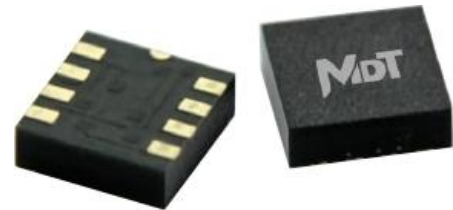


Magnetoresistive Angle Sensor IC CYAS-TM3005

CYAS-TM3005 angle sensor adopts two orthogonal push pull Wheatstone bridge design, and each bridge contains four high sensitivity TMR sensing elements to produce a best in class peak to peak output signal as large as 65% of the supply voltage thereby eliminating many external signal amplifying and processing circuit needed in the applications. The voltage signal output by the two axes of the chip has a sine and cosine relationship with the angle of the magnetic field when a magnet is placed above the CYAS-TM3005 chip to provide an operating magnetic field parallel to the surface of the chip in general angle sensor application. Additionally, the TMR full bridge technology accurately compensates the output against changes in ambient temperature. This high performance CYAS-TM3005 angle sensor is available in packaging form factors of compact LGA8 in 3.0 mm x 3.0mm x 0.75 mm.



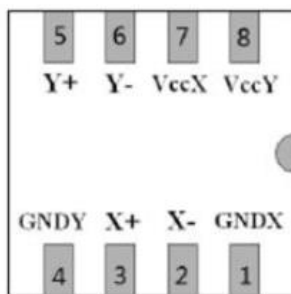
Features

- Tunneling magnetoresistive (TMR) technology
- Large output signal without amplification
- Dual axis 360°angle measurement
- Compatible with a wide range of supply voltages
- Low power consumption
- Large air gap tolerance
- Compact LGA package
- Excellent thermal stability
- ROSH approved: (EU) 2015 / 863

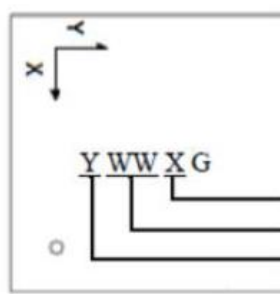
Applications

- Contactless angle sensor
- Rotational speed and direction detection
- Highly accurate angle measurement
- Automotive speed measurement and control
- Rotary position sensors
- Rotary encoders
- Contactless potentiometers
- Valve position sensors
- Knob position sensors

Pin Configuration and Functional Block Diagram

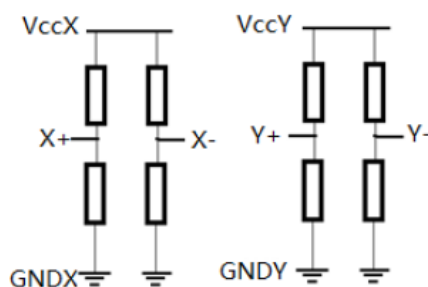


Bottom View



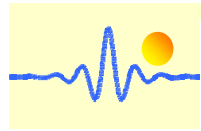
Top View

X: lot code
WW: week code
Y: year code



Bridge Schematic

No	Symbol	Description
1	GNDX	Ground (bridge X)
2	X-	X-bridge negative output
3	X+	X-bridge positive output
4	GNDY	Ground (bridge Y)
5	Y+	Y bridge positive output
6	Y-	Y bridge negative output
7	VccX	Power Supply (X bridge)
8	VccY	Power Supply (Y bridge)



Absolute maximum rating

Parameters	Symbol	Min.	Max.	Unit
Supply Voltage	V _{CC}	-	7	V
External magnetic flux	B	-	300	mT
Operating ambient temperature	T _A	-40	85	°C
Storage ambient temperature	T _{STG}	-40	105	°C
Electrostatic protection	ESD(HBM)	-	4000	V

Electromagnetic parameters

Test conditions V_{CC}=5.0V and T_A=25°C (unless otherwise specified)

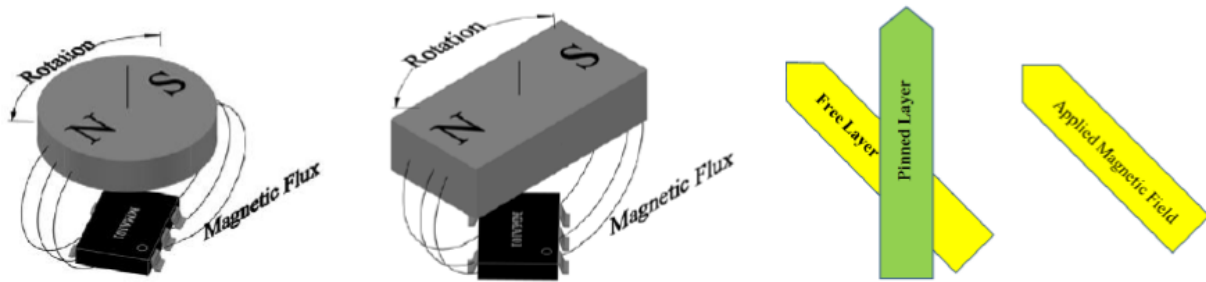
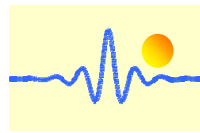
Parameters	Symbol	Test conditions	Min	Typ.	Max.	Unit	
Supply Voltage	V _{CC}	Operating		3.3	7	V	
Bridge resistance	CYAS-TM3005L	R _{OUT}	Operating	2	6 ⁽¹⁾	9	kΩ
	CYAS-TM3005			100	140	190	
	CYAS-TM3005H			1400	1900	2800	
Peak voltage	V _{peak}	Operating	-	340 ⁽²⁾	-	mV/V	
Offset voltage	V _{OS}	Angle=0°	-10.0	-	10.0	mV/V	
Magnetic field	H	Operating	20		80	mT	
Orthogonality Error	OE	Operating	-	±0.6		°	
temperature coefficient of peak voltage	TCV _{peak}	T _A = -40°C ~ 85°C		-970		ppm/°C	

