

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 intergrated 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.



Product Number: SM5651

ABSOLUTE MAXIMUM RATING TABLE FOR SM5651

All parameters are specified at VSUPPLY = 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 ^(d)	P_{PROOF}	10x			P_{RANGE}
3	Burst Pressure ^(d)	P_{BURST}	15x			P_{RANGE}
4	Operating Temperature ^(d)	T_{OP}	-40		+125	°C
5	Storage Temperature ^(d)	T_{STG}	-40		+125	°C
6	Media Compatibility ^(d)					

OPERATING CHARACTERISTICS FOR SM5651 - SPECIFICATIONS

All parameters are specified at VSUPPLY = 5.00 V DC supply at room temperature, unless otherwise noted.

No.	Characteristic	Symbol	Minimum	Typical	Maximum	Units
7	Span (FS p_{RANGE