

Catalogue

Differential Magneto-resistive Sensors

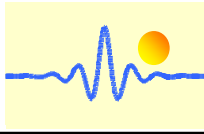
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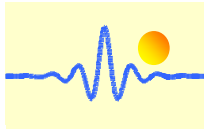
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Differential Magneto-resistive Sensor CY-DMR-01H and CY-DMR-02H

Features

- Sensing over wide rotation speed range
- Robust metallic or plastic housing
- Signal amplitude is speed independent
- Biasing magnet built in
- Best suited for harsh environments

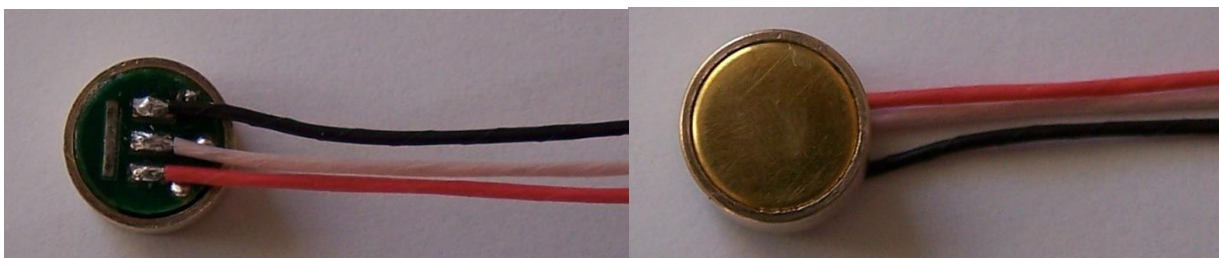
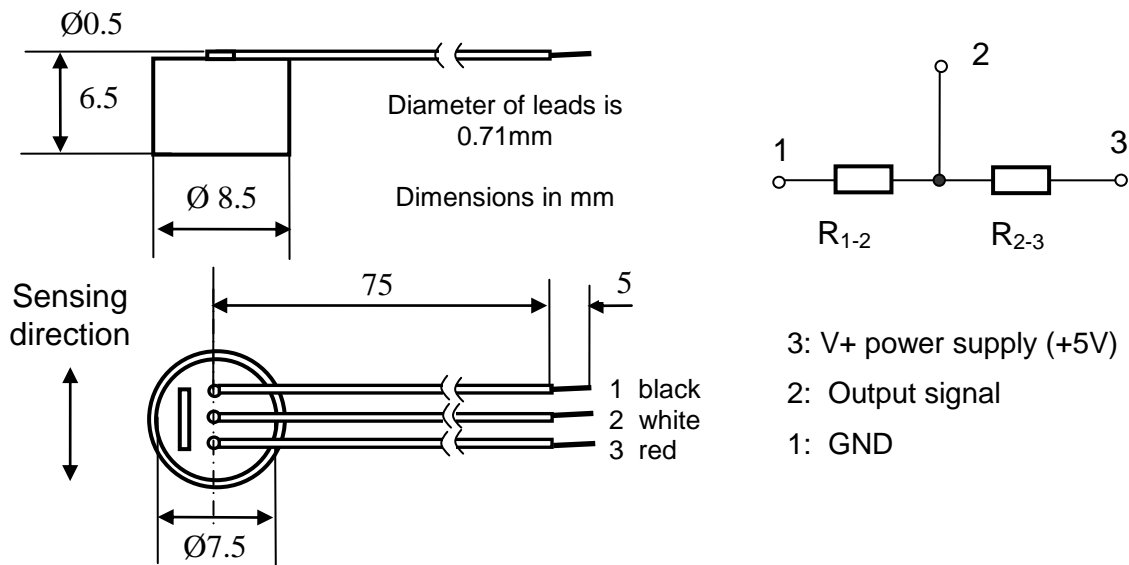
Typical applications

- Speed detection
- Position detection
- Rotation detection
- Angle encoder
- Linear position sensing

