

HPSD 4000 Pressure Transducer

General description

Pressure transducer HPSD 4000 is an OEM pressure sensing device. Signal conditioning consist of complete temperature compensation and adjusted amplifier in single, programmable ASIC. High performance and accuracy enables use of this transducer in many applications. Programmable temperature compensation provides 0,5%FS total error over 0 to 70°C temperature range. Standard ratiometric 0,5 to 4,5 V and I2C digital output at the same time give OEM users maximum freedom for any type of application with dry air or non-corrosive gases and liquids.

The whole group consists for pressure ranges from 10 mbar to 7 bar. Differential and absolute versions are available for this transducer group.

Features

- Single 5 V supply voltage
- Easy to use package
- Wide compensated range (0 to 70°C)
- **Total accuracy** down to **0,5%FS** (0 to 70°C)
all effects included (max)
- Standard 0,5 to 4,5 V voltage output
- Up to 15 bits I2C output (pressure + temperature)
- High performance OEM applications
- Differential and absolute pressure configurations
- Pressure ranges: from 10 mbar to 7 bar

Applications

- HVAC
- Medical instrumentation
- Respirators
- Air flow monitoring
- Process control
- Leak detection
- Altimeters



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HPSD 4000 Pressure Transducer

Types overview

$$T_{AMB} = 25^{\circ}\text{C}$$

$V_{cc} = 5\text{ V}$ unless otherwise noted.

Low pressure range

Pressure range	10 mbar (0,15 psi)	20 mbar (0,3 psi)	50 mbar (0,8 psi)	100 mbar (1,5 psi)
ID group	HPSD 4000-010M	HPSD 4000-020M	HPSD 4000-050M	HPSD 4000-100M
Pressure types	differential/ bidirectional differential	differential/ bidirectional differential	differential/ bidirectional differential	differential/ bidirectional differential
V_{OUT}	0,5 to 4,5 V	0,5 to 4,5 V	0,5 to 4,5 V	0,5 to 4,5 V
Temperature ranges	Operating: -25 to 85°C Compensated: 0 to 70°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

High pressure range

Pressure range	350 mbar (5 psi)	1 bar (15 psi)	2 bar (30 psi)	4 bar (60 psi)	7 bar (100 psi)
ID group	HPSD 4000-350M	HPS D4000-001B	HPSD 4000-002B	HPSD 4000-004B	HPSD 4000-007B
Pressure types	differential/ bidirectional differential	differential/ bidirectional absolute	differential/ bidirectional absolute	differential/ bidirectional absolute	differential/ bidirectional absolute
V_{OUT}	0,5 to 4,5 V	0,5 to 4,5 V	0,5 to 4,5 V	0,5 to 4,5 V	0,5 to 4,5 V
Temperature ranges	Operating: -25 to 85°C Compensated: 0 to 70°C Storage : -40 to 125°C				
Over pressure ¹⁾	1 bar	3 bar	6 bar	8 bar	14 bar
Burst pressure ²⁾	1,7 bar	5 bar	10 bar	12 bar	21 bar

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Performance characteristics

 $T_{AMB} = 25^{\circ}\text{C}$
 $V_{CC} = 5\text{ V}$ unless otherwise noted.

Parameter	Symbol	Min.	Typ.	Max.	Unit
Power supply					
Supply voltage	V_{CC}	4,75		5,25	V
Current consumption	I_{CC}		4	6,5	mA
Analog output (pressure)³⁾					
Offset voltage ⁴⁾	V_O		0,50		V
Full scale output (FSO) ⁵⁾	V_{FS}		4,50		V
Full scale span (FSS) ⁶⁾	V_{FSO}		4,00		V
Offset voltage (bidirectional devices)	V_O		2,50		V
Digital output (pressure), 15 bits³⁾					
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 bits⁷⁾					
Temperature output @ 0°C	T_o		8192		counts
Temperature output @ 70°C	T_s		24576		counts
Accuracy (pressure) @ 25°C⁸⁾					
Low pressure (10 mbar FS devices)	E_a		0,3	±0,5	%FSO
Low pressure (20 to 100 mbar FS devices)	E_a		0,2	±0,4	%FSO
Standard pressure	E_a		0,1	±0,3	%FSO
Total accuracy (pressure) @ 0 to 70°C⁹⁾					
Low pressure (10 mbar FS devices)	E_{ta}		0,5	±1	%FSO
Low pressure (20 to 100 mbar FS devices)	E_{ta}		0,3	±0,5	%FSO
Standard pressure (all other devices)	E_{ta}		0,2	±0,5	%FSO
Resolution					
A/D converter	D_i			15	bit
D/A converter	D_o		11		bit
Response time	E_{rt}		1,5		ms
Repeatability ¹⁰⁾	E_r		±0,05		% FSO
Nonlinearity & pressure hysteresis (BFSL) ¹¹⁾	E_l		±0,1	±0,3	% FSO
Load resistance	R_L	2		∞	k
Media compatibility		See spec. note ^{12), 13)}			
Weight	W		9		g

