

# COMPENSATED AND CALIBRATED LOW PRESSURE SENSOR



**SILICON  
MICROSTRUCTURES  
INCORPORATED**  
*Member of the ELMOS Group*

Product Number: SM5651

## HIGHLIGHTS

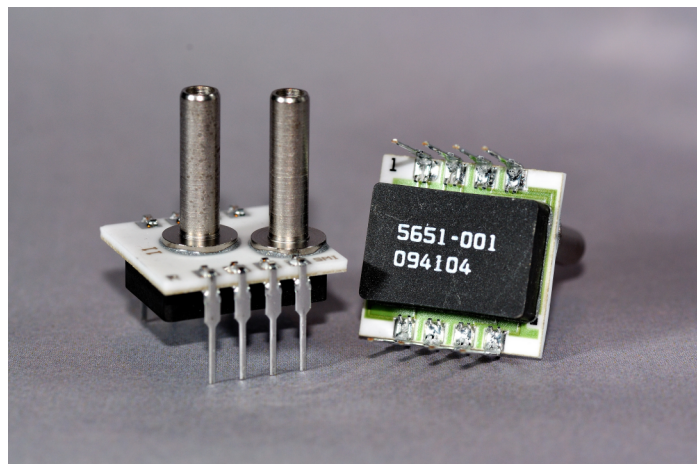
- Low pressures for sensitive applications
- Constant current driven
- Dual inline package (DIP)
- Fully temperature compensated and calibrated
- Primary pressure port on back-side of sensor die, protecting front-side of sensor
- Span calibration using integrated resistor and external op-amps

## TYPICAL APPLICATIONS

- Medical equipment
- Respiration
- HVAC
- Level detection
- Flow measurement
- Industrial control

## TECHNICAL FEATURES

- 0.15, 0.3, 1.5 PSI / 1.0, 2.1, 10.3 kPa
- Constant current or constant voltage drive
- Easy-to-use dual inline package (DIP)
- Zero offset calibration
- High-performance, stable packaged silicon chip
- Wide 0-60°C compensated temperature range



## DESCRIPTION

The SM5600 Series of OEM pressure sensors are calibrated, temperature-compensated low-pressure sensors in dual in-line packages for printed circuit board mounting. These sensors offer improved performance as well as the option for constant current excitation. With the ability to detect pressure ranges as low as 0.15 PSI full scale, the SM5651 is ideal for applications requiring extreme sensitivity, from respiration to air filter obstructions.

The SM5600 Series pressure sensors are constructed by attaching a highly stable piezoresistive pressure sensor chip to a ceramic substrate. Thick film resistors on the ceramic are laser trimmed during manufacturing to provide zero offset calibration, temperature compensation for zero offset, and temperature compensation for sensitivity. In the SM5651 an additional resistor is trimmed to normalize the output of an external differential amplifier to provide span calibration when the sensor is driven by a constant current supply.

The SM5651 is designed for constant current excitation.

Various pressure port configurations are available for flexibility in matching this product to specific applications.



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## ABSOLUTE MAXIMUM RATING TABLE FOR SM5651

All parameters are specified at  $V_{SUPPLY} = 5.00$  V DC supply at room temperature, unless otherwise noted.

No.	Characteristic	Symbol	Minimum	Typical	Maximum	Units
1	Excitation Current	$I_{SUPPLY}$	0	1.5	3.0	mA
2	Proof Pressure <sup>(d)</sup>	$P_{PROOF}$	10x			$P_{RANGE}$
3	Burst Pressure <sup>(d)</sup>	$P_{BURST}$	15x			$P_{RANGE}$
4	Operating Temperature <sup>(d)</sup>	$T_{OP}$	-40		+125	°C
5	Storage Temperature <sup>(d)</sup>	$T_{STG}$	-40		+125	°C
6	Media Compatibility <sup>(d)</sup>					

## OPERATING CHARACTERISTICS FOR SM5651 - SPECIFICATIONS

All parameters are specified at  $V_{SUPPLY} = 5.00$  V DC supply at room temperature, unless otherwise noted.

