Preliminary Datasheet

HPSD 3900 Pressure Transducer

General description

The HPSD 3900 pressure transducer is an exceptionally versatile sensor engineered to measure both differential and absolute pressure. It incorporates advanced signal conditioning, featuring complete temperature compensation and an integrated ASIC, to deliver exceptional accuracy and performance across a variety of applications. With programmable temperature compensation, the transducer achieves a total error of just 0,5% FS within a temperature range of -25 to 85°C. Powered by a single supply (3 to 5,5 V), its wide compensated temperature output offers OEM users maximum flexibility for use with dry air, non-corrosive gases, or liquids.

Specifically engineered for through-hole PCB assembly, the HPSD 3900 includes dual pressure ports and supports differential pressure ranges from 10 mbar to 100 mbar, and absolute pressure range from 200 mbar to 1200 mbar, it suitable for a wide array of applications, including drone systems, industrial monitoring, and HVAC controls.

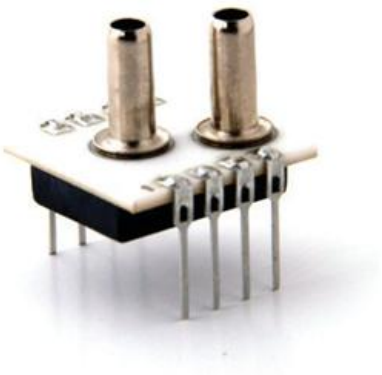
Applications

- HVAC
- Medical instrumentation
- Airflow monitoring
- Altitude tracking
- Pneumatics control
- Process control
- Wind tunnel testing
- Atmospheric research probes

Features

- Single power supply voltage (3 to 5,5 VDC)
- Total accuracy down to 0,5%FS over -25 to 85°C, all effects included (maximum)
- Ratiometric voltage output (10% to 90% of supply voltage)
- I^2C digital output
- Up to 16 bits of digital output (pressure + temperature)
- Differential pressure ranges from 10 mbar to 100 mbar
- Absolute pressure ranges from 200 mbar to 1200 mbar

Dual Pressure Sensor



RoHS COMPLIANT

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Available types overview

T_{AMB}=25°C (unless otherwise noted)

Differential pressure sensor

Pressure range	**10 mbar (0,15 psi)**	**20 mbar (0,3 psi)**	**50 mbar (0,8 psi)**	**100 mbar (1,5 psi)**
Order code	HPSD 3900 -010M-x	HPSD 3900 -020M-x	HPSD 3900 -050M-x	HPSD 3900 -100M-x
Pressure types	Differential/ bidirectional differential	Differential/ bidirectional differential	Differential/ bidirectional differential	Differential/ bidirectional differential
Temperature ranges	Operating: -40 to 85°C, Compensated: -25 to 85°C, Storage: -40 to 125°C			
Over pressure [1)]	100 mbar	200 mbar	500 mbar	1000 mbar
Burst pressure [2)]	150 mbar	300 mbar	750 mbar	1500 mbar

Absolute pressure sensor

Pressure range	**200 to 1200 mbar**	**800 to 1200 mbar**
Order code	HPSD 3900-xxxx-1	HPSD 3900-xxxx-2
Pressure types	Absolute	Absolute
Temperature ranges	Operating: -40 to 85°C, Compensated: -25 to 85°C, Storage: -40 to 125°C	
Over pressure [1)] **(Common mode)**	3 bar	3 bar
Burst pressure [2)] **(Common mode)**	5 bar	5 bar

