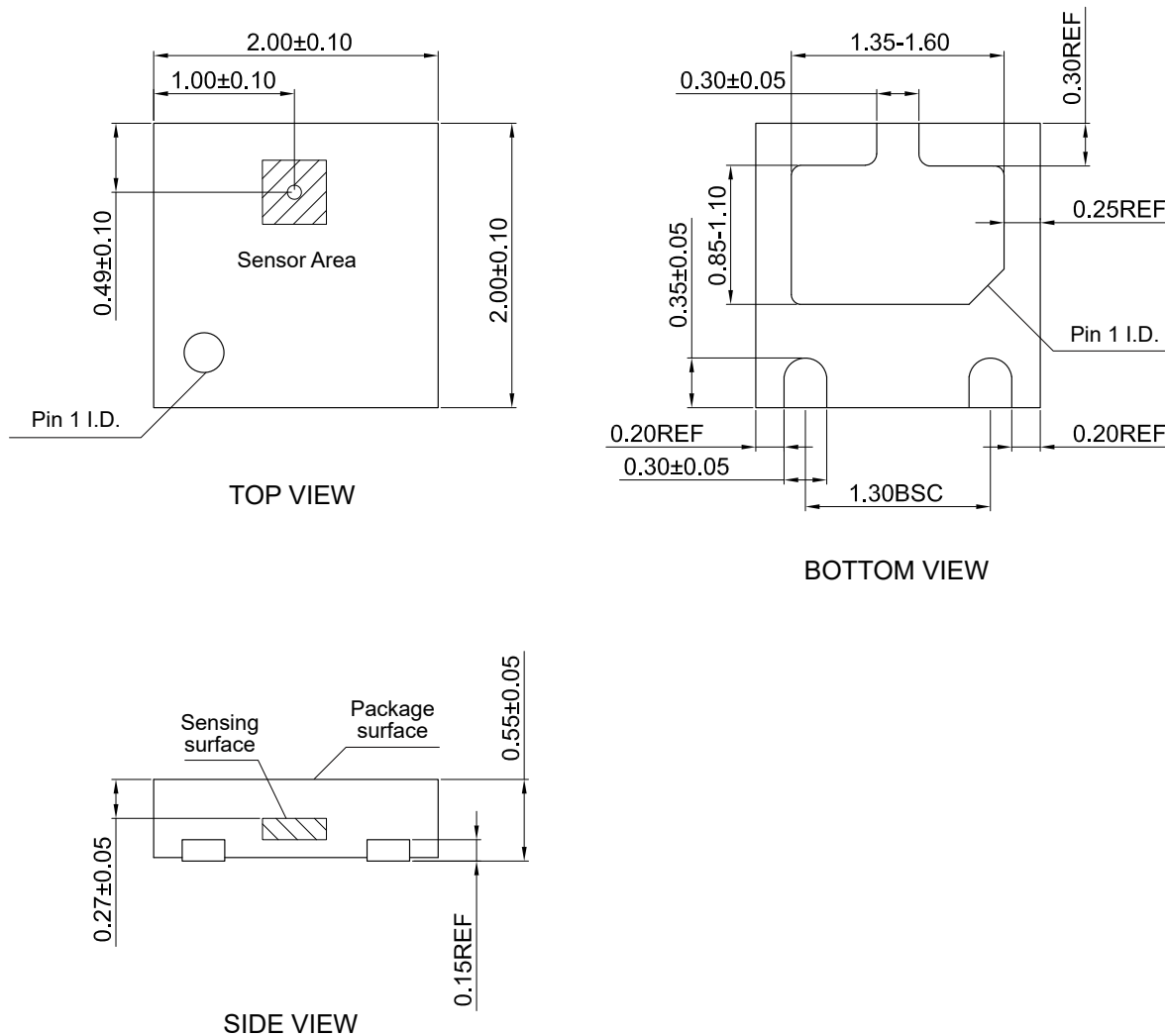


Figure 6. Package outline of DFN3L (2×2×0.55) (unit: mm)

