

PPS43 Board Level Differential Pressure Sensor

Amplified, digitally compensated gauge & differential sensing — 0.5–4.5 V analog or 14-bit I²C / SPI



GAUGE / DIFFERENTIAL

8-PIN DIP / SMD

ANALOG + DIGITAL

FEATURES

- Gauge and differential pressure ranges from 2 PSI to 150 PSI
- Ratiometric 0.5–4.5 V analog output or 14-bit I²C / SPI digital output
- 14-bit digital front end · 0.01% FS resolution
- Total error band $\pm 1.5\%$ FS over 0–60 °C (incl. hysteresis, non-linearity, TC)
- Non-linearity $\pm 0.25\%$ FS (BFSL)
- Operating temperature –20 to 85 °C
- 5 V supply standard; 3 V supply option
- Compact 8-pin package — through-hole DIP or SMD J-clip leads
- Single or dual barbed ports

DESCRIPTION

The PPS43 is an amplified, digitally compensated pressure sensor in a compact 8-pin package. A MEMS piezoresistive die is pressurized on its passive backside and isolated from the substrate with silicone gel, improving long-term stability, resistance to moisture ingress, and accuracy.

An on-board signal-conditioning ASIC corrects offset, span and temperature effects. The sensor delivers a ready-to-use ratiometric 0.5–4.5 V signal or a 14-bit I²C / SPI reading, with no host-side calibration needed.

APPLICATIONS

- Flow meters
- Gas chromatography
- HVAC & filter monitoring
- Pneumatic controls
- Pool & spa equipment
- Medical equipment
- Automated oil / gas valves

MAXIMUM ENVIRONMENTAL RATINGS

Operating Temperature	–20 to 85 °C · –4–185 °F	Proof Pressure	2.5× full scale
Storage Temperature	–20 to 85 °C · –4–185 °F	Burst Pressure	4× full scale
Compensated Temperature	0 to 60 °C	Pressure Range	2 to 150 PSI

Electrical & performance specifications

$V_{DD} = 5\text{ V}$, $25\text{ }^{\circ}\text{C}$ unless otherwise noted.

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS
Supply voltage (Note 1)	V_{DD}	3.0	5.0	5.2	V
Supply current	I_{DD}	70	120	2,500	μA
Analog output (ratiometric)	V_{OUT}	0.5	—	4.5	V
Digital output	—	$I^2\text{C}$ or SPI, 14-bit			counts
Resolution	—	—	0.01	—	%FS
Total error band (0–60 $^{\circ}\text{C}$)	TEB	–1.5	—	1.5	%FS
Non-linearity (Note 2)	NL	–0.25	—	0.25	%FS
Response time	t_R	1	2	20	ms
Compensated temperature	—	0	—	60	$^{\circ}\text{C}$
Operating temperature	T_{OP}	–20	—	85	$^{\circ}\text{C}$
Pressure range	—	2	—	150	PSI

1) 5 V supply standard; 3 V supply is an ordering option. 2) Best-fit straight line. Total error band includes hysteresis, non-linearity and thermal effects over the compensated range.

Pin connections — analog output

PIN	NAME	FUNCTION
2	V_{DD}	Positive supply voltage
4	GND	Ground
3	V_{OUT}	Analog output, 0.5–4.5 V
1, 5–8	N/C	No connection

DIGITAL OUTPUT

$I^2\text{C}$ / SPI versions use the same 8-pin footprint. The digital pin assignment and $I^2\text{C}$ address come with the digital-output configuration drawing – contact the factory.

Pin configuration

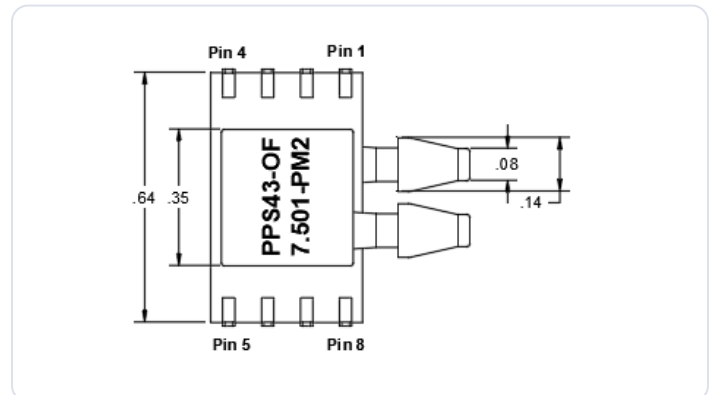


Fig. 1 – Top view, DIP package. Pin 1 at upper right; pins 1–4 top row, 5–8 bottom row.

