

POSIC

Differential inductive microcoil sensor

PO2211

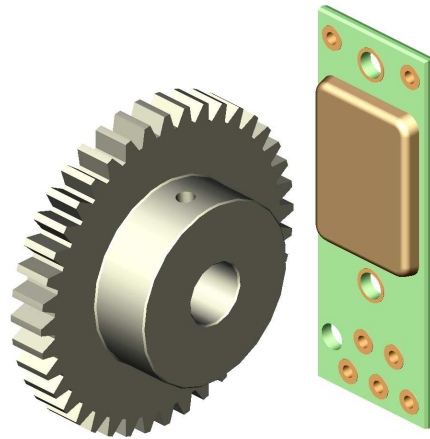
Product data

Features

- Differential sensor configuration
- Robust in oil, water, dust, magnetic fields
- 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
- Supply 5V / 15 mA
- Distance between detection coils: 1 mm

Applications

- Gear tooth sensing
- Speed sensing
- Cam- and crankshaft



Description

The PO2211 is a differential microcoil inductive sensor to measure the speed or position of a gear, a slotted disk or a metal strip with openings. Because the sensor employs a high-frequency magnetic field and employs a differential configuration, the sensor

- is insensitive to magnetic fields
- senses any metallic (electrically conducting) or ferromagnetic material.

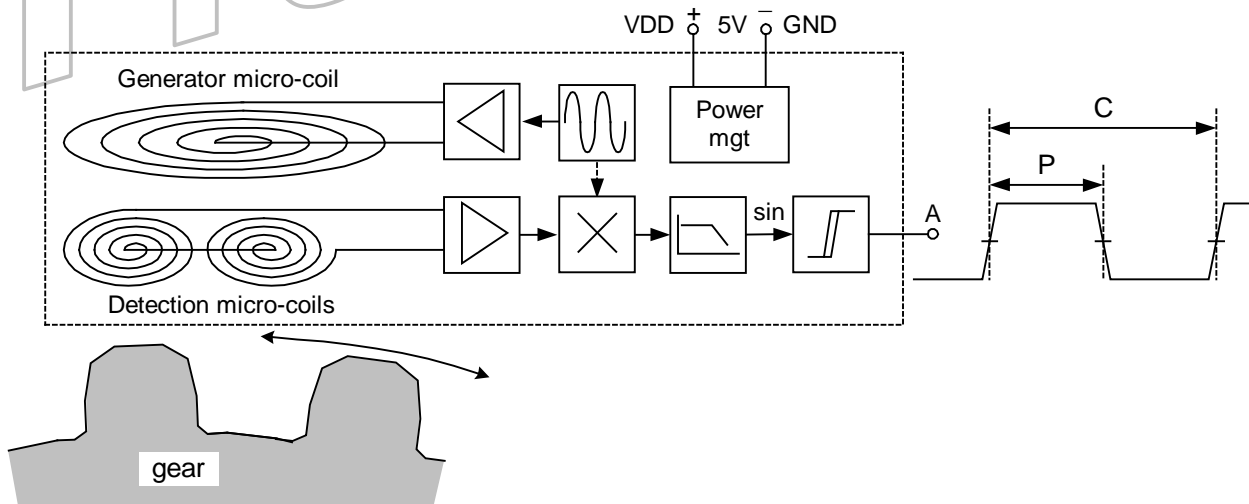
Working mechanism

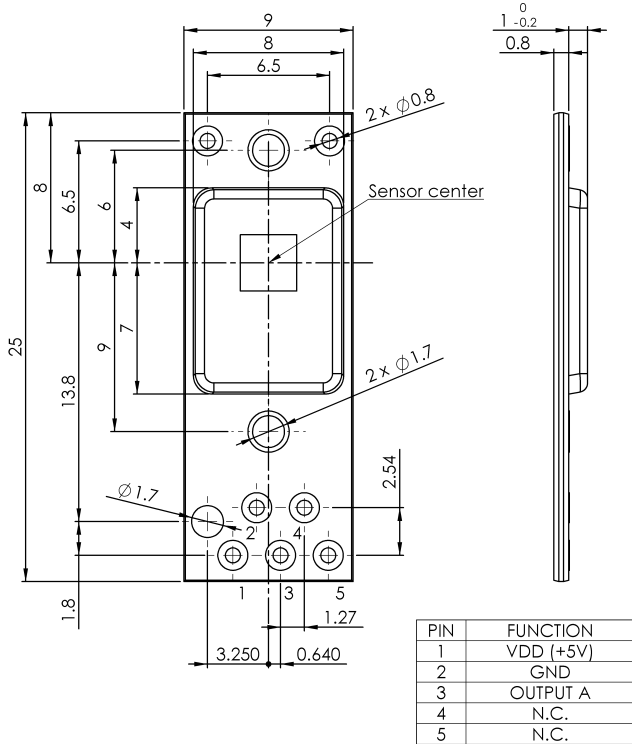
The generator micro-coil creates a AC magnetic field with a frequency around 1 MHz. The magnetic field couples into

the two detection coils that are separated by a distance of 1 mm and that are connected in a differential configuration. When a ferromagnetic (steel) or electrically conducting (aluminum, brass, copper etc) object in front of the sensor deforms the AC magnetic field, a signal is measured at the outputs of the differential detection coils. The detection coil signal is amplified, demodulated, low-pass filtered and passed through a comparator. The comparator includes hysteresis in order to provide a stable switching point.

Output signals

The period of output signal A corresponds to the target period (center to center distance between two adjacent teeth). The duty cycle $\Delta = P/C$ depends on target dimensions, shape and material.



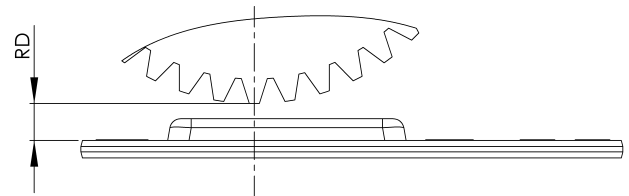


Targets and sensor mounting

The sensor can operate in combination with a wide range of linear or angular targets. Duty cycle and maximum working distance depend on the target dimensions, shape and material. Some examples for targets:

- Gear with module 0.4 – 1.0 with radial readout (see drawing below)
- Metal disk with stamped or etched openings with a periodicity of 1.5 – 3.5 mm with axial readout
- Metallic band with stamped or etched openings for linear applications

The sensor may be rotated around its sensitive axis in order to adapt to the target period or to optimize the maximum working distance.



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	1.5	2.0	mm

* This corresponds to a distance of 0 – 1.0 mm between sensor surface and the outer diameter of the gear and is valid for a steel gear with module 0.7.

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}	$V_{DD} = 5\text{V}$, excluding output currents	10	-	20	mA
Output level, high	V_{OH}	$V_{DD} = 5\text{V}$, $I_o = -1\text{mA}$	$V_{DD}-0.5$	-	V_{DD}	V
Output level, low	V_{OL}	$V_{DD} = 5\text{V}$, $I_o = 1\text{mA}$	GND	-	0.5	V

Sensing characteristics

Sensing characteristics using the reference target (steel gear module 0.7) in a radial mounting configuration. The typical values are averages over several periods of the gear wheel, at $V_{DD} = 5.0$ V, $T = 25^\circ\text{C}$, $RD = 1.5$ mm, $f_c = 1$ kHz.

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Duty cycle	Δ	-	-	50	-	%

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