

POSIC

# Dual channel differential inductive position sensor

PO2210

## Product data

### Features

- Position, speed and direction on gear targets
- Robust in oil, water, dust, magnetic fields, etc.
- No magnet required
- Target in any metallic material (steel, alu, copper)
- Ultra-thin package, 1.8 mm thick
- 0 to 1 mm distance between sensor and target
- -40°C to +125°C operating temperature range
- 0 to 10 kHz frequency range
- 5V / 15 mA

### Applications

- Angular incremental encoder
- Position and speed control in electric motors
- Motion control for robotics, factory automation
- Automotive: electric steering, electric braking

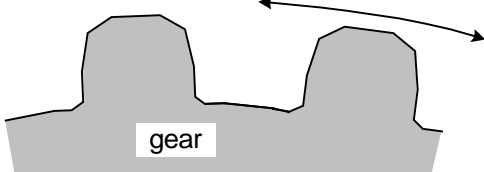
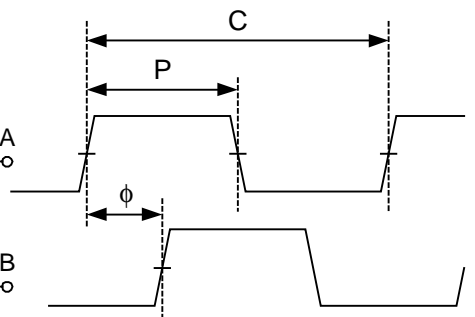
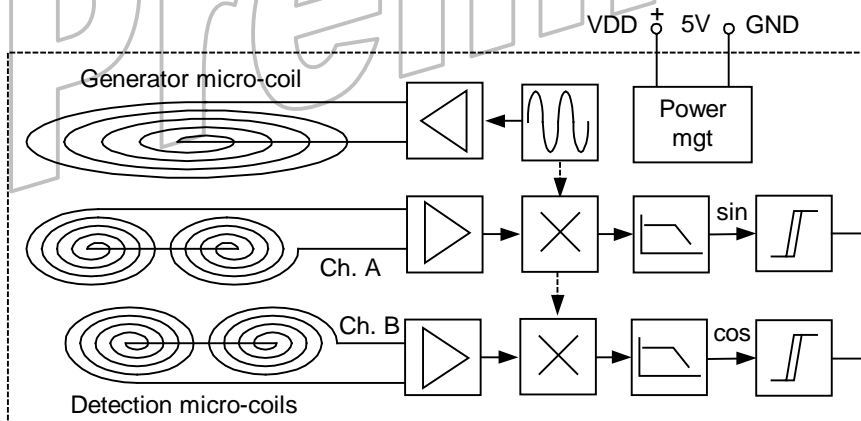
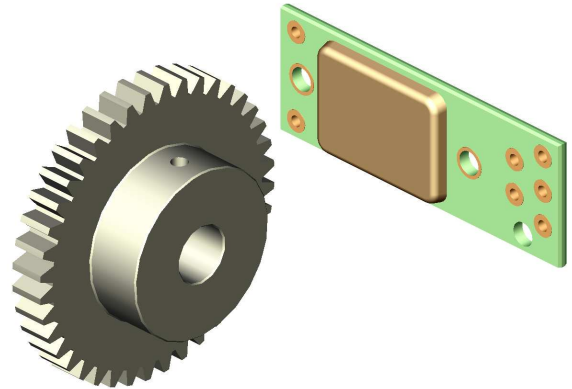
### Description