Package, media & installation

Package

The PPS43 is housed in an 8-pin industrial plastic package with through-hole DIP or surface-mount J-clip leads. The covers are ABS plastic, with single-port (gauge) and dual-port (differential) options.

Pressure ports

Strong polyethylene barbed ports resist stress during manufacturing and tubing installation. On dual-port parts the high-side port is marked on the outline drawing. Output rises as high-side pressure exceeds low-side pressure.

Wetted parts

Silicon, RTV, epoxy, polyethylene and high-temperature polyimide.

PCB mounting

Solder DIP leads by wave or hand soldering. Do not exceed the package temperature limits, and keep flux out of the ports. Route tubing so it does not load the barbs.

Process equipment



Stability

The silicon MEMS die has an SiO₂ base. It is mounted to a ceramic base with RTV and sealed under a ceramic cover. A low-stress die attach and factory stabilization of every sensor improve stability over time and temperature.

Media

Clean, dry air and non-corrosive gases. The backside-pressurized, gel-isolated die resists moisture ingress, but the PPS43 is not intended for continuous liquid contact.

Pressure ranges

Standard ranges from 2 PSI to 150 PSI, gauge or differential. Custom ranges and absolute versions are available for OEM customers.

Decoupling

Place a 0.1 μ F ceramic capacitor between V_{DD} and GND, close to the sensor.

Automated oil / gas valves



±1.5%

Total error band

14-bit

Digital front end

2 ms

Typical response

150

Max range PSI

Output details

OUTPUT	TRANSFER FUNCTION	SUPPLY	REFERENCE
Analog 0.5–4.5 V	$V_{out} = V_{DD} \times (0.1 + 0.8 \times P / P_{FS})$	5.0 V (3 V option)	Ratiometric
Digital I ² C / SPI	14-bit corrected pressure count	5.0 V (3 V option)	Internal ADC

At $V_{DD} = 5.0$ V the analog output is 0.5 V at zero pressure and 4.5 V at full scale.

Ratiometric analog output

The analog output scales with V_{DD} . Power the sensor and the host ADC from the same reference and supply variation cancels, so no separate precision reference is needed. A supply that drifts independently of the ADC reference shows up as a proportional pressure error.

PRESSURE	V_{OUT} AT 5.0 V
0% FS	0.50 V
25% FS	1.50 V
50% FS	2.50 V
75% FS	3.50 V
100% FS	4.50 V

Digital output – I²C / SPI

On digital versions the conditioned pressure is read as a 14-bit count. The interface (I²C or SPI) is selected at order and set at the factory. The compensation coefficients are stored in factory-locked EEPROM.

INTEGRATION NOTES

I²C: fit pull-up resistors on SDA and SCL at the host.
SPI: read-only, sensor as slave.
Count-to-pressure scaling, I²C address and timing are given in the digital-output application note supplied with the order.

ANALOG APPLICATION NOTES

Minimum 0.1 μ F decoupling capacitor on V_{DD} and keep analog pins away from switching circuitry.

Mechanical dimensions — inches

Through-hole mount — DIP

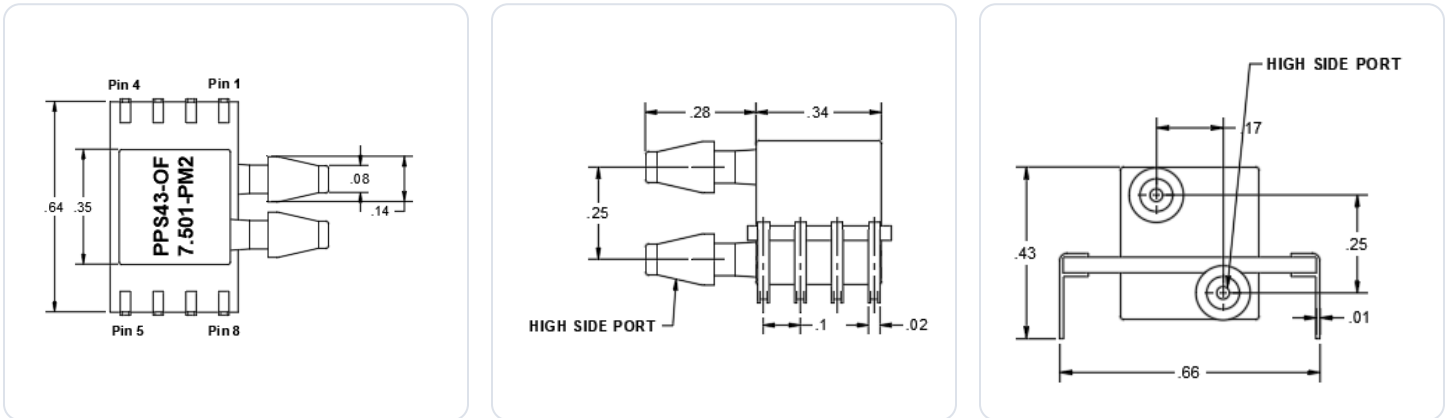


Fig. 2 — DIP package: top, side and end views. Body 0.64 × 0.43; lead pitch 0.10.