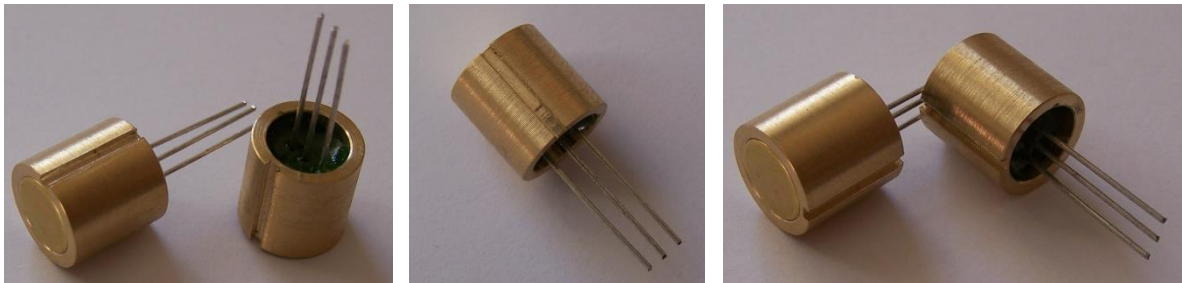
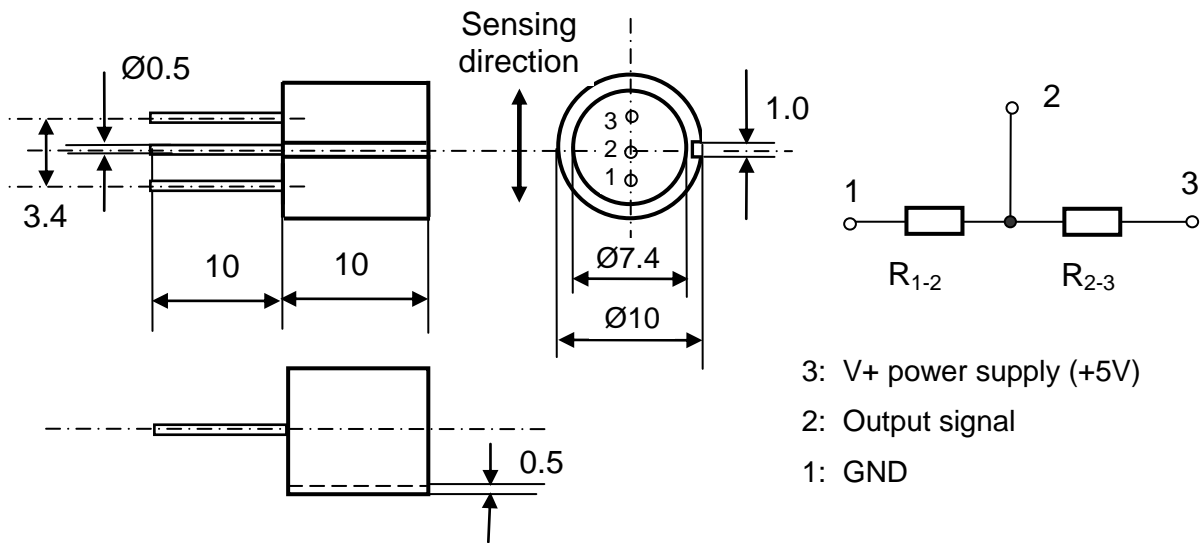
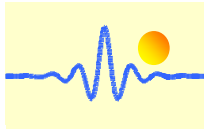
The differential magneto-resistive sensors CY-DMR-01, CY-DMR-01H, CY-DMR-02 and CY-DMR-02H consist of two series coupled magneto resistors (D-type InSb/NiSb semiconductor resistors whose value can be magnetically controlled), which are mounted onto an insulated ferrite substrate. The sensors are encapsulated in a metallic or plastic package and each of them has 3 connection terminals. The basic resistance of the total system is from $2 \times 120\Omega$ to $2 \times 300\Omega$. A permanent magnet, which supplies a biasing magnetic field, is fixed on the base of the sensor.