(1) The resistance of single axis between V_{CC} and GND, customizable upon request

(2) V_{peak} is the amplitude of the output sinusoidal voltage, which equals to half of the peak-to-peak value (V_{P-P})

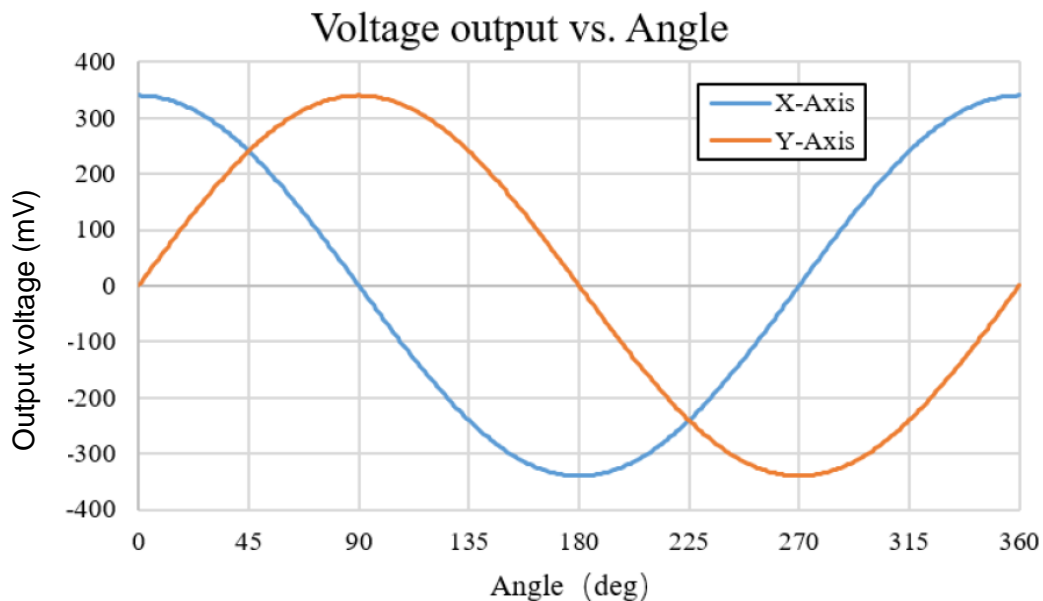
Application Information

A small dipole magnet, placed above the CYAS-TM3005, can provide a magnetic field in any desired orientation parallel to the plane of the CYAS-TM3005 package. The magnetic field is detected by the TMR sensors in the CYAS-TM3005 which are comprised of two ferromagnetic layers. One layer is a “pinned layer” that is not affected by the magnetic field, and the other is “free layer,” which has a magnetization that aligns parallel to the applied magnetic field. Because the TMR effect produces a resistance that is proportional to the sine or cosine of the angular difference between the free and pinned layer magnetization orientations, the sensor output voltage depends sinusoidally on the angle of the applied magnetic field, thereby providing a true 360° measurement of the orientation of the magnetic field.



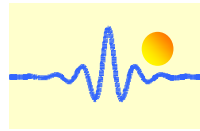
Typical Output Characteristics

The following chart shows a typical sensor output as a function of the angle of the applied magnetic field using a 6mm diameter, 2.5mm thick magnet under power supply of 1V DC.