Performance characteristics

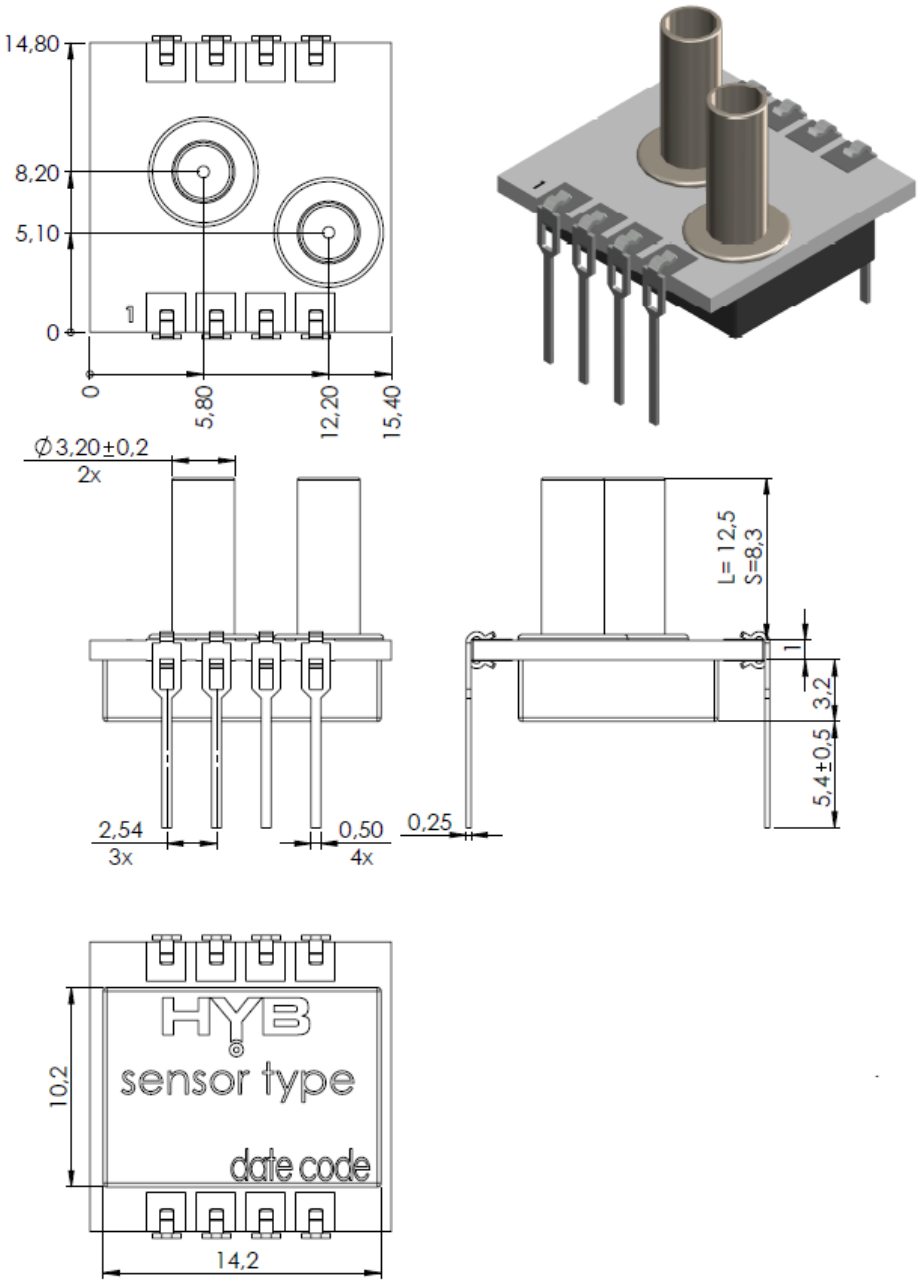
T_{AMB}=25°C (unless otherwise noted)