Outlines

Case Style A: $\varnothing 8.5 \times 6.5 \text{mm}$



Case Style B: $\varnothing 10 \times 10 \text{mm}$

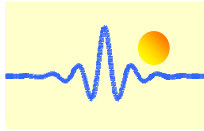


Part number

Part number	Case style	Outline	Cross reference
CY-DMR-01H-A	A	Ø8.5x6.5mm	Infineon FP212D250-22
CY-DMR-01H-B	B	Ø10x10mm	Infineon FP210D250-22
CY-DMR-02H-A	A	Ø8.5x6.5mm	Infineon FP212L100-22
CY-DMR-02H-B	B	Ø10x10mm	Infineon FP210L100-22

Specifications

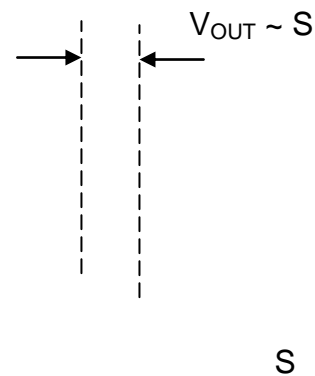
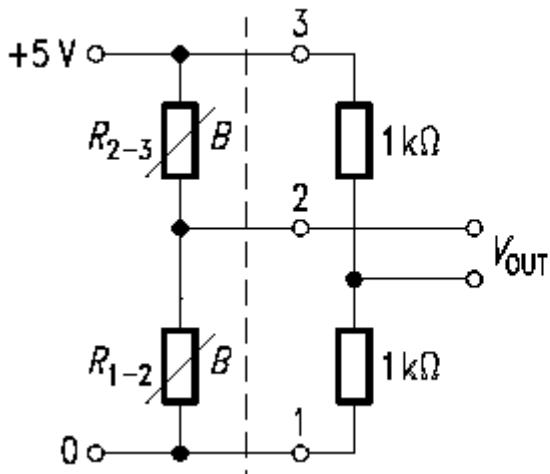
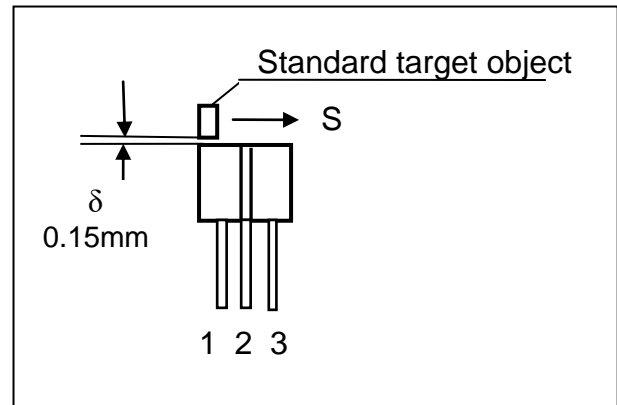
Maximum power supply V_{max}		10V DC
Nominal power supply		5V DC
Total resistance R_{1-3} ($\delta=\infty$, $I \leq mA$, $t=25^\circ C$)	CY-DMR-01H	900 Ω – 1600 Ω
	CY-DMR-02H	220 Ω – 660 Ω
Center symmetry $M=100\%$ ($R_{1-2}-R_{2-3}$)/ R_{1-2} ($\delta=\infty$)		$\leq 10\%$
Offset voltage (at V_{in} and $\delta=\infty$)		$\leq 130mV$
Open circuit output voltage $V_{out pp}$ (at V_{in} and $\delta=0.15mm$)	CY-DMR-01H	$\geq 900mV$
	CY-DMR-02H	$\geq 1000mV$
Cut-off frequency		$> 20kHz$
Operating temperature	CY-DMR-01H	$-30^\circ C \sim +100^\circ C$
	CY-DMR-02H	$-30^\circ C \sim +100^\circ C$
Storage temperature	CY-DMR-01H	$-40^\circ C \sim +100^\circ C$
	CY-DMR-02H	$-40^\circ C \sim +100^\circ C$



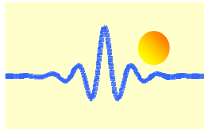
Standard target object: 1.8x5x4mm (1.8x5mm face moves in the sensing direction of the sensor).

Measurement Arrangement

A measuring bridge is used for applications of the magnetoresistive sensors CY-DMR-01, CY-DMR-01H, CY-DMR-02 and CY-DMR-02H. The resistance of one sensor is changed by approaching a small soft iron part (standard target object) close to it. As result an output voltage change of measuring bridge is caused by the resistance change (see below).



