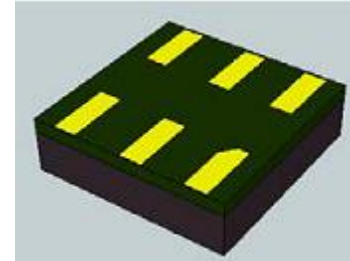


Magnetoresistive Gear Tooth Sensor CY-TMR40XX

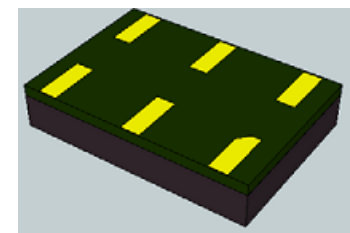
The CY-TMR40XX magnetic gear tooth sensors utilize a unique push-pull Wheatstone bridge design, including one or two Wheatstone full bridges, with four or eight unshielded high sensitivity TMR sensing elements. The Wheatstone bridge creates a differential voltage output with respect to the magnetic field gradient along the sensor's sensitive direction. In the dual-bridge configuration, the two orthogonal Wheatstone full bridges provide sine and cosine voltage signals that can be used to measure both the gear tooth position and the direction of motion. The CY-TMR40XX magnetic gear tooth sensors offer superior performance with high sensitivity to the magnetic field gradient. They can detect very small changes in magnetic field, along with good temperature stability of the output signal.

The CY-TMR40XX magnetic gear tooth sensors are available in 14 different standard spaces of 0.25mm, 0.4mm, 0.50mm, 0.6mm, 0.75mm, 0.8mm, 1.0mm, 1.2mm, 1.4mm, 1.6mm, 1.8mm, 2.0mm, 3.0mm and 4.0mm.

Two types of small form factor LGA packages are available. The package dimensions are 3mm x 3mm x 0.9mm and 3mm x 6mm x 0.9mm.



LGA6L (3x3x0.9)



LGA6L (3x6x0.9)

Features

- Tunnelling Magnetoresistance (TMR) Technology
- High Saturation Point Allowing Operation under Large DC Magnetic Field
- Wide Air-Gap Tolerance
- High Sensitivity to Magnetic Field Gradient
- Capable of Small-Pitch Gear Tooth Detection DC(Zero-Speed) Operation
- Sine/Cosine Signal Outputs with Precise Phase Shift
- Excellent Thermal Stability
- Good Immunity to Environmental Magnetic Field
- Compact Ultra-Thin Package

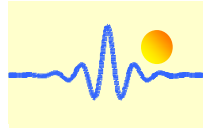
Typical applications

- Gear Tooth Motion, Speed, and Direction Sensing
- Linear and Rotary Speed Sensing
- Linear and Rotary position Sensing
- Linear Magnetic Scales
- Magnetic Encoders

Absolute Maximum Ratings

Parameter	Symbol	Maximum	Unit
Supply Voltage	V_{CC}	7	V
Reverse Supply Voltage	V_{RCC}	7	V
Magnetic Field	H_e	1500	Oe ⁽¹⁾
ESD Voltage	V_{ESD}	4000	V
Operating Temperature	T_A	-40 ~ 150	°C
Storage Temperature	T_S	-50 ~ 150	°C

(1) 1 Oe (Oersted) = 1 Gauss in air = 0.1 millitesla = 79.8 A/m.



Electrical & Magnetic Characteristics ($V_{CC} = 1.0V$, $T_A = 25^\circ C$, Differential Output)

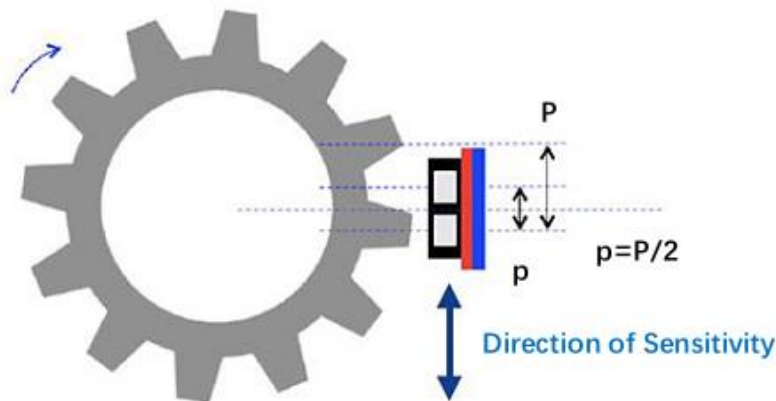
Parameter	Symbol	Conditions	Min	Typ.	Max	Unit
Supply Voltage	V_{CC}	Operating		1	7	V
Supply Current	I_{CC}	Output open		67 ⁽²⁾		μA
Bridge Resistance	R			15 ⁽³⁾		k Ω
Single Resistor Sensitivity	SEN			0.46		% $\Delta R/Oe$
Saturation Field	Hsat			± 70 ⁽⁴⁾		Oe
Linear Range 1	LIN1	LIN $\geq 98\%$		± 20		Oe
Linear Range 2	LIN2	LIN $\geq 95\%$		± 40		Oe
Offset Voltage	V_{OS}		-20		20	mV/V
Hysteresis	Hys	Fit@ $\pm 20Oe$		1		&FS
Maximum Differential Voltage Output	V_{OUTMax}			650		mV/V
Temperature Coefficient of Resistance	TCR	H = 0 Oe		-985		PPM/ $^\circ C$
Temperature Coefficient of Sensitivity	TCC			-1800		PPM/ $^\circ C$