No.	Characteristic	Symbol	Minimum	Typical	Maximum	Units
7	Span (FS $p_{RANGE}$ ) <sup>(a),(b)</sup>	$V_{SPAN}$	25.0	45.0	75.0	mV
8	Zero Offset	$V_{ZERO}$	-2.0	+0.2	+2.0	mV
9	Pressure Hysteresis <sup>(d)</sup>	$H_{PZERO}$	-0.30	0.05	0.30	%FS
10	Resistance Input	$R_B$	1.8	3.0	3.8	kΩ
11	Resistance Output	$R_{B,OUT}$	2.7	3.3	3.8	kΩ
12	Compensated Temp. Range <sup>(c)</sup>	$T_{COMP}$	0		60	°C

No.	Characteristic	Symbol	Minimum	Typical	Maximum	Units
13	TC of Span <sup>(c)</sup>	TCS	-2.0	0.2	2.0	%FS
14	TC Zero Offset <sup>(c)</sup>	TCZ	-2.0	0.2	2.0	%FS
15	Temperature Hysteresis <sup>(d)</sup>	$H_T$	-0.65	0.05	0.65	%FS
16	Linearity <sup>(d)</sup>	NL	-2.50	0.05	2.50	%FS
17	Repeatability <sup>(d)</sup>	REP	-0.30	0.05	0.30	°C
18	Sensitivity Matching <sup>(a),(b),(d)</sup>	$S_M$		-0.2		%FS

??? Add explanation note, add gain set resistor ???

No.	Characteristic	Symbol	Minimum	Typical	Maximum	Units
19	TC of Span <sup>(c)</sup>	TCS	-0.75	0.2	0.75	%FS
20	TC Zero Offset <sup>(c)</sup>	TCZ	-1.0	0.2	1.0	%FS
21	Temperature Hysteresis <sup>(d)</sup>	$H_T$	-0.45	0.05	0.45	%FS
22	Linearity <sup>(d)</sup>	NL	-0.50	0.05	0.50	%FS
23	Repeatability <sup>(d)</sup>	REP	-0.30	0.05	0.30	°C
24	Sensitivity Matching <sup>(a),(b),(d)</sup>	$S_M$		-0.2		%FS

## NOTES:

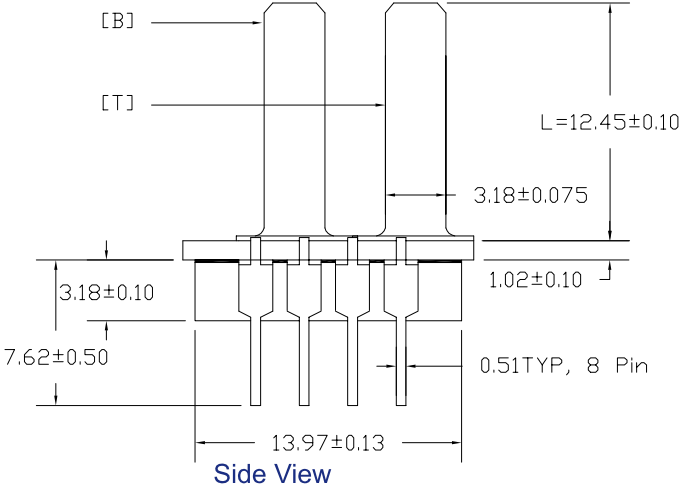
- (a) Positive Pressure is defined as entry on the bottom side of the die; gain, during factory calibration, is set using negative pressure.  
 (b) Values given for top side.  
 (c) Measured over a temperature range of 22°C to 58°C.  
 (d) Tested on a sample basis.  
 (e) For comp. temp. range, see spec no. 12

## QUALIFICATION STANDARDS

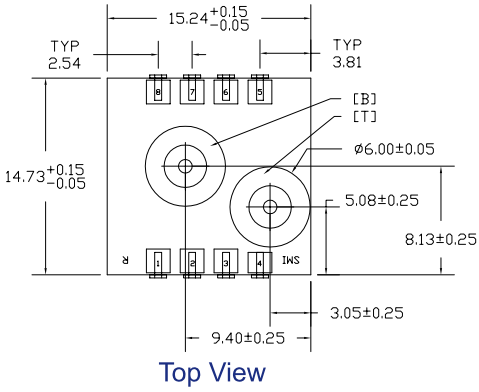
→ For qualification specifications please contact Sales at sales@si-micro.com

