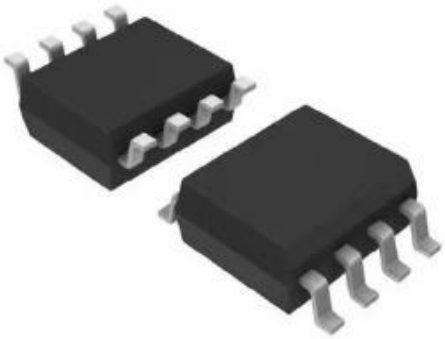
ChenYang Technologies GmbH & Co KG

Magnetoresistive Angle Sensor IC CYAS-AM100

The CYAS-AM100 is an angle sensor IC based on anisotropic magnetoresistance (AMR) technology. It generates an analog output voltage that varies with the direction of the magnetic flux passing over the sensor surface. The chip contains an internal Wheatstone bridge, which operates in saturation mode to produce orthogonal sine and cosine signals for angle measurement over a 180° range.
The IC has a wide operating voltage range and temperature range. Together with the corresponding signal conditioning circuit, it can be used in position sensing, speed and direction detection systems.
The CYAS-AM100 is available in a SOP8 package with an operating temperature range of -40 to 125°C and is RoHS compliant.



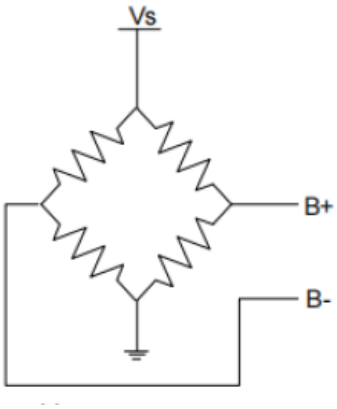
Features

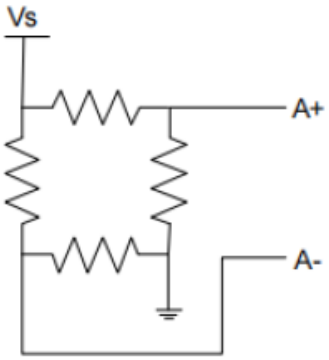
- Non-contact angle measurement
- Based on AMR sensing technology
- Operating voltage 12V
- Temperature range -40°C to 125°C
- ESD (HBM) 5kV
- ROSH approved: (EU) 2015 / 863

Applications

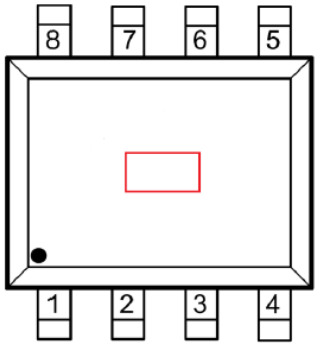
- Contactless angle sensor
- Rotational speed and direction detection
- Highly accurate angle measurement
- Motor control
- Robot control
- Automotive speed measurement and control

Functional diagram





Pin arrangement



No	Symbol	Description
1	B-	B-bridge negative output
2	A-	A-bridge negative output
3	NC	NC not connected
4	Vs	Supply Voltage
5	B+	B bridge positive output
6	A+	A bridge positive output
7	NC	NC not connected
8	GND	Ground

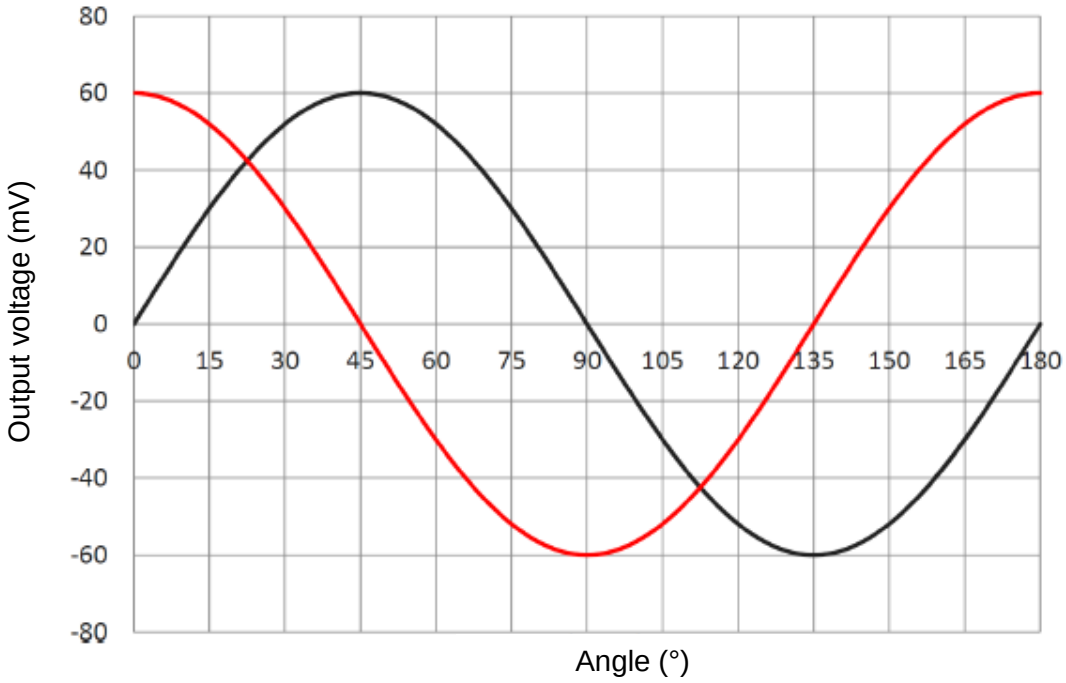
Markt Schwabener Str. 8
D-85464 Finsing
Germany