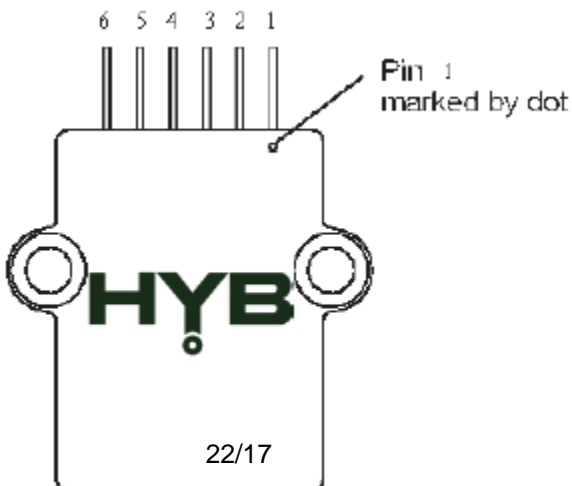
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Specification notes

- 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) Analog output signal is ratiometric to power supply V_{cc} , digital signal is not ratiometric to the power supply.
- 4) Offset voltage is the voltage output at zero pressure.
- 5) Full scale output is the voltage output 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 0 to 70°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 Al_2O_3 , gold, epoxy, polymer.
- 13) Media compatibility: on pressure port P2: noncorrosive gases or liquids to RTV, ceramics Al_2O_3 , epoxy, polymer.

Pinout



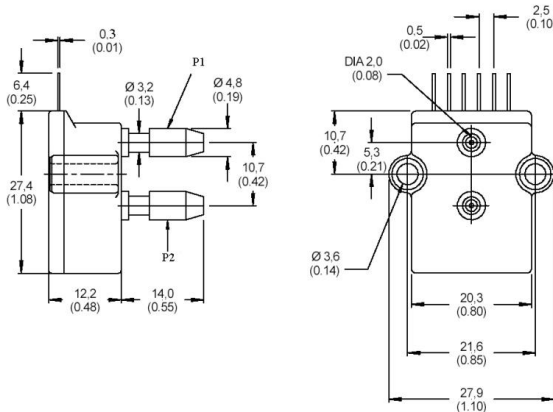
Pin number	Output
1	GND
2	SDA
3	SCL
4	OUT
5	N/C ¹
6	IN

¹– Pin 5 must be left unconnected

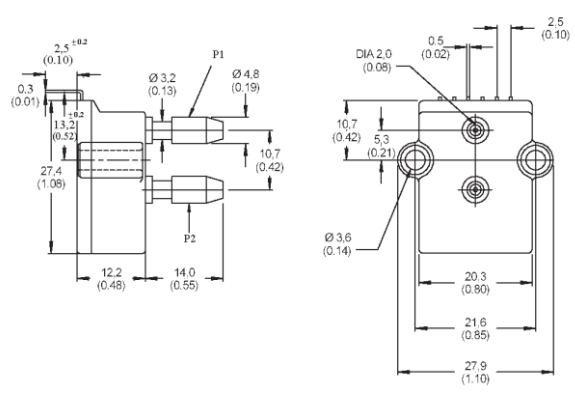
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Outline dimensions

1) PINS STRAIGHT:



2) PINS CURVED:



Transducer type	Pressure range	Pressure type	Pressure direction	Pressure port	Pressure tube
HPSD 4000	010M	D	0	P	S
	020M	A	B	N	C
	050M				
	100M				
	350M				
	001B				
	002B				
	004B				
	007B				

Pressure range	
010M	10 mbar
020M	20 mbar
050M	50 mbar
100M	100 mbar
350M	350 mbar
001B	1 bar
002B	2 bar
004B	4 bar
007B	7 bar

Pressure type	
D	Differential
A	Absolute (for p ≥ 1 bar)

Pins	
S	Straight
C	Curved

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

Pressure port	
P	Positive pressure on P1
N	Positive pressure on P2

Other configurations possible on special request.

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