Description

The ZMID5201, ZMID5202, and ZMID5203 family of inductive position sensor ICs are used for absolute rotary or linear motion sensing in automotive, industrial, medical, and consumer applications. The ZMID520x uses the physical principles of induction in a wire loop and eddy currents to detect the position of an electrically conducting target that is sliding or rotating above a set of coils, consisting of one transmitter coil and two receiver coils.

The three coils are typically printed as copper traces on a printed circuit board (PCB). They are arranged such that the transmitter coil induces a secondary voltage in the receiver coils that depends on the position of the metallic target above the coils.

A signal representative of the target's position over the coils is obtained by demodulating and processing the secondary voltages from the receiver coils. The target can be any kind of metal, such as aluminum, steel or a PCB with a printed copper layer.

The ZMID5201/02/03 ICs are fully qualified according to the automotive standard AEC-Q100 grade 0 (-40°C to 150°C ambient temperature).

Three versions with different output interfaces are available:

- ZMID5201: Analog output
- ZMID5202: PWM digital output
- ZMID5203: SENT digital output

Available Support

IDT provides Application Modules that demonstrate ZMID520x position sensing, including rotary, arc, and linear applications.

Physical Characteristics

- Wide operation temperature: -40 C to +150°C
- Supply voltage: 4.5V to 5.5V
- Small 14-TSSOP package

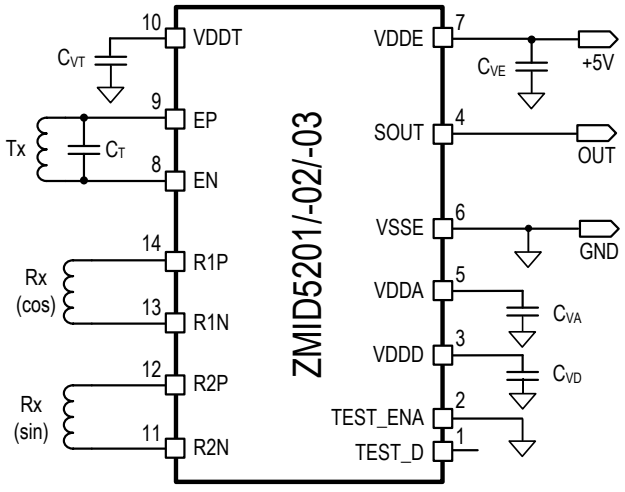
Typical Applications

- Rotary position sensors up to 360°; e.g. steering angle sensors, potentiometer replacement
- Small-angle sensors or arc-motion sensors; e.g. pedal, vehicle level, or valve sensors
- Linear motion sensors; e.g. linear-actuator position sensors, fluid-level sensors

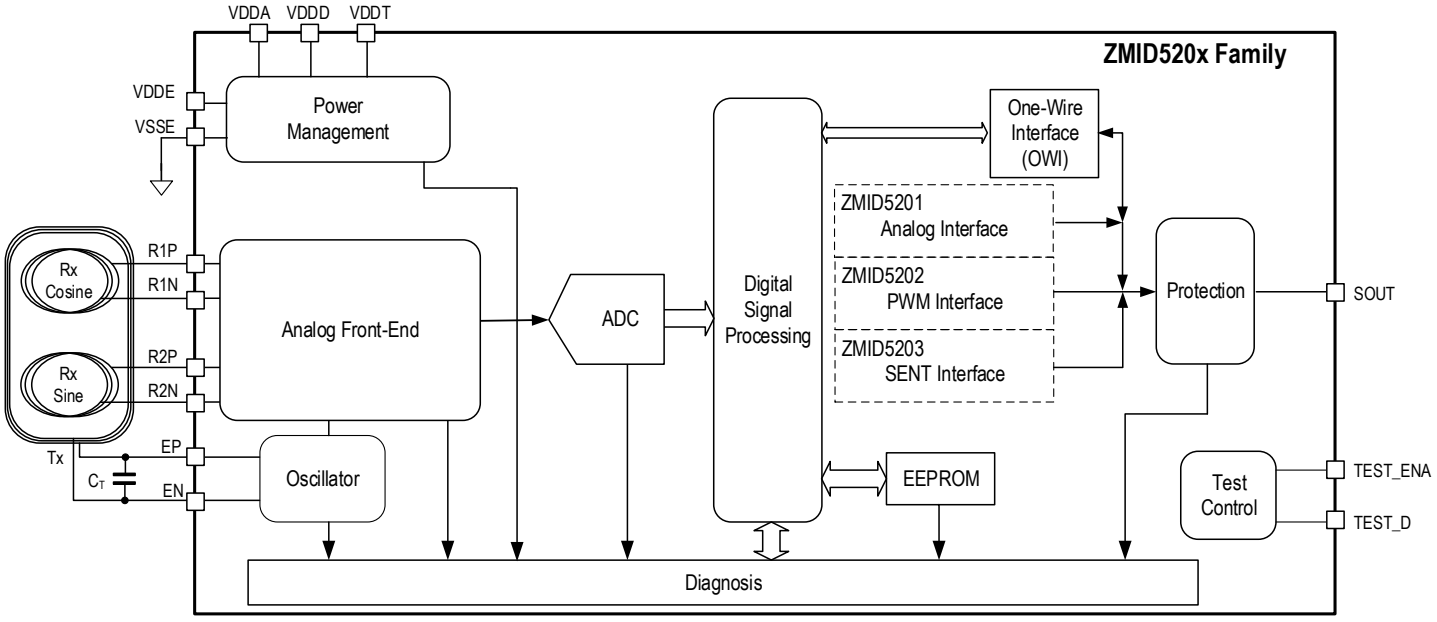
Features

- Position sensing based on inductive principle
- Cost effective; no magnet required
- Immune to magnetic stray fields; no shielding required
- Suitable for harsh environments and extreme temperatures
- Only three wires (ground, supply, output)
- Nonvolatile user memory; programming through output pin
- Single IC supports on-axis and off-axis rotation, linear motion, and arc motion sensing
- High resolution, even for small angle ranges
- High accuracy: ≤ 0.2% full scale
- 9-point user linearization
- Rotation sensing up to a full turn of 360º
- Overvoltage and reverse-polarity protection: -14V to +18V maximum, depending on product
- ESD and short-circuit protection
- Power or ground loss detection
- Facilitates redundant design requirements
- Programmable non-linearity correction
- ASIL B capable, according to user risk analysis
- Adaptive gain control supporting a wide range of coil designs and target displacement
- The ZMID5201/02/03 products are safety-related, intermediate hardware parts supporting ISO26262-compliant systems in regard to random failures

Application Circuit



Block Diagram



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