(2) Supply current is determined by the resistance of the sensor.

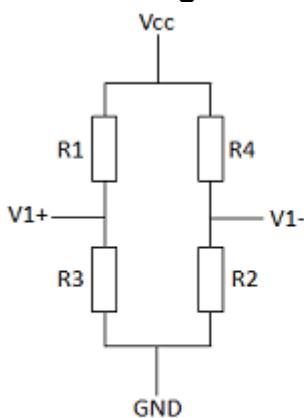
(3) Custom sensor resistance may be available upon request.

(4) The sensors may saturate if the magnetic field exceeds this range. Saturation field can be custom designed to meet special requirements.

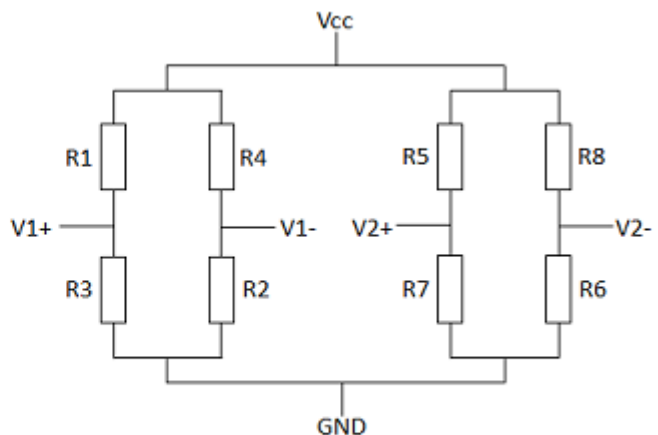
Usage Method



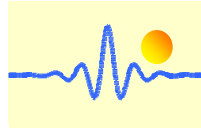
Wheatstone Bridge Connection



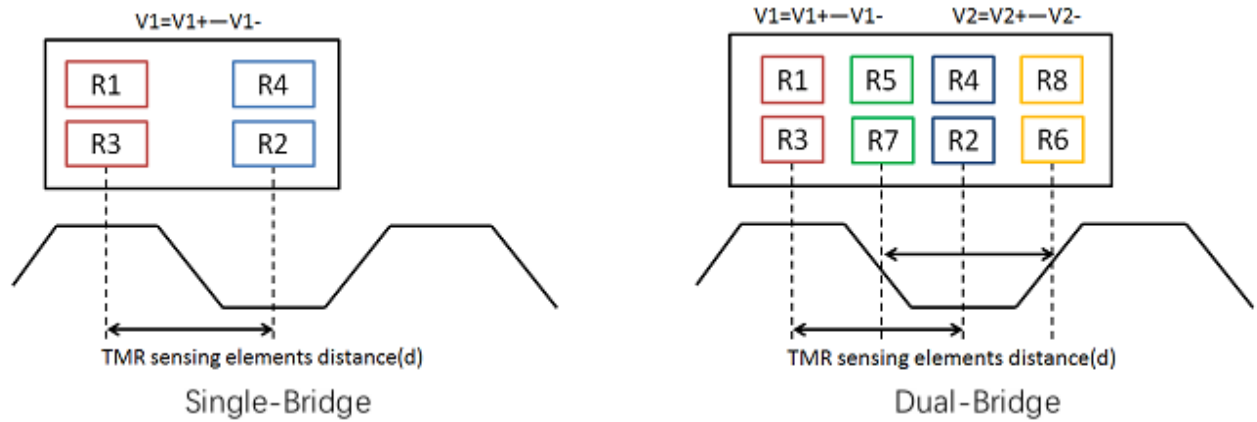
Single-Bridge Configuration



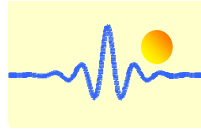
Dual-Bridge Configuration



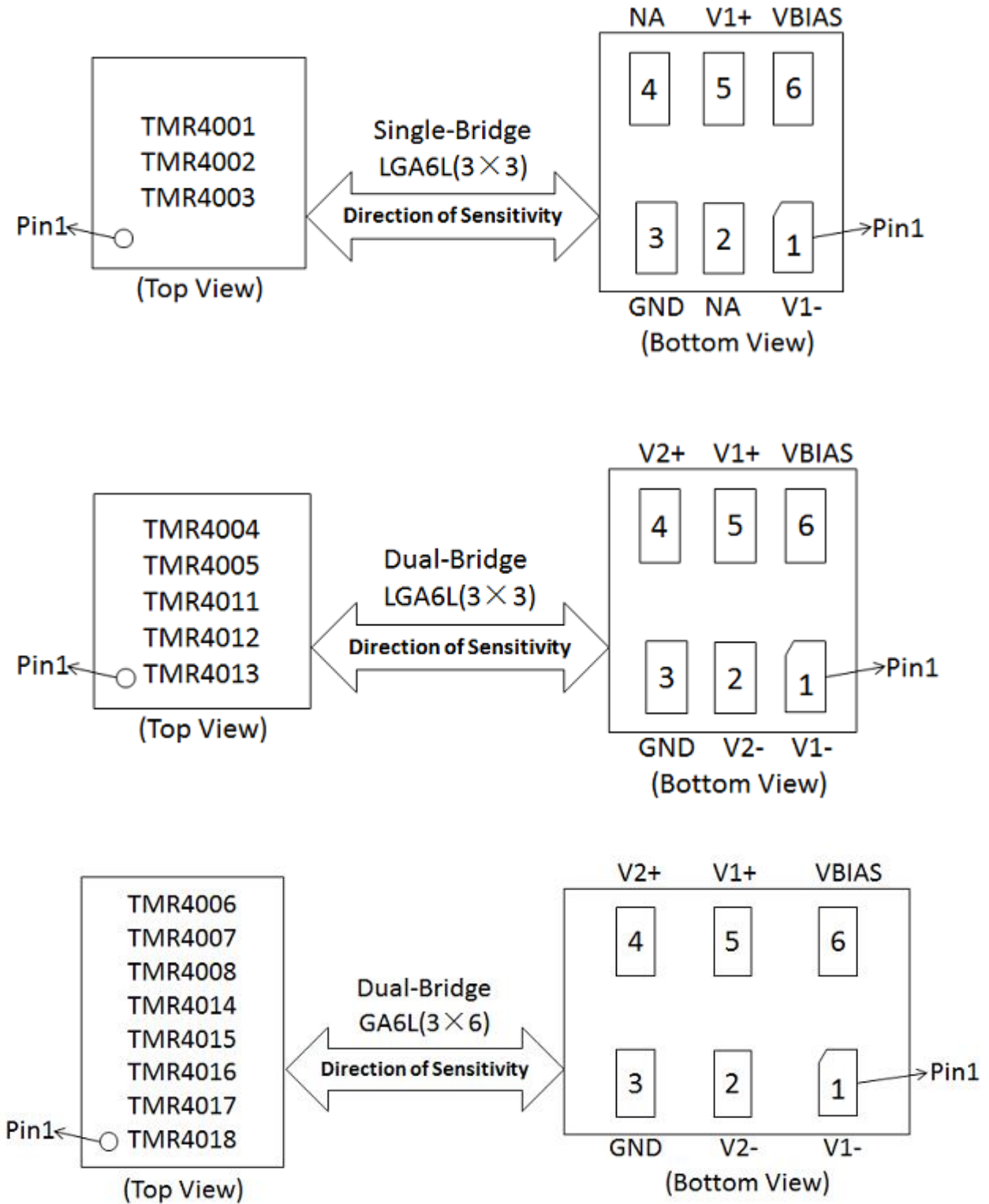
TMR Sensing Elements Layout