To convert small distance into a proportional electric signal, one can use a small soft iron part with definite width (e.g. $b=1.8\text{mm}$) to move over the face of the sensor. A linear signal up to 1.5mm can be obtained in this way. The sinusoidal signal gives a voltage output proportional to the distance in the zero crossover region.



Differential Magneto-resistive Sensor CY-DMR-03

Features

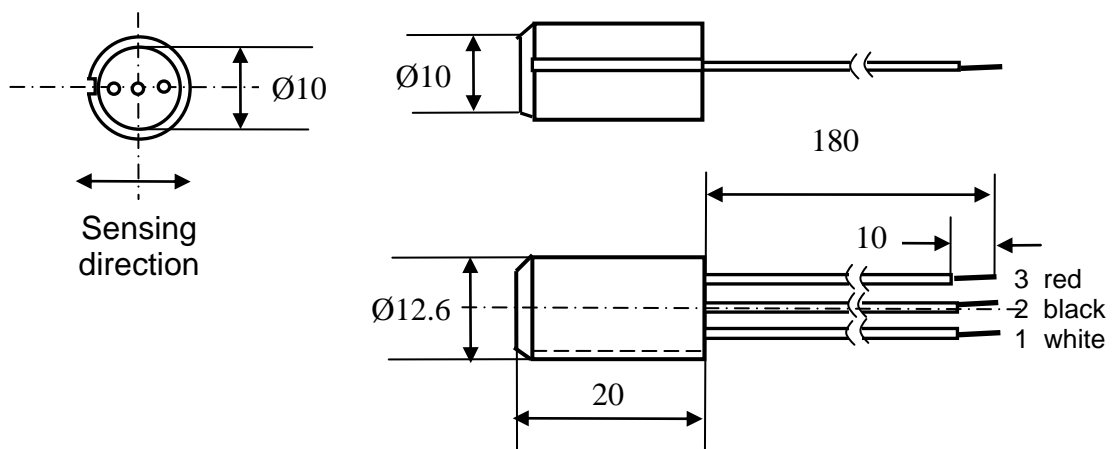
- Sensing over wide rotation speed range (0~100kHz)
- Robust metallic or plastic housing
- Signal amplitude is speed independent
- Biasing magnet built in
- Best suited for harsh environments

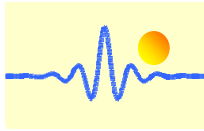
Typical applications

- Rotation speed detection
- Rotation position detection
- Proximity Switch
- Angle encoder
- Linear position sensing

The differential magneto-resistive sensor CY-DMR-03 consists of two series coupled magneto resistors (D-type InSb/NiSb semiconductor resistors whose value can be magnetically controlled), which are mounted onto an insulated ferrite substrate. The sensor is encapsulated in a metallic package and has 3 connection terminals. The basic resistance of the total system is $2 \times 250\Omega$. A permanent magnet, which supplies a biasing magnetic field, is fixed on the base of the sensor.