Tel.: +49 (0)8121 – 2574100
Fax: +49 (0)8121– 2574101
Email: info@cy-sensors.com
http://www.cy-sensors.com

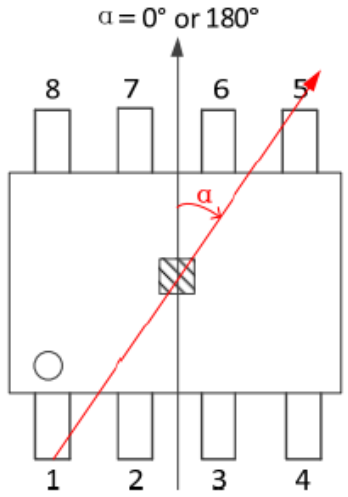
When the external magnetic field rotates clockwise, the outputs A and B produce a cosine waveform and a sine waveform, respectively, as shown in the following equation:

$$V_{outA}(\alpha) = \frac{V_{amp}}{2}\cos(2\alpha)$$

$$V_{outB}(\alpha) = \frac{V_{amp}}{2}\sin(2\alpha)$$



Output curve of CYAS-AM100 at room temperature with magnet rotating clockwise from top to bottom (Red curve: Bridge A output; Black curve: Bridge B output)



Definition of magnetic field rotation direction and zero degree position

Installation schematic of CYAS-AM100 and magnet

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Absolute maximum rating

Parameters	Symbol	Min.	Max.	Unit
Supply Voltage	Vcc	-12	12	V
Power consumption	P_D		200	mW
Operating ambient temperature	T_A	-40	125	°C
Magnetic flux	B	20	1000	mT
Electrostatic protection	ESD(HBM)	-1000	1000	V

Electromagnetic parameters

Test conditions Vcc=5.0V and T_A=25°C (unless otherwise specified)

Parameters	Symbol	Test conditions	Min	Typ.	Max.	Unit
Supply Voltage	V_{CC}			5.0	12	V
Supply current	I_{CC}			2.8		mA
Bridge resistance	R_{OUT}		1.55	1.77	1.92	kΩ
Sensitivity	Sens	S=Vamp*π/180	1.81	2.06	2.21	mV/°
Offset voltage	V_{OS}		-2.0		2.0	mV/V
Synchronism	K	(VampA / VampB) x100	98		104	%
Orthogonality Error	OE		-1.0		1.0	°
Output amplitude temperature coefficient	TCA			-3200		ppm/°C
Bridge resistance temperature coefficient	TCR			2700		ppm/°C
Output amplitude temperature drift	Vampd	T_A = -40°C ~ 125°C	-40		29	%
Offset Voltage Temperature Drift	Vosd	T_A = -40°C ~ 125°C	-0.30		0.30	mV/V
Output amplitude (peak-to-peak)	Vamp		97	118	129	mV
Frequency Bandwidth (-3dB)	Fbw		0		4.0	MHz