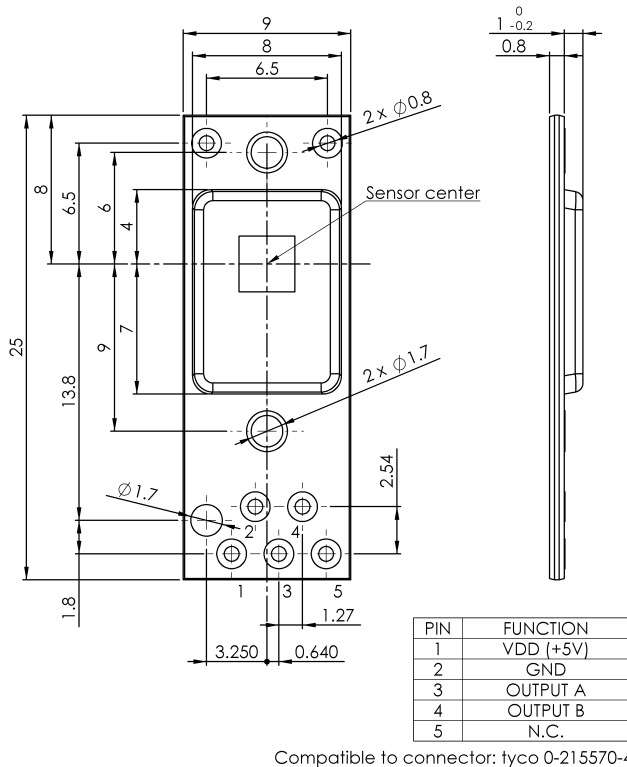
The inductive micro-sensor is an integrated version of the LVDT and resolver type of sensors. The core is a sensor chip with one generator coil and two sets of detection coils. The detection coils are connected in a differential arrangement, to reject the common mode signal. The sensor also includes an electronic interface, which is composed of a high frequency excitation for the generator coil and two read-out channels for the two sets of detection coils (channels A and B). The read-out electronics extract the amplitude variation of the high frequency signal due to the presence of a metallic target. The output stage consists

of a low-pass filter and a comparator. For a nominal target period of 1.3 – 1.5 mm (module 0.4 – 0.5), the outputs are two channels in quadrature (A quad B).

### Output signals

Output signals A and B have a periodicity identical to the target gear. The ratio between the pulse-width (P) and the cycle-width (C) yields the duty cycle ( $\Delta$ ) for any of the two channels. The phase difference ( $\phi$ ) between the channels A and B is defined by the ratio of the width between two rising edges over the cycle-width.



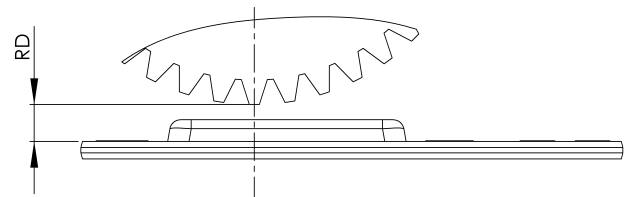


### Reference gear

The sensor can operate in combination with a wide range of linear or angular target gears. However, sensing characteristics (duty cycle, phase) and maximum working distance depend on the target form. For linear gears, a target period of 1.3 – 1.5 mm generates A and B signals in quadrature and duty cycle close to 50%. On angular gears, this corresponds to a module 0.4 – 0.5.

### Radial mounting

The sensor may be used in many different application specific mounting configurations. For angular gears, radial and axial mounting are commonly used. Furthermore, the sensor may be rotated around its sensitive axis to adjust the phase difference between channels A and B.



### Absolute maximum ratings

Supply voltage  $V_{DD}$  ..... 6.5 V  
 ESD ..... 2 kV HBM (JESD22-A114)

Operating temp. range ..... -40 to +125°C  
 Storage temp. range ..... -40 to +125°C

### Recommended operating conditions

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Temperature	T	-	-40	-	+125	°C
Supply voltage	$V_{DD}$	Relative to GND	4.5	5.0	5.5	V
Count frequency	$f_c$	-3dB	-	-	10	kHz
Output current	$I_O$	-	-1	-	1	mA
Rotor distance*	RD	PCB surface to OD of reference gear	1.0	1.4	1.8	mm

\* This corresponds to a distance of 0 – 0.8 mm between the sensor surface and the outer diameter of the gear and is valid for a steel gear with module 0.5.

### Electrical characteristics

Electrical characteristics over Recommended Operating Conditions, typical at  $V_{DD} = 5.0$  V and  $T = 25^\circ\text{C}$ .

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Supply current	$I_{CC}$	$V_{DD} = 5V$ , excluding output currents	10	-	20	mA
Output level, high	$V_{OH}$	$V_{DD} = 5V$ , $I_O = -1mA$	$V_{DD}-0.5$	-	$V_{DD}$	V
Output level, low	$V_{OL}$	$V_{DD} = 5V$ , $I_O = 1mA$	GND	-	0.5	V

### Sensing characteristics

Sensing characteristics using the reference target (steel gear module 0.5) in a radial mounting configuration. The typical values are averages over several periods of the gear wheel, at  $V_{DD} = 5.0$  V,  $T = 25^\circ\text{C}$ ,  $RD = 1.4$  mm,  $f_c = 1$  kHz.

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Duty cycle	$\Delta$	-	-	50	-	%
Phase	$\phi$	-	-	90	-	°

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