AN14353

MPXV2010DP add-on board

Rev. 1 — 11 July 2024 Application note

Document information

Information	Content
Keywords	Low-pressure differential MPXV2010DP sensor
Abstract	This document describes the design and application of the MPXV2010DP add-on board reference design.

1 Introduction

This document describes the design and application of the MPXV2010DP add-on board reference design. The physical outline of this design is similar to the popular "click" type board format. This design facilitates easy connection between the MPXV2010 Low-Pressure Differential Pressure Sensor and an MCU-based host system.

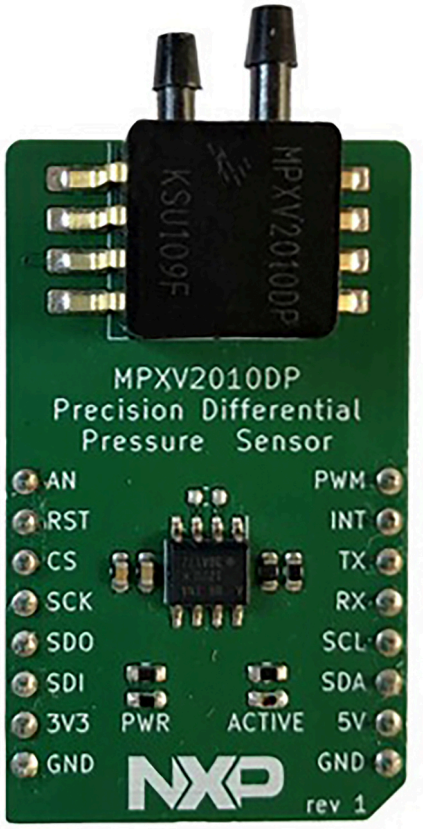

Figure 1. MPXV2010DP add-on board

2 Schematic design

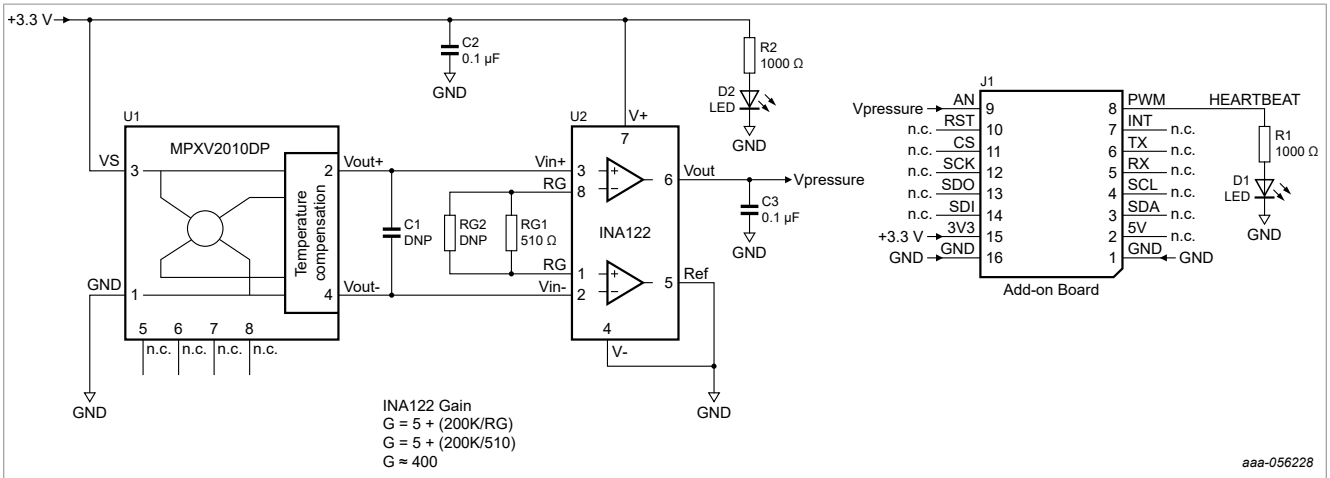

Figure 2. MPXV2010DP add-on board schematic

The MPXV2010DP is a precision differential low-pressure sensor with analog output. The sensing element and the temperature compensation circuit are ratiometric to both the differential input pressure signal and the power supply.