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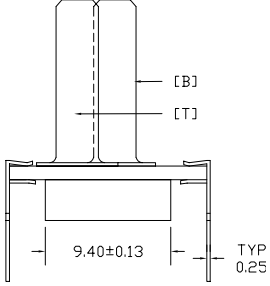
### Package Dimensions & Pin-Out



Side View



Top View



PIN	DESCRIPTION
1	Sig-
2	Iexc-
3	Sig+
4	Iexc+
5	Gainset Resistor
6	Gainset Resistor
7	NC
8	NC

All dimensions are shown in millimeters

NOTES:

- Do not connect to NC pins.
- External connections to NC pins will cause part malfunction.
- Tolerance on all dimensions ±0.13 mm unless otherwise specified.
- [B] is tube connected to bottom side of sensor die.
- [T] is tube connected to top side of sensor die.
- Tube [B] is used for positive differential pressure.

Pin Configuration

- Pins opposite direction of tube

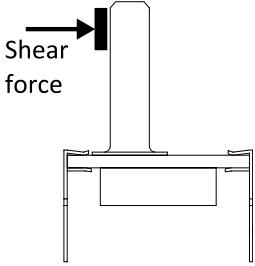
Pressure Type

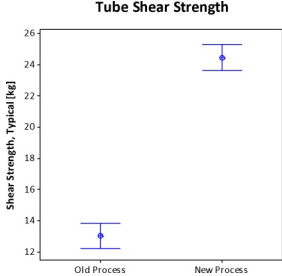
D: Differential (2 Tubes)

Tube Length

L: Long (12.45 mm ± 0.10 mm)

S: Short (8.25 mm ± 0.10 mm)





Tube Shear Strength

Ordering information

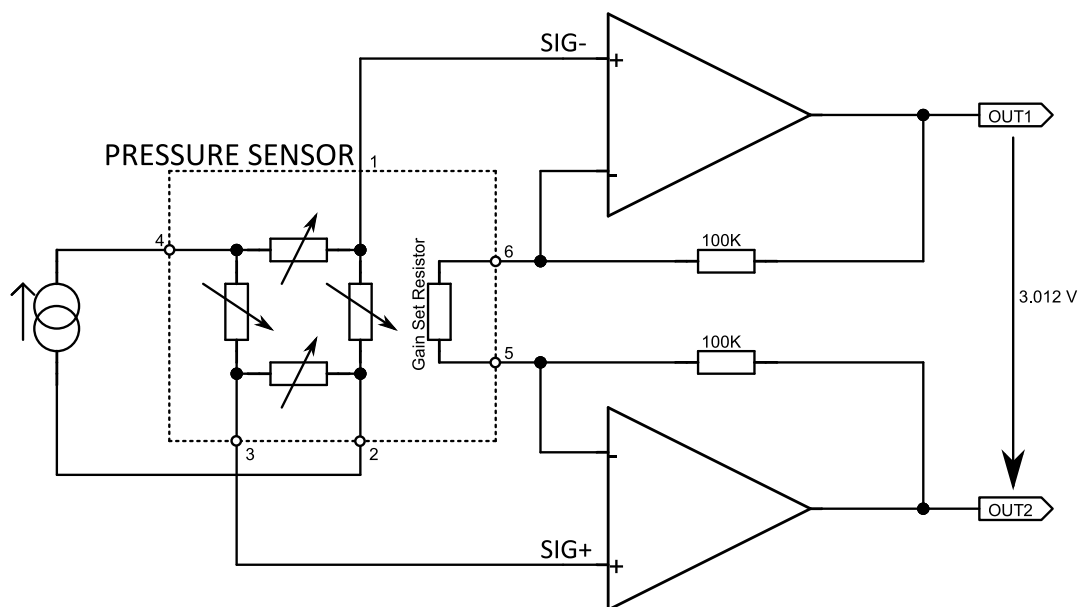
Order Code	Pressure Type	Full-Scale Pressure Range	Tube Length
5651-001-D-3-LR	Differential	0.15 PSI / 1.0 kPa	Long
5651-001-D-3-SR	Differential	0.15 PSI / 1.0 kPa	Short
5651-003-D-3-SR	Differential	0.3 PSI / 2.1 kPa	Short
5651-015-D-3-SR	Differential	1.5 PSI / 10.3 kPa	Short

For samples, please contact [sales@si-micro.com](mailto:sales@si-micro.com).

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## Wiring Diagrams

Typical Circuit Configuration for SM5651



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