DFN3L (1.6×1.6×0.5) Package

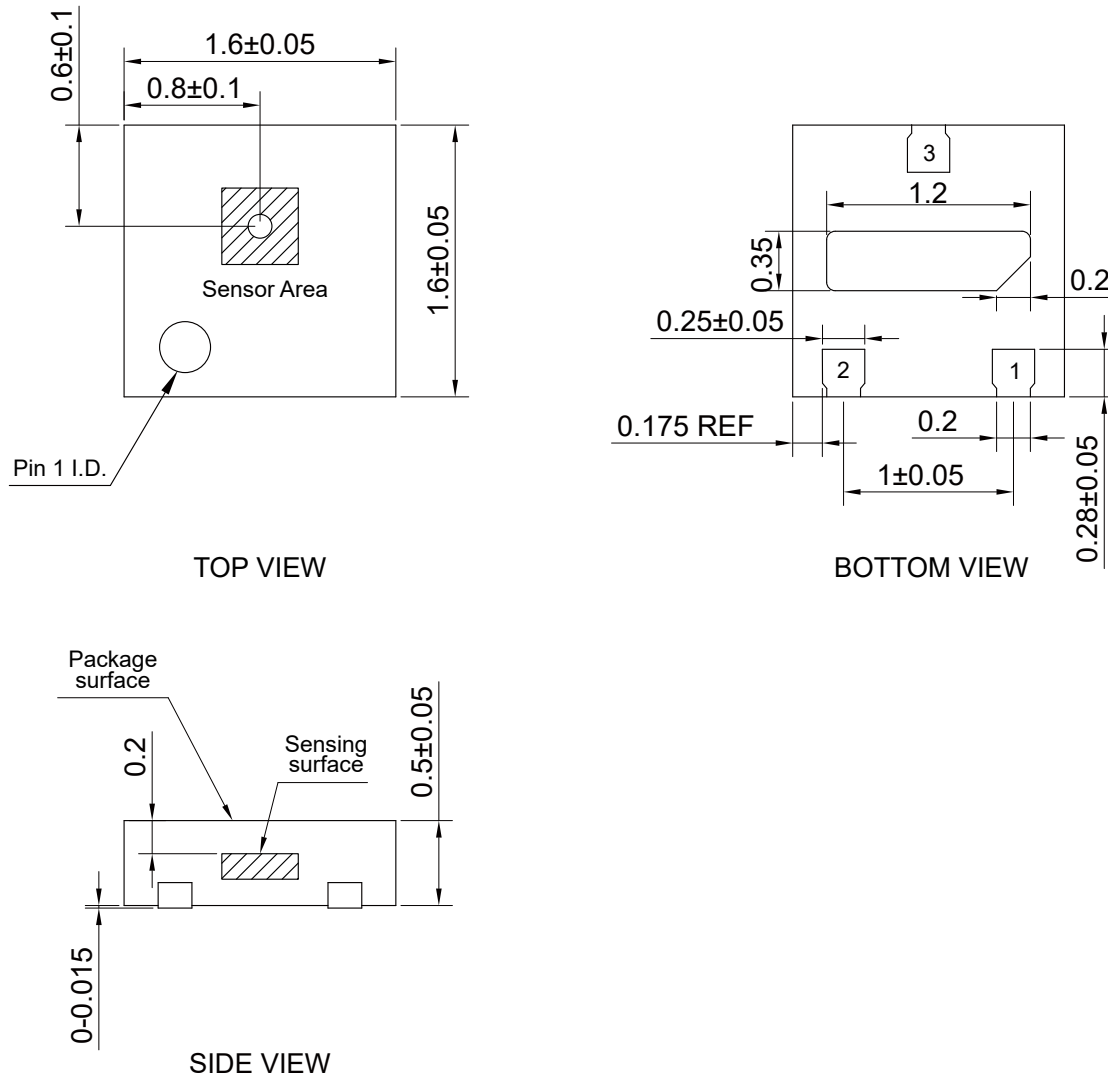


Figure 7. Package outline of DFN3L (1.6×1.6×0.5) (unit: mm)

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