AMS 5612
Calibrated and temperature compensated pressure sensor

FEATURES

- **Calibrated and temperature compensated pressure sensor, fully analog**

- **Differential, gage / relative and absolute versions**

- **Standard and low pressure types (ranges from 0 .. 0.3 PSI up to 0 .. 15 PSI)**

- **Unamplfied ratiometric mV-output signal -typ. 25 mV FSO for low pressure types -typ. 40 mV FSO for standard pressure types**

- **Constant voltage excitation up to 20 V**

- **0 .. 60 ºC compensated temperature range**

- **High performance, stable silicon chip**

- **Dual in-line package (DIP)**

- **REACH and RoHS compliant**

GENERAL DESCRIPTION

AMS 5612 is a series of unamplified, laser trimmed pressure sensors with differential, ratiometric mV output signal. They are designed for constant voltage excitation with a supply voltage up to 20 V. All AMS 5612 are calibrated and temperature compensated within a range of 0 .. 60 °C.

AMS 5612 comes as a dual in-line package (DIP) for assembly on printed circuit boards (PCBs). The electrical connection is made via the DIP solder pins; pressure is connected via vertical metal tubes.

The AMS 5612 series uses micromachined high quality piezoresistive silicon pressure sensor chips in a ceramic package. The calibration of offset and span as well as temperature compensation is done individually during the manufacturing process by laser trimming of thick film resistors. The fully analog construction of this series enables precision, high speed measurements combined with an excellent long-term stability.

TYPICAL APPLICATIONS

- Industrial control

- Medical equipment

- Respiration control

- Level detection

- Flow measurement

- Barometric pressure measurement

- Vacuum monitoring

- Heating, Ventilation and Air Conditioning (HVAC)
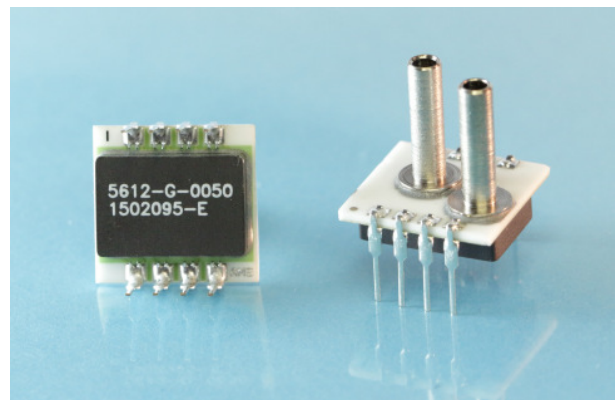
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Analog Microelectronics GmbH
An der Fahrt 13, D – 55124 Mainz

your distributor
www.amsys.de

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PRESSURE RANGES

Sensor type (code)	Pressure type	Pressure range in PSI	Burst pressure[1] in PSI	Pressure range in mbar	Burst pressure[1] in bar
Low pressure					
AMS 5612-0003-D	differential	0 .. 0.3	> 3	0 .. 20.68	> 0.2
AMS 5612-0008-D	differential	0 .. 0.8	> 8	0 .. 55.16	> 0.5
AMS 5612-0015-D	differential	0 .. 1.5	> 15	0 .. 103.4	> 1
AMS 5612-0030-D	differential	0 … 3	> 30	0 .. 206.8	> 2
AMS 5612-0003-G	relative / gage	0 .. 0.3	> 3	0 .. 20.68	> 0.2
AMS 5612-0008-G	relative / gage	0 .. 0.8	> 8	0 .. 55.16	> 0.5
AMS 5612-0015-G	relative / gage	0 .. 1.5	> 15	0 .. 103.4	> 1
AMS 5612-0030-G	relative / gage	0 .. 3	> 30	0 .. 206.8	> 2
Standard pressure					
AMS 5612-0050-D	differential	0 .. 5	> 25	0 .. 344.7	> 1.7
AMS 5612-0150-D	differential	0 .. 15	> 72	0 .. 1034	> 5
AMS 5612-0050-G	relative / gage	0 .. 5	> 25	0 .. 344.7	> 1.7
AMS 5612-0150-G	relative / gage	0 .. 15	> 72	0 .. 1034	> 5
AMS 5612-0150-A	absolute	0 .. 15	> 72	0 .. 1034	> 5

Table 1: **AMS 5612 standard pressure ranges (other ranges on request)**

Notes:

1) Burst pressure is defined as the maximum pressure which can be applied to one pressure port relative to the other port (or while only one pressure port is connected) without causing leaks in the sensor.