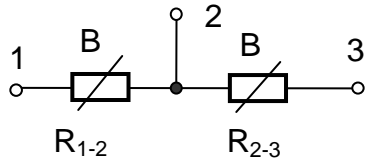
Sensor Outline





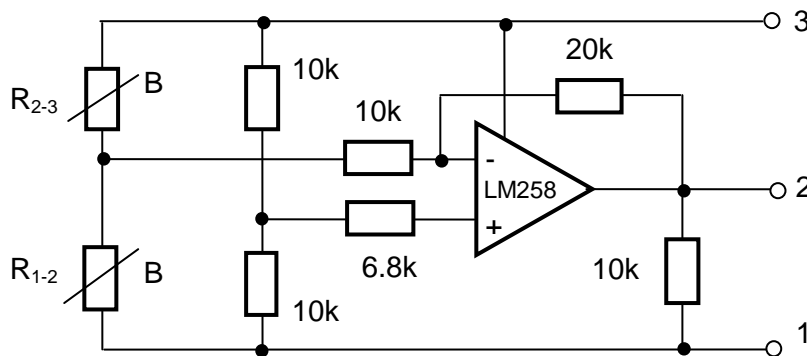
Sensor Circuits

a) Without Amplifier



3: V+ power supply (+5V),
2: V_{out} Output signal,
1: GND

b) Built-In Inner Amplifier



3: V+ (+5V),
2: V_{out} Output signal,
1: GND

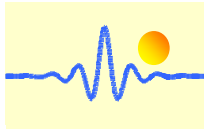
Specifications

Part numbers	CY-DMR-03A	CY-DMR-03B
Built-in Inner amplifier	no	yes
Maximum power supply V _{max}	10V DC	5.5V DC
Nominal power supply	5V DC	5V DC
Inner total resistance R ₁₋₃ (δ=∞, I≤mA, t=25°C)	700 Ω – 1500 Ω	700 Ω – 1500 Ω
Center symmetry M=100% (R ₁₋₂ -R ₂₋₃)/R ₁₋₂ (δ=∞)	≤10%	≤10%
Offset voltage (at Vin and δ=∞)	≤ 130mV	≤ 130mV
Open circuit output voltage V _{out pp} (at Vin and δ=0.15mm)	≥1100mV	3500mV
Frequency range	0-100kHz	0-100kHz
Operating temperature	-20°C ~ +80°C	-20°C ~ +80°C
Storage temperature	-40°C ~ +85°C	-40°C ~ +85°C

Standard target object: 1.8x5x4mm (1.8x5mm face moves in the sensing direction of the sensor).

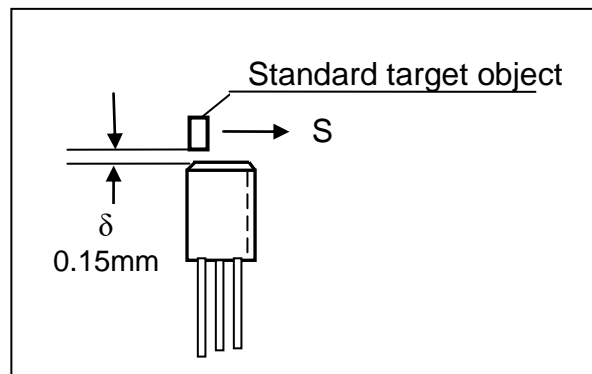
Cross Reference

Part number	Cross reference
CY-DMR-03A	MuRata FR05CM21AR
CY-DMR-03B	---

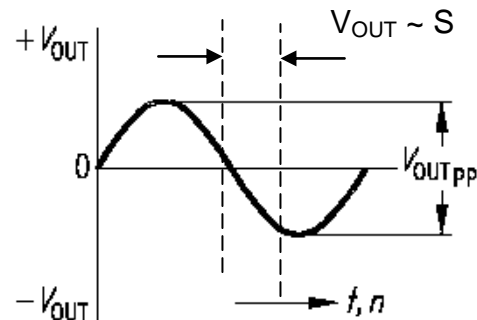
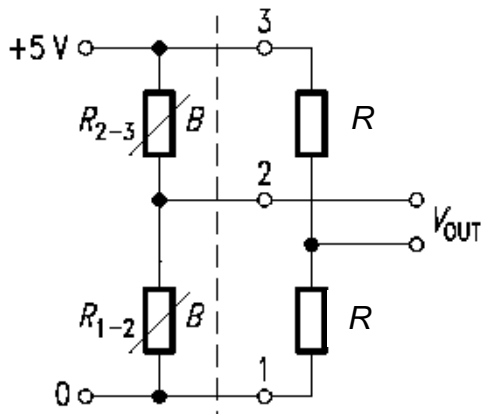


Measurement Arrangement

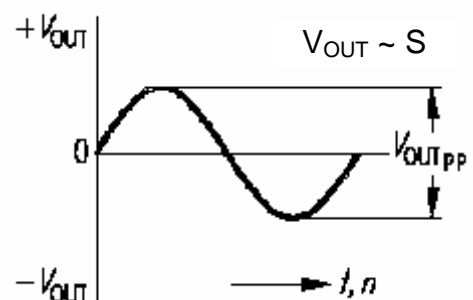
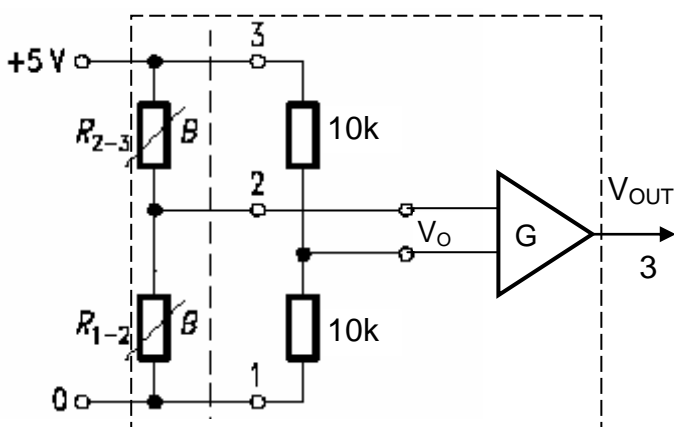
A measuring bridge is used for applications of the magnetoresistive sensor CY-DMR-03. The resistance of the sensor is changed by approaching a small soft iron part (standard target object) close to it. As result an output voltage change of measuring bridge is caused by the resistance change (see below).