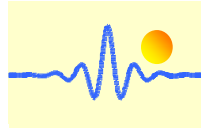


Part Number	Single/Dual Bridge	TMR Element distance d(mm)	Gear Tooth Pitch P(mm)	Package Format
CY-TMR4001	Single	0.25	0.5	LGA6L(3x3x0.9)
CY-TMR4002	Single	0.5	1.0	LGA6L(3x3x0.9)
CY-TMR4003	Single	0.75	1.5	LGA6L(3x3x0.9)
CY-TMR4004	Dual	0.5	1.0	LGA6L(3x3x0.9)
CY-TMR4005	Dual	1	2.0	LGA6L(3x3x0.9)
CY-TMR4006	Dual	2	4.0	LGA6L(3x6x0.9)
CY-TMR4007	Dual	3	6.0	LGA6L(3x6x0.9)
CY-TMR4008	Dual	4	8.0	LGA6L(3x6x0.9)
CY-TMR4011	Dual	0.4	0.8	LGA6L(3x3x0.9)
CY-TMR4012	Dual	0.6	1.2	LGA6L(3x3x0.9)
CY-TMR4013	Dual	0.8	1.6	LGA6L(3x3x0.9)
CY-TMR4014	Dual	1	2.0	LGA6L(3x6x0.9)
CY-TMR4015	Dual	1.2	2.4	LGA6L(3x6x0.9)