MAXIMUM RATINGS

Parameter	Minimum	Typical	Maximum	Units
Maximum supply voltage: $V_{S,max}$			20	V
Operating and storage temperature: T [1]	-40		125	°C
Common mode pressure: p_{CM} [2]			175	PSI

Table 2: **Maximum ratings**

Notes:

1) Temperature effects on offset and span are only specified within a temperature range of 0 .. 60 °C. For negative temperature the thermal effect on span becomes increasingly nonlinear.

2) Common mode pressure is defined as the maximum pressure, which can be applied simultaneously on both pressure ports of a differential or relative / gage transmitter without causing damages, while no differential pressure is applied.

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SPECIFICATIONS

All parameters apply to V_S = 10.0 V and T_{op} = 25 °C, unless otherwise stated.

| Parameter	Minimum	Typical	Maximum	Units
Supply voltage (V_S) [1]	>0	10	20	V
Analog output signal [2]				
@ specified minimum pressure [3] (offset)	-2.0	0	2.0	mV
Full span output (FSO) [4] – low pressure sensors	24.5	25.0	25.5	mV
Full span output (FSO) [4] – standard pressure sensors	39.5	40.0	40.5	mV
Performance @ T = 25 °C				
Nonlinearity [5], [6]			± 0.3	%FSO
Repeatability		± 0.05	± 0.2	%FSO
Pressure hysteresis		± 0.05	± 0.2	%FSO
Temperature Performance (range T = 0 .. 60 °C)				
Thermal effect on span [7]			± 1.00	%FSO
Thermal effect on offset [8]			± 1.00	%FSO
Temperature hysteresis			± 0.30	%FSO
Impedance				
Input	4.50	8.0	25.0	kΩ
Output	2.00	2.50	3.80	kΩ
Position sensitivity [9] (low press. sensors only)			< 0.15	%FSO
Long-term stability			< 1.0	%FSO/a
Pressure changes	10^6			
Calibrated temperature range	0		60	°C
Weight		3		g
Media compatibility	See "Specification notes"[10], [11]			

Table 3: **Specifications**

SPECIFICATION NOTES

1) Supply voltage is defined as voltage between pin 4 and pin 2 (see *Figure 2*).
2) The analog output signal is ratiometric to the supply voltage.
3) See *Table 1*
4) The specified Full Span Output (FSO) is the algebraic difference between the output signal at the specified maximum pressure and the output signal at the specified minimum pressure at V_S = 10 V.
5) The maximum deviation from the best fit straight line across the specified pressure range.
6) For AMS 5612-0150-G nonlinearity is smaller than 0.5 %FSO.
7) Thermal effect on span is defined as the maximum deviation from the span value at room temperature measured at any temperature within the compensated temperature range. It is given in %FSO.
8) Thermal effect on offset is defined as the maximum deviation from the offset value at room temperature measured at any temperature within the compensated temperature range. It is given in %FSO.
9) The position sensitivity is defined as the maximum change in output due to a change in orientation relative to the Earth's gravitational field, when no pressure difference is applied.
10) Media compatibility of port 1 (see *Figure 2*): fluids and gases non-corrosive to silicon, Pyrex, RTV silicone rubber.
11) Media compatibility of port 2 (see *Figure 2*): clean, dry gases, non-corrosive to silicon, RTV silicone rubber, aluminium, gold (alkaline or acidic liquids can destroy the sensor).