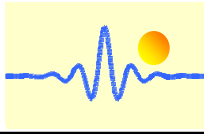
Sensor CY-DMR-03A



Sensor CY-DMR-03B



To convert small distance into a proportional electric signal, one can use a small soft iron part with definite width (e.g. $b=1.8\text{mm}$) to move over the face of the sensor. A linear signal up to 1.5mm can be obtained in this way. The sinusoidal signal gives a voltage output proportional to the distance in the zero crossover region.



Dual Differential Magnetoresistive Sensor CY-SMR-04

Features

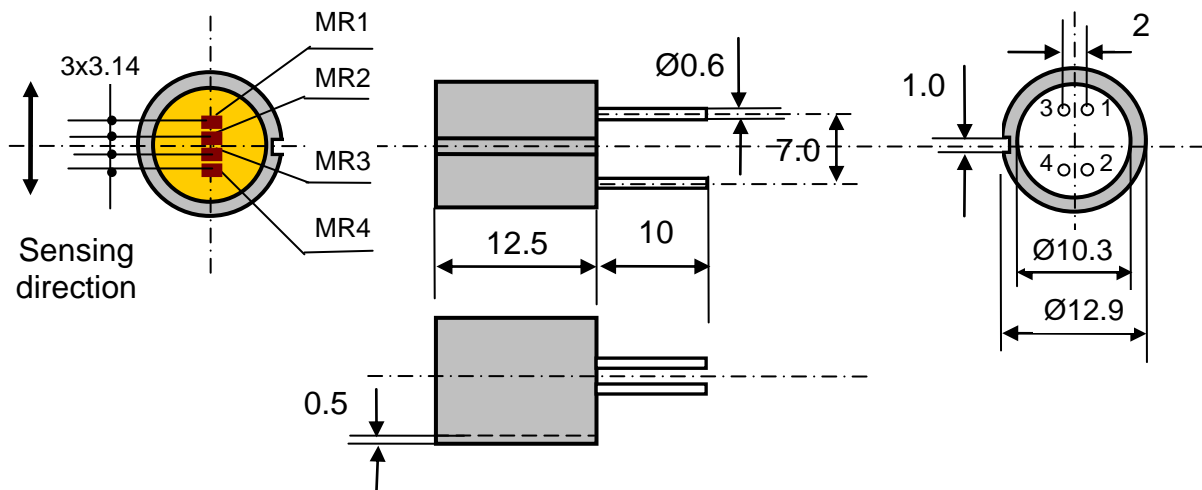
- The gear rotation direction can be detected by monitoring the phase shift direction of the two output signals A and B
- Wide sensing range, detecting frequency range 0 ~ 100kHz
- Good Signal-to-Noise ratio, high resolution, high sensitivity
- Contactless measurement, easy to use

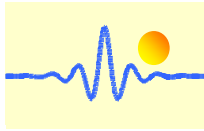
Typical applications

- Detection of gear rotation speed and direction in factory automation equipments
- Detection of the direction of linear motion servo
- Motor controller for vehicles
- Measurement of needle position in industrial knitting machines