Surface mount — J-clips

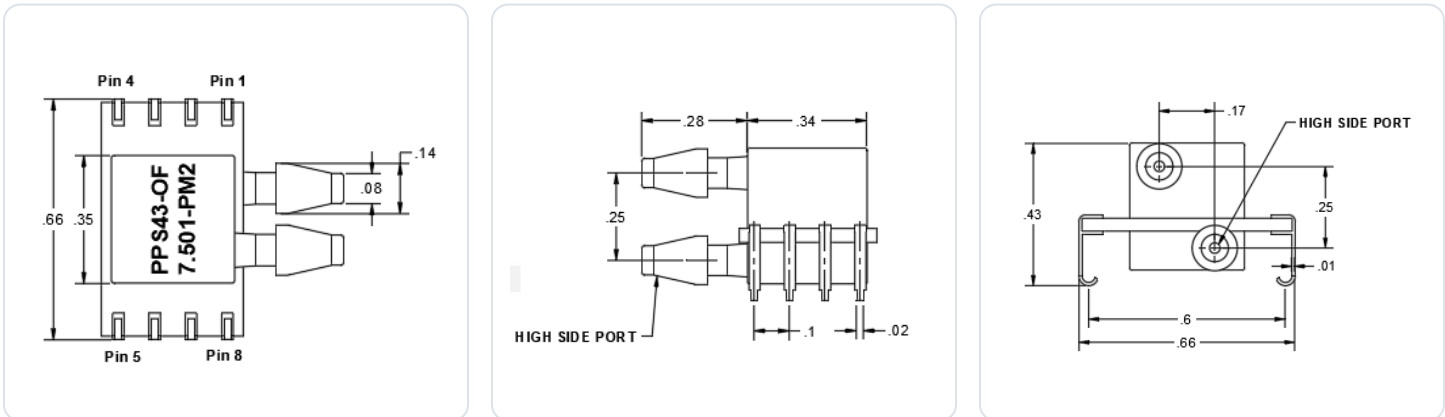


Fig. 3 — SMD J-clip package: top, side and end views. Footprint 0.66 across leads.

FEATURE	DETAIL
Package	8-pin, ABS covers
Leads	DIP (through-hole) or SMD J-clip
Ports	Single (gauge) or dual (differential), barbed
Port material	Polyethylene

TOLERANCES (INCHES)

X.XX ± 0.010 · X.XXX ± 0.005

The high-side port is marked on the side view. Support tubing so it does not load the barbs.

Ordering information — part-number configuration



Model	Supply	Range (PSI)	Type	Ports	Leads	Output
PPS43	0 = 5 V 1 = 3 V	3-digit PSI 002 = 2 PSI 005 = 5 PSI 150 = 150 PSI	G = Gauge A = Absolute	1 = Single port 2 = Dual port 3 = Custom	0 = DIP 1 = SMD J-clip	A = 0.5–4.5 V I = I ² C S = SPI

EXAMPLE PART NUMBERS

PPS43-0-005G2-0-A → 5 V · 0–5 PSI · dual port (differential) · DIP · 0.5–4.5 V analog

PPS43-1-030G1-1-I → 3 V · 0–30 PSI gauge · single port · SMD J-clip · I²C

SPECIFY WITH YOUR ORDER

Custom pressure range · Absolute reference · I²C address / SPI configuration · Custom port geometry · Tape-and-reel packaging for SMD versions.

Configure your PPS43

Custom ranges, ports and digital configurations for OEM volumes. Talk to an engineer to spec your part.

REQUEST A QUOTE

sales@phoenixsensors.com
(480) 462-1810

Notice: Phoenix Sensors LLC reserves the right to make changes to the product contained in this publication. Phoenix Sensors LLC assumes no responsibility for the use of any circuits described herein, conveys no license under any patent or other right, and makes no representation that the circuits are free of patent infringement. While the information in this publication has been checked, no responsibility is assumed for inaccuracies. Phoenix Sensors LLC does not recommend the use of any of its products in life-support applications where the failure or malfunction of the product can reasonably be expected to cause failure of a life-support system or to significantly affect its safety or effectiveness. Products are not authorized for use in such applications.