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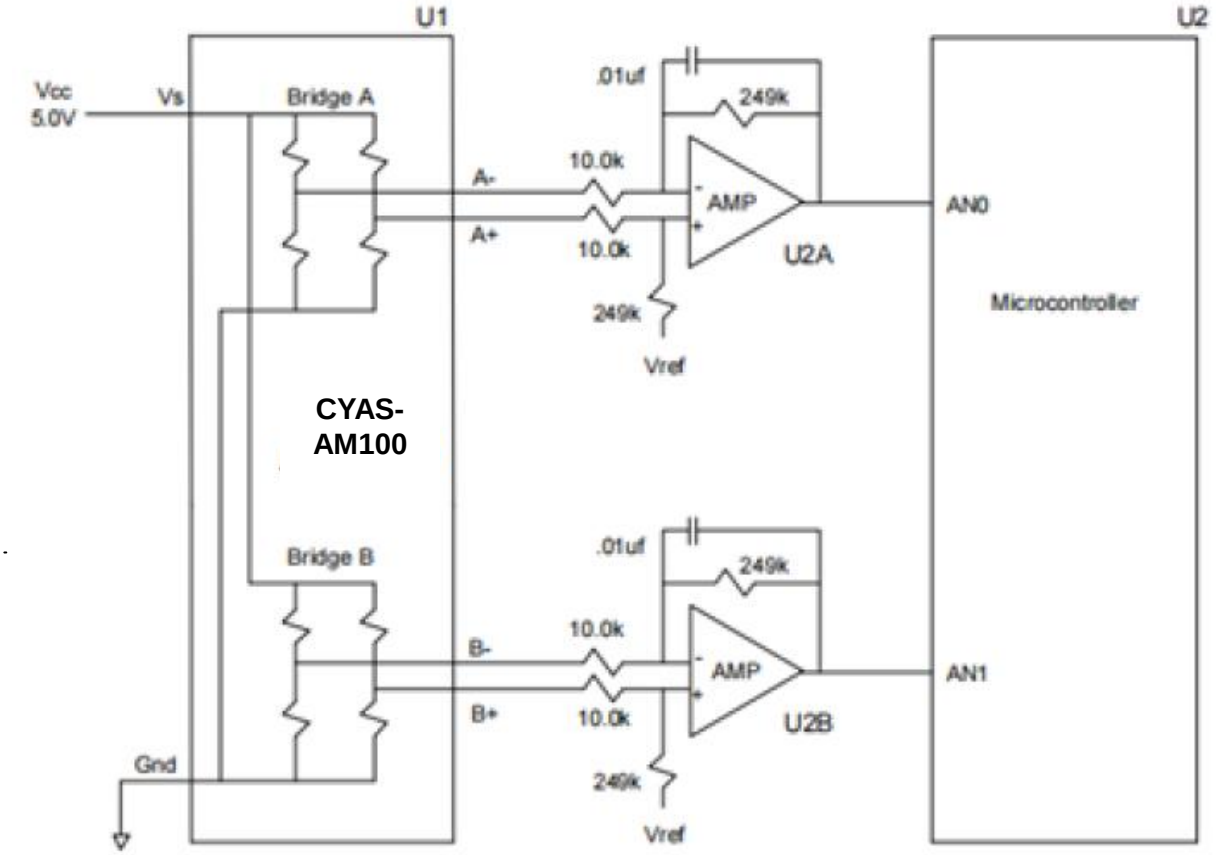
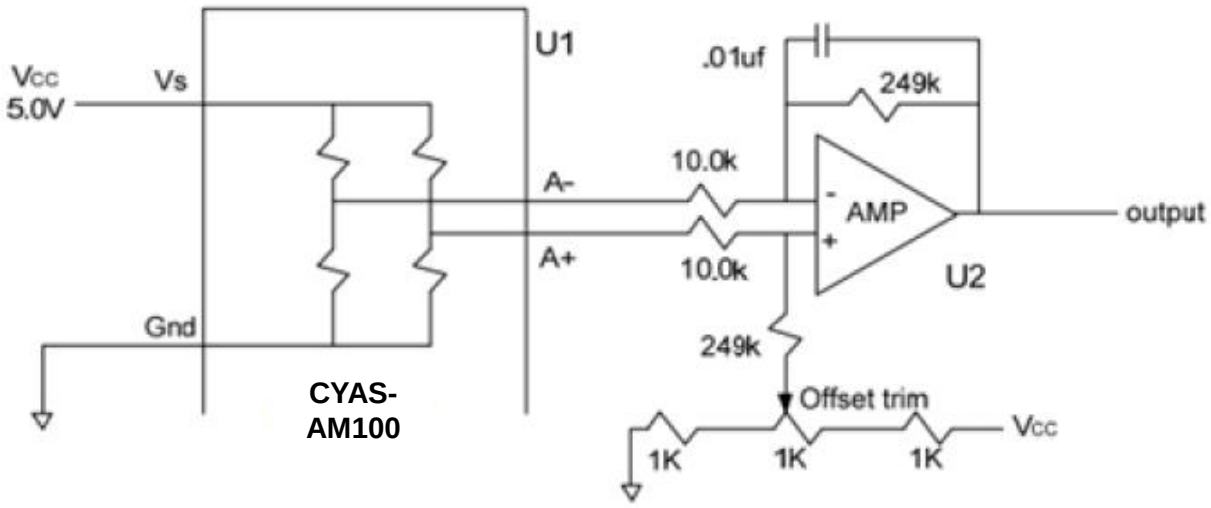
Typical application circuit