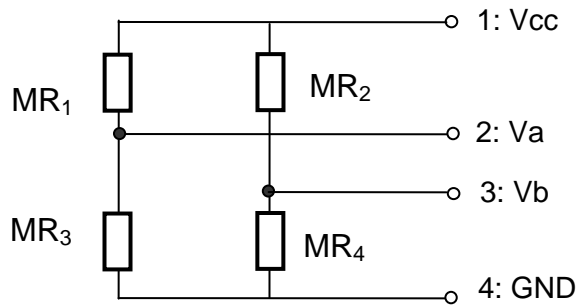
The differential magnetoresistive sensor CY-SMR-04 consists of two groups of two series coupled magneto resistors (D-type InSb/NiSb semiconductor resistors whose value can be magnetically controlled). The magneto resistors are mounted onto an insulated ferrite substrate. The sensor is encapsulated in a metallic and plastic package and has 2 output signals. The phase shift between the two output signals is 90°. A permanent magnet, which supplies a biasing magnetic field, is fixed on the base of the sensor.

Outlines

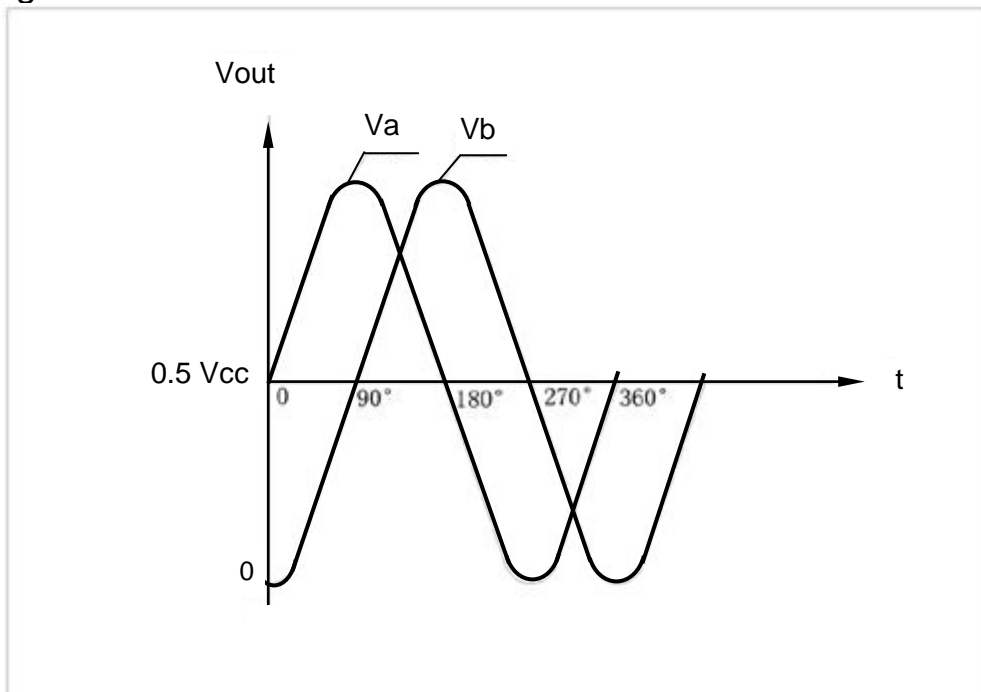




Inner Circuit



Output Signal Wave



Specifications

Maximum power supply V_{max}	10V DC
Nominal power supply	5V DC
Total resistance R_{14} ($\delta=\infty$, $I\leq mA$, $t=25^{\circ}C$) $R_{14} = (MR_1+MR_3)\times(MR_2+MR_4)/(MR_1+MR_2+MR_3+MR_4)$	0.5k Ω –3k Ω
Center symmetry $M=100\%$ ($R_{1-2}-R_{2-3})/R_{1-2}$ ($\delta=\infty$)	$\leq 10\%$
Open circuit output voltage $V_{out,pp}$ (at V_{in} and gap $\delta=0.15mm$)	$\geq 450mV$
Frequency range	0-100kHz
Target Gear Modulus	0.4mm
Phase difference between two output signals Va and Vb	$90^{\circ} \pm 10^{\circ}$
Operating temperature	$-20^{\circ}C \sim +80^{\circ}C$
Storage temperature	$-40^{\circ}C \sim +85^{\circ}C$

Part number

Part number	Case style	Outline	Cross reference
CY-SMR-04	Cylinder	$\varnothing 12.9 \times 12.5mm$	MuRata FR05CM12AL