Note: *If the host system has an unstable or noisy power rail, then that noise is reflected in the output signal of the pressure sensor. It is important to ensure clean and stable power is applied to the MPXV2010DP sensor.*

The optional capacitor C1 can be sized to filter out the high frequency content of the output signal if any unwanted energy exists.

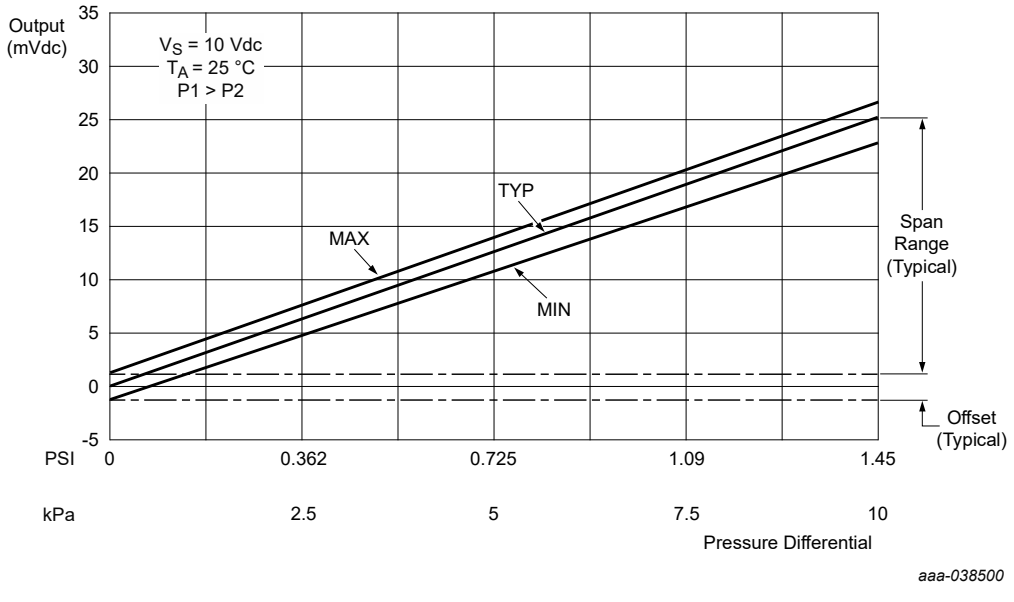

Figure 3. Pressure vs output transfer function from MXPV2010DP data sheet

Using an INA1222, the amplitude of the analog pressure sensor output signal is gained up to be a common instrumentation amplifier. With a 3.3 V supply, a gain of approximately 400 is appropriate to raise the signal to a level compatible with most 3.3 V MCU ADC inputs.

$$\frac{3.3\ V}{10\ V} \times 25\ mV \times 400 = 3.3\ V$$

The transfer function in the MPXV2010DP data sheet shows a full-scale output of 25 mV with a power supply of 10 V. With the lower power supply of 3.3 V applied, and a desired full-scale output of 3.3 V (typical for an MCU ADC input) a gain of of approximately 400 is needed.

The C3 capacitor reduces the noise frequently associated with the input switching networks of MCU ADC inputs.

A powered LED (D2) is provided for convenience. For convenience a heartbeat LED (D1) may be driven by the host MCU software.

Symbol J1 represents the standard add-on board connections. The gained up pressure signal (Vpressure) is conveyed to the AN pin of the add-on board. Typically, this pin drives an MCU's ADC input.

3 Application

The MPXV2010DP differential low-pressure sensor ranges up to 10 kP (approximately 1.5 PSI).

This low-pressure range is most frequently useful in flow metering applications. Typically, the differential pressure is measured across a restrictor plate or a metering orifice. The pressure drop is proportional to the flow of the gas or fluid.

In HVAC systems the restrictor plate may, in practice, actually be an in-line air filter. In this application (for a given blower speed), higher than nominal differential pressure is indicative of a dirty/clogged air filter.

Similarly, in hydraulic systems, the differential measurement is made across an in-line filter element.

4 Abbreviations

Table 1. Abbreviations

Acronym	Description
Pa	Pascals, the SI Unit of Pressure
kPa	kiloPascals
PSI	Pounds per Square Inch, Imperial Unit of Pressure (10,000 Pa = 1.450377 PSI)

Revision history

Table 2. Revision history

Revision	Date	Description
AN14353 v.1	11 July 2024	initial release.

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