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EQUIVALENT CIRCUIT

The equivalent circuit of the AMS 5612 series is shown in *Figure 1*.
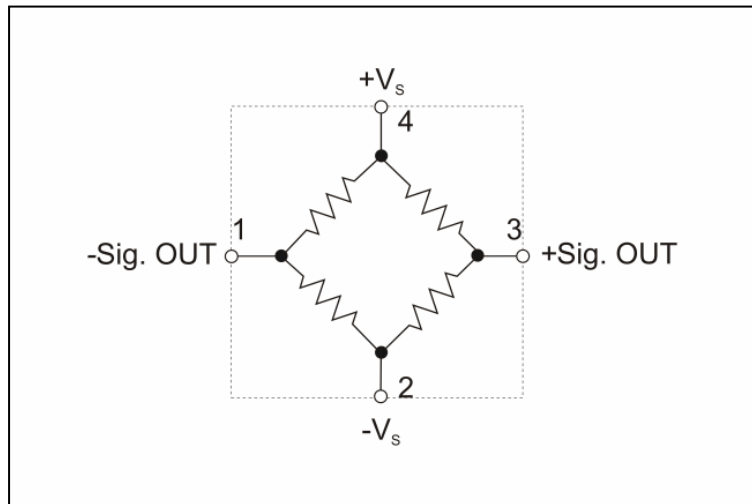
Figure 1: **Equivalent circuit**

INITIAL OPERATION

The sensors are connected electrically by mounting them on a PCB. The supply voltage has to be connected between pin 4 and pin 2. The differential output voltage is given between pin 3 and pin 1.

Important: *DO NOT connect to unlabeled pins (pin 5 .. pin 8)!*

The sensor pressure connection is made using the metal pressure ports (hose connectors) on top of the ceramic substrate. Depending on the type of sensor and measuring pressure one or two of the pressure ports have to be connected to the measuring media / volume.

Port 1 is connected to the back side of the sensor die, port 2 is connected to the top side of the die (for port definitions see *Figure 2*). Positive pressure is defined as entry on the back side of the die.

The output voltage of the sensor is positive, if the following conditions are fulfilled (according to the definition p_1 = pressure at port 1 and p_2 = pressure at port 2):

Differential sensors	$p_1 > p_2$
Gage / relative sensors:	p_1 = measuring pressure > ambient pressure
Absolute sensors	p_2 = measuring pressure