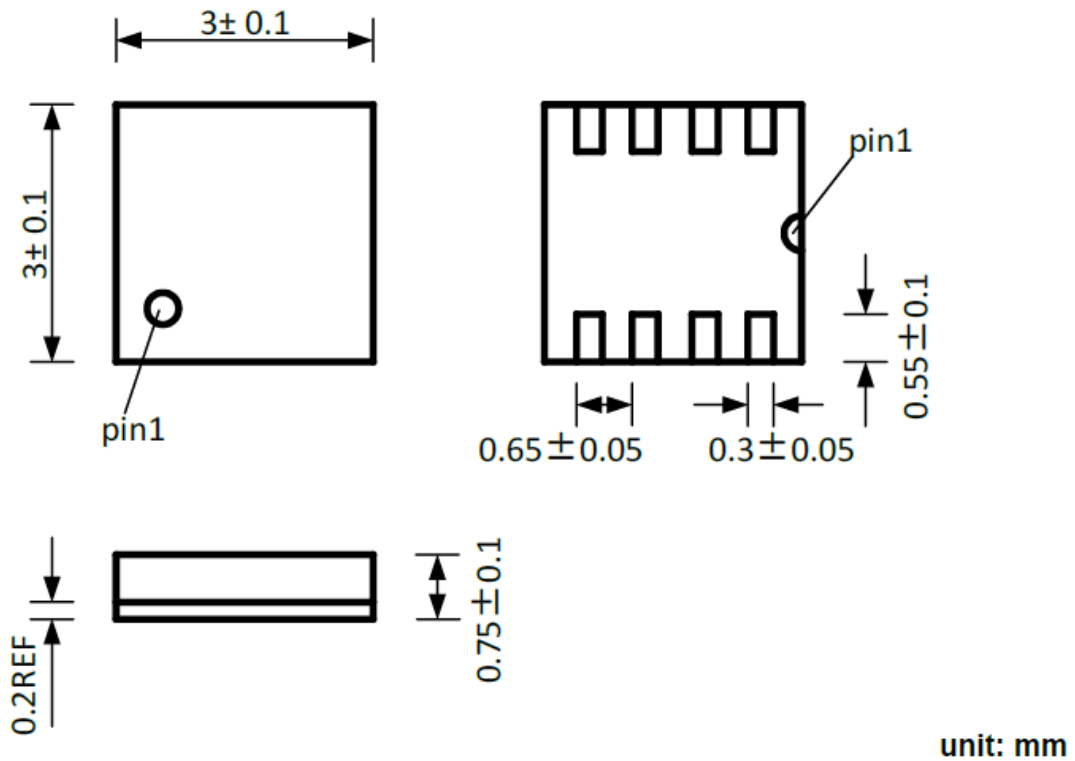


Recycling

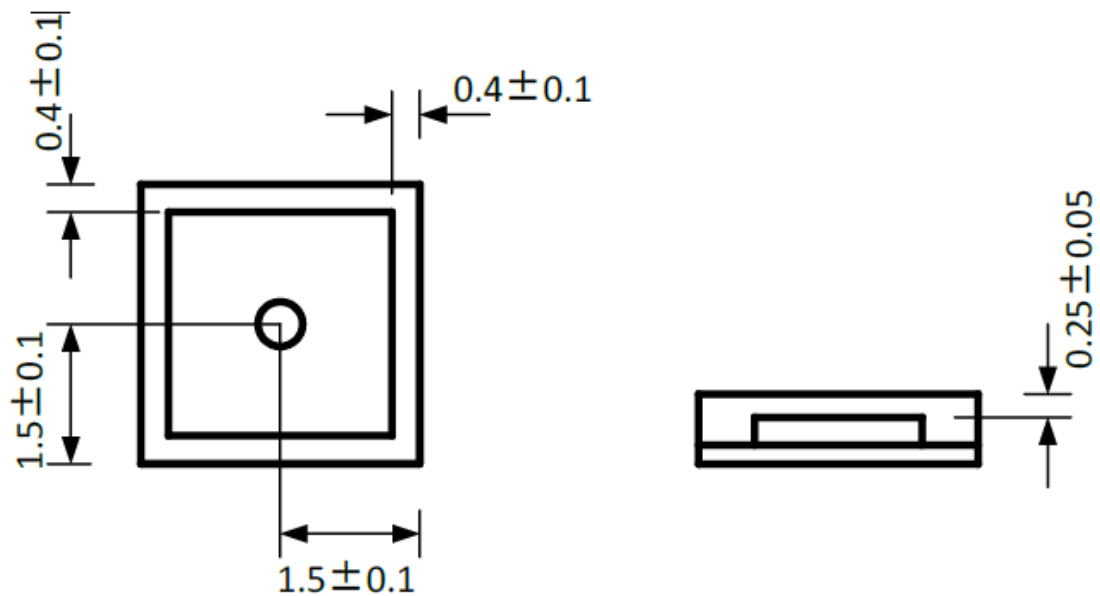
The product in this document needs to be handed over to a qualified solid waste management services company for recycling in accordance with relevant regulations on waste classification after the end of the product life.



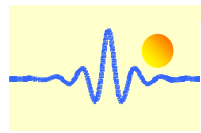
Package Information



Active Area Positioning



Top and side view (unit: mm)



Notes

- TMR chips are sensitive devices, so special care should be taken to protect them from static electricity during use and storage.
- The mechanical stress applied to the device housing and leads should be minimized during soldering and use.
- It is recommended that the soldering temperature does not exceed 350°C and the duration does not exceed 5 seconds.
- To ensure the safety and stability of TMR ICs, long-term use outside the parameter range is not recommended.

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