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LX3301A Inductive Sensor Interface IC with Embedded MCU

Description

The LX3301A is a member of Microsemi’s new family of smart sensor interface products. Designed to process inductive sensors, which are based upon linear variable differential transformer (LVDT) principles, this new device integrates two complete analog channels, oscillator/exciter, 32-bit RISC processor, non-volatile configuration memory, and analog or PWM outputs.

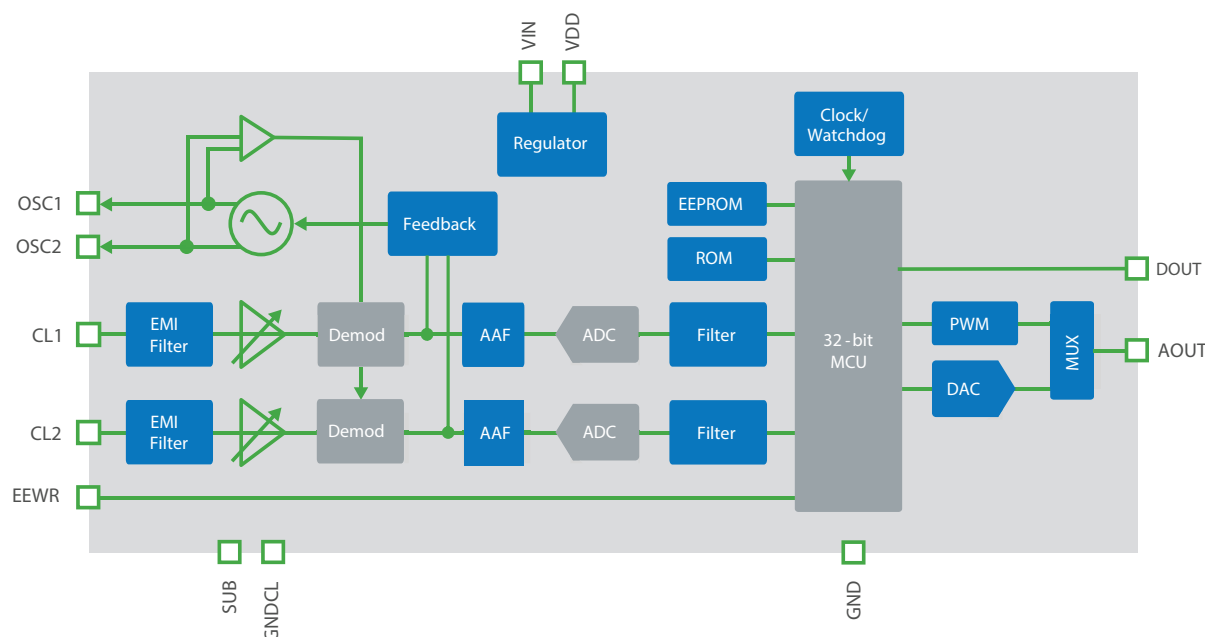


Figure 1: Top-Level Block Diagram

In typical operation, inputs from the inductive sensor are conditioned, demodulated, and converted into 13-bit values. The MCU processes these values to produce a linearized measurement value with either 12-bit accuracy (analog output) or 13-bit accuracy (PWM output.) Internal non-volatile memory allows the user to configure various parameters within the IC, including five (5) calibration points, origin/end points, and low and high plateau levels. The internal non-volatile memory is configured via the VIN power pin, which allows a sensor assembly to be configured without the need for additional programming pins.

Key Features

- Embedded 32-bit processing engine with 12 kB program memory
- Two sensor input channels with integrated demodulator
- Internal oscillator with frequency range of 1 to 5 MHz
- Dual 13-bit ADC with sample rates to 2 kHz
- Linearization algorithm with:
 - o Five user-defined linearization points
 - o Programmable origin and end points
 - o 6 segments linearization
 - o Programmable low and high plateau levels
- User-programmable 16 x 16-bit non-volatile configuration memory
- Multiple diagnostics features (ISO 26262 compliant)
- Host interface: Analog output or PWM
- 4.5 V to 5.6 V input voltage; 8 mA (typical) operating current, not including exciter tail current
- -40 to 125 °C operation, AEC-Q100 grade 1 certified

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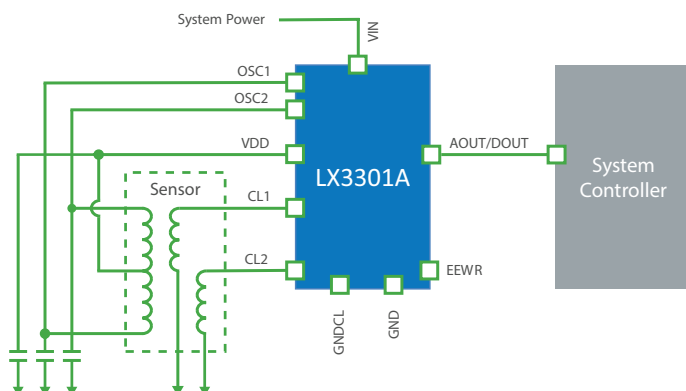


Figure 2: LVDT/Inductive Sensor Configuration

The LX3301A includes integrated diagnostics features, which regularly monitor various functions within the IC and report conditions which are outside of specified parameters. In the event of a detect failure, the device drives the output to a pre-defined diagnostics level. The internal diagnostics information can also be output via SENT-compatible protocol for system development and debug purposes.

The LX3301A is compliant with ISO 26262 and rated for ASIL C applications. Packaged in a 14-TSSOP package, the device operates (to specification) from -40 to 125 °C and maintains full functionality to 150 °C. The LX3301A is certified to AEC-Q100 grade 1.

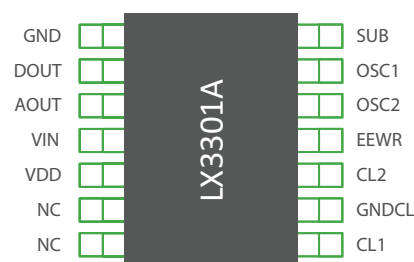


Figure 3: 14-TSSOP Pin Assignments

Target Applications

The LX3301A is an ideal solution for measuring mechanical movement (linear, angular/rotation, and proximity) in a wide variety of applications in automotive, industrial, aerospace, and commercial applications including:

- Rotor position sensing (brushless DC motors)
- Robotic arm positioning
- Fluid level sensing
- Proximity detection (industrial automation)
- Gear position/travel (automotive)

For more information about Microsemi's product portfolio for automotive and industrial applications, visit

<http://www.microsemi.com/applications/automotive>

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