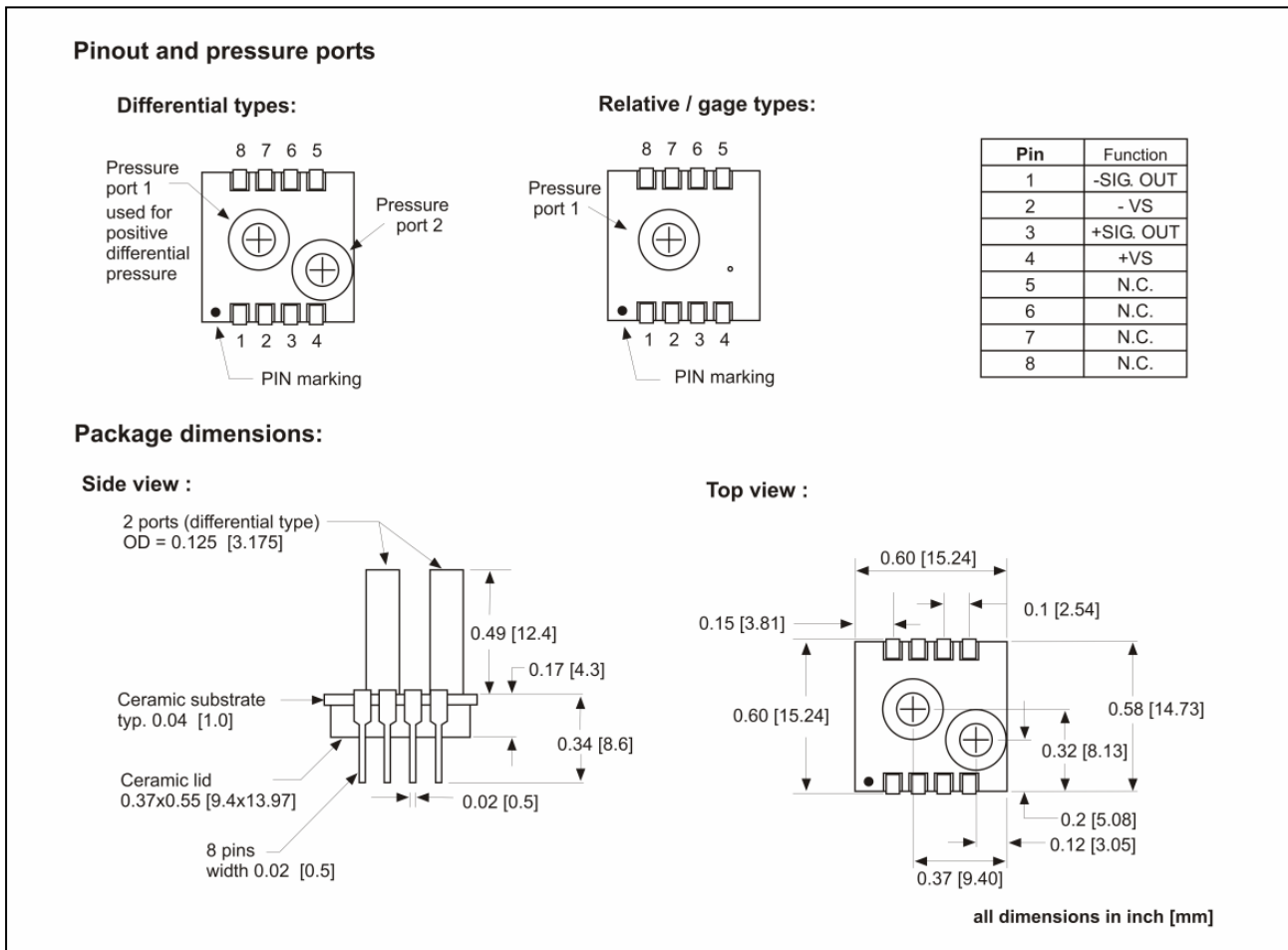The guidelines governing media compatibility must be taken into account here (see "Specification notes", 10) and 11)).

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DIMENSIONS AND PINOUT

AMS 5612 pressure sensors come in a dual-in-line package (DIP) for assembly on printed circuit boards.

Figure 2 below gives the pinout and dimensions of the dual in-line package.

Figure 2: Dimensions

All sensors in the AMS 5612 series are maintenance free during their lifetime.

Notes:

1. For absolute pressure types only pressure port 2 is available.
2. A package without tubes (for O-ring sealing) is also possible.
3. For pressure connections up to 30 PSI Analog Microelectronics recommends silicone tubing (inner diameter Ø=2mm, outer diameter Ø=6mm).

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INFORMATION FOR ORDERING

Ordering code:

Model   Pressure type

AMS 5612-0015-D
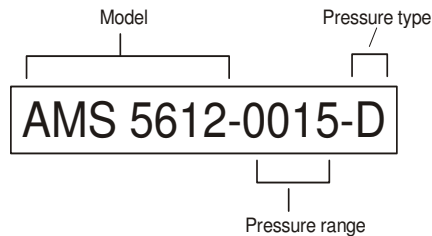
Pressure range

Pressure range:

Pressure range code	PSI	mbar	kPa
0003	0.3	20.68	2.068
0008	0.8	55.16	5.516
0015	1.5	103.4	10.34
0030	3.0	206.8	20.68
0050	5.0	344.7	34.47
0150	15	1034	103.4

Table 4: Pressure ranges

Pressure type:

Pressure type code		Available pressure ranges
D	differential / relative (gage)	0 .. 0.3 PSI to 0 .. 15 PSI
G	gage (relative)	0 .. 0.3 PSI to 0 .. 15 PSI
A	absolute	0 .. 15 PSI

Table 5: Pressure types

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