Parameter	Symbol	Min.	Type	Max.	Unit
Power supply					
Supply voltage	V_{CC}	3		5,5	V
Current consumption	I_{CC}		9,2	11	mA
Digital output (pressure), 15 bits [3]					
Offset voltage [4]	V_O		3277		counts
Full scale output (FSO) [5]	V_{FS}		29491		counts
Full scale span (FSS) [6]	V_{FSO}		26214		counts
Offset voltage (bidirectional devices)	V_O		16384		counts
Digital output (temperature), 15 bits [7]					
Temperature output @ -25°C	T_o		8192		counts
Temperature output @ 85°C	T_s		24576		counts
Accuracy (pressure) @ 25°C					
Differential pressure (10 mbar)	E_a		0,5	±1,5	% FSO
Differential pressure (20 to 100 mbar)	E_a		0,2	±1,0	% FSO
Absolute pressure	E_a		0,1	±0,3	% FSO
Total accuracy (pressure) @ -25 to 85°C [9]					
Differential pressure (10 mbar)	E_{ta}		1	±2	% FSO
Differential pressure (20 to 100 mbar)	E_{ta}		0,5	±1,5	% FSO
Absolute pressure	E_{ta}		0,3	±0,5	% FSO
Resolution					
A/D converter	D_i			16	bit
D/A converter			16		bit
Response time	E_{rt}		1,3		ms
Repeatability [10]	E_r		±0,05		% FSO
Nonlinearity & pressure hysteresis (BFSL) [11]	E_l		±0,1	±0,3	% FSO
Load resistance	R_L	1		∞	k
Media compatibility			see spec. note [12], [13]		
Weight	W		3		g

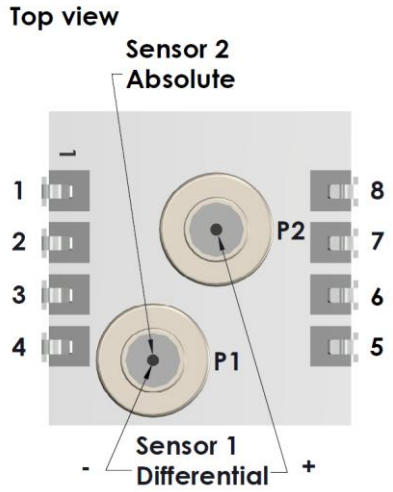
Specification notes

1) Over pressure is the maximum pressure which may be applied without causing damage to the sensing element.
2) Burst pressure is the maximum pressure which may be applied without causing leakage damage to the sensing element.
3) Digital signal is not ratiometric to the power supply.
4) Offset value is the output value at zero pressure.
5) Full scale output is the output value at full pressure range.
6) Full scale span is the algebraic difference between the output at full scale pressure range and offset.
7) Digital output signal (temperature) is not ratiometric to power supply V_{cc}. Temperature data are read directly on the sensing element.
8) Accuracy includes all effects (offset, span, nonlinearity, pressure hysteresis and repeatability) at room temperature and represents maximum deviation of transducer signal from ideal characteristic.
9) Total accuracy includes all effects (offset, span, nonlinearity, pressure hysteresis and repeatability) included with all temperature effects of offset and span. It describes overall error and represents maximum deviation of transducer signal from ideal characteristic in compensated temperature range from -25 to 85°C.
10) Repeatability is defined as typical deviation of the output signal after 10 pressure cycles.
11) Nonlinearity is defined as the BFSL (best fit straight line) across entire pressure range.
12) Media compatibility: on pressure port P1: clean, dry and noncorrosive gases to silicon, RTV, ceramics Al2O3, Pyrex, LCP plastics, epoxy, solder, tin.
13) Media compatibility: on pressure port P2: noncorrosive gases or liquids to silicon, Pyrex, RTV, ceramics Al2O3, solder, tin.