CYAS-AM100 connected with differential amplifier circuit



CYAS-AM100 external bias correction circuit

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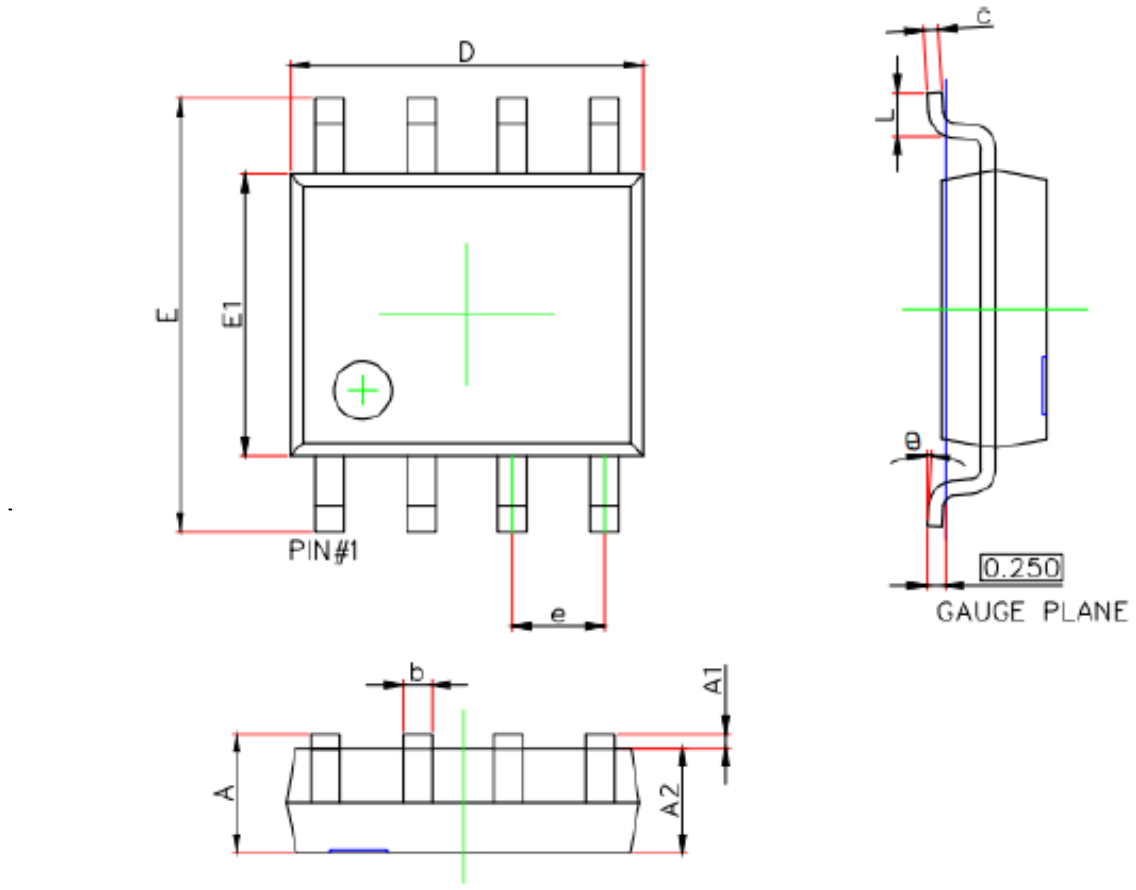
Package Information



symbol	dimensions(mm)		dimensions (inches)	
	Min.	Max.	Min.	Max.
A	1.35	1.75	0.053	0.069
A1	0.10	0.25	0.004	0.010
A2	1.35	1.55	0.053	0.061
b	0.33	0.51	0.013	0.020
c	0.17	0.25	0.007	0.010
D	4.80	5.00	0.189	0.197
e	1.27(BSC)		0.050(BSC)	
E	5.80	6.20	0.228	0.244
E1	3.80	4.00	0.150	0.157
L	0.40	1.27	0.016	0.050
θ	0°	8°	0°	8°

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Notes

- AMR 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 AMR ICs, long-term use outside the parameter range is not recommended.

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Author and Contact Info:

Dr.-Ing. habil. Jigou Liu
ChenYang Technologies GmbH & Co. KG
Markt Schwabener Str. 8
85464 Finsing,
Germany
Tel. +49-8121-2574102,
Fax: +49-8121-2574101
Email: jigou.liu@chenyang-ism.com