CY-TMR4016	Dual	1.4	2.8	LGA6L(3x6x0.9)
CY-TMR4017	Dual	1.6	3.2	LGA6L(3x6x0.9)
CY-TMR4018	Dual	1.8	3.6	LGA6L(3x6x0.9)



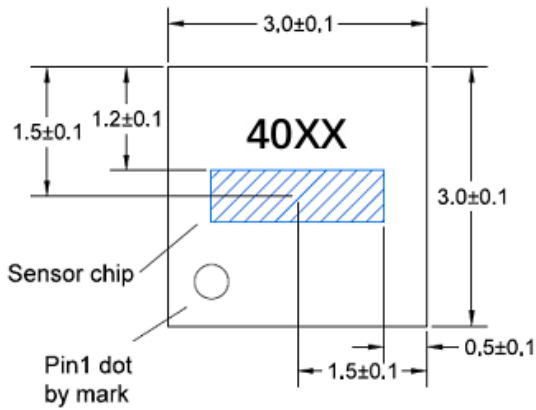
Pin Configuration



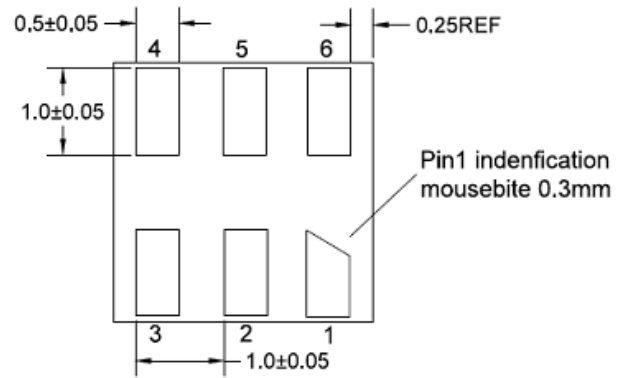


Package Information (Unit: mm) and TMR Sensor Position (Blue shadow)

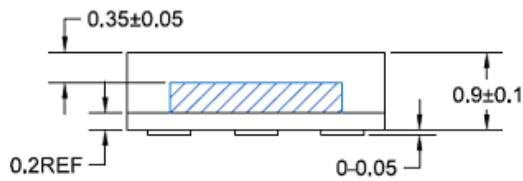
LGA6L(3x3x0.9) Package Drawing



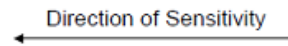
Top View



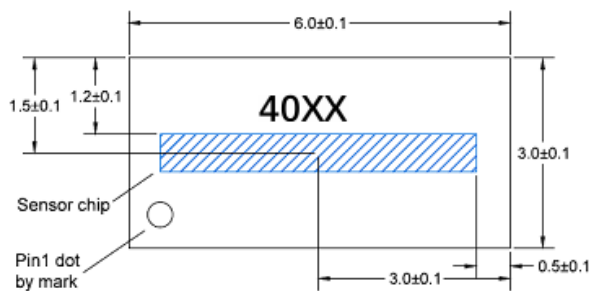
Bottom View



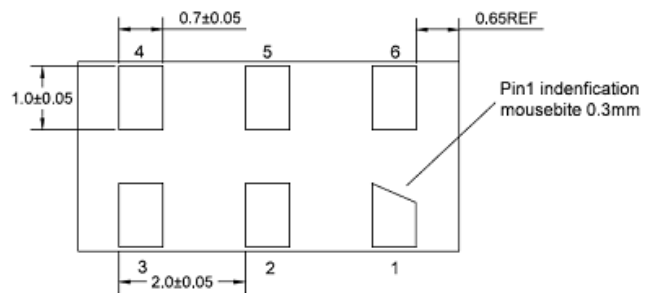
Side View



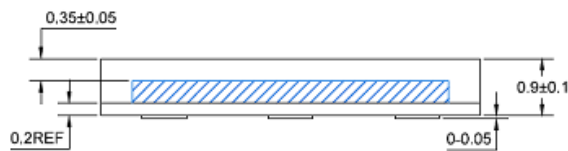
LGA6L(3x6x0.9) Package Drawing



Top View



Bottom View



Side View