Outline dimensions



Pinout

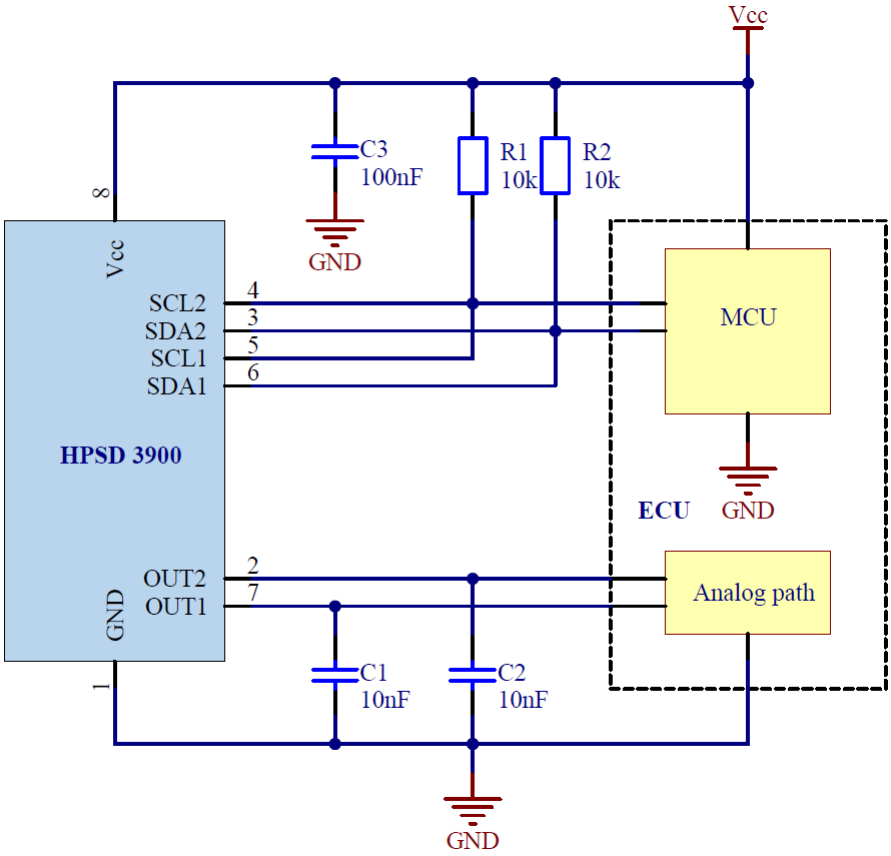


Pin	Name	Function
1	GND	Ground
2	OUT2	Ratiometric Analog Output or OWI I/O (Sensor 2)
3	SDA2	I^2C Serial Data (Sensor 2)
4	SCL2	I^2C Serial Clock (Sensor 2)
5	SCL1	I^2C Serial Clock (Sensor 1)
6	SDA1	I^2C Serial Data (Sensor 1)
7	OUT1	Ratiometric Analog Output or OWI I/O (Sensor 1)
8	VCC	Power supply

Notes

1) For a differential pressure sensor, positive pressure is applied to port P2.
2) Absolute pressure is measured at port P1; however, ensure that the pressure difference between ports P1 and P2 does not exceed the specified overpressure limit of the differential sensor in use.

Typical Operating Circuit



Notes

1) The load capacitance (C1, C2) at pins OUT1 and OUT2 must not exceed 22 nF.
2) The external decoupling capacitor 100 nF (C3) must be connected between pins V_{CC} and GND.
3) The I²C signal lines must be connected to external pull-up resistors (R1, R2 ≥ 2 kΩ).
4) The I²C communication protocol is described in Application Note 005.
5) The I²C slave address for the differential pressure sensor is 0x6C, and for the absolute pressure sensor, it is 0x6E.

Ordering guide

Transducer type	Differential pressure range	Pressure direction	Absolute pressure range	Pressure tube
HPSD 3900	010M-D	0	1	S
	020M-D	B	2	L
	050M-D			
	100M-D			

Differential pressure range	
010M-D	10 mbar
020M-D	20 mbar
050M-D	50 mbar
100M-D	100 mbar

Pressure direction	
0	0 to pressure range
B	-press. range to +press. range (bidirectional)

Absolute pressure range	
1	200 to 1200 mbar
2	800 to 1200 mbar

Pressure tube	
S	SHORT (8,3 mm)
L	LONG (12,5 mm)

Other configurations are possible on special request.

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