

Automotive Capacitive Pressure Sensor Interface



System Description

This reference design utilizes a fully integrated SOC (System on a Chip) as an interface device for piezoresistive, strain gauge and capacitive sense elements. The device incorporates the analog front end that directly connects to the sense element and has voltage regulators and oscillator. The device also includes sigma-delta analog-to-digital converter, 2 DAC outputs, 8051 WARP core microprocessor and OTP memory. Sensor compensation algorithms can be implemented in software which enables a fully configurable system that can be modified to support multiple sensor elements.

Featured Applications

- Pressure Sensor Signal Conditioning
- Level Sensing Signal Conditioning
- Humidity Sensing Signal Conditioning
- Fuel pressure
- Antilock Braking
- Manifold Pressure

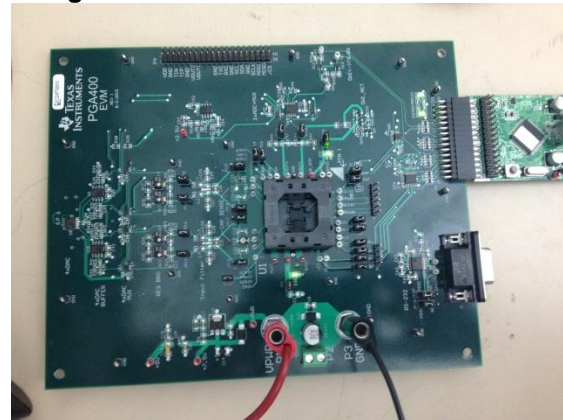
Design Resources

- Block Diagram and Schematic
- Test Data
- Design Files
- Bill of Materials
- User's Guide

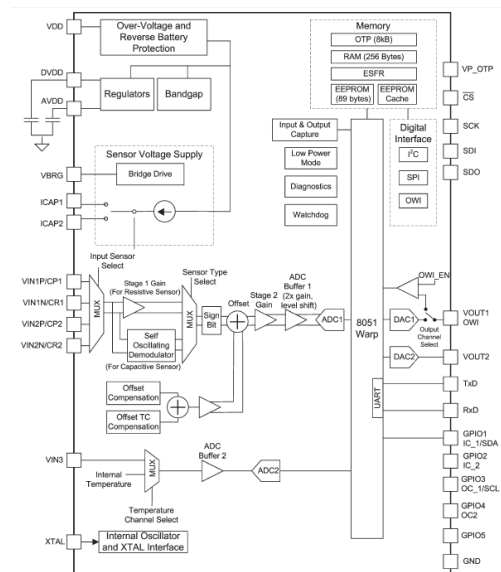
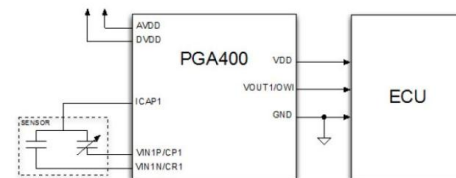
Design Features

- Single +12VDC power-supply input for basic operation where 12V bucks down to 5V for the PGA400
- Resistive and Capacitive Sensor Simulators
- PC Control with a Graphical User Interface and USB Communications Board
- One-Wire-Interface (OWI) Activation and Communication Circuitry
- AEC-Q100 qualified

Design Photo



Block Diagram



Jump start system design and speed time to market

Comprehensive designs include schematics or block diagrams, BOMs, design files and test reports by experts with deep system and product knowledge. Designs span TI's portfolio of analog, embedded processor and connectivity products and supports a board range of applications including industrial, automotive, medical, consumer, and more. To explore the designs, go to <http://www.ti.com/tidesigns>

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Associated Part Numbers

<u>Part Number</u>	<u>Part Description</u>	<u>EVM Link</u>
PGA400-Q1	Automotive Programmable Sensor Signal Conditioner w/ MCU	EVM

Design Considerations:

- The PGA400-Q1 is a highly integrated signal conditioner that can linearize capacitive or resistive pressure sense elements.
- The system-on-chip contains integrated reverse protection, a complete signal chain (including data converters and core), and a temp sensor. The integration also allows the PGA400-Q1 to support applications outside of pressure sensing.
- The PGA400-Q1 does not contain an integrated sense element and therefore allows user to choose sense element.
- Most pressure sensing applications do not offer much real estate. The PGA400-Q1 comes in an efficient, small WCSP package. This product is also offered in a QFN package under the product name PGA400-EP.

Quick Start Guide

What's needed:

1. 12V power supply
2. PGA400-Q1 EVM GUI installed on PC
3. PGA400-Q1 EVM + board that interfaces with PC (TI-ger board)

Before the system is powered up, please make sure all hardware is configured properly. Check that all jumpers and headers are connected appropriately. For a detailed description of configurations, see EVM user's guide.

To power the board:

4. The PGA400-Q1 EVM is shipped with a TI-ger USB communication board that provides a link from the PC controlled GUI to the EVM. Connect the TI-ger board to the PGA400-Q1 EVM.
5. Connect 12V from a power supply to the EVM. The 12V bucks down to 5V to power the PGA400-Q1.
6. Connect the TI-ger board to the PC.

To get more information on specific PGA400-Q1 EVM GUI settings, see PGA400-Q1 EVM user's guide and TI Designs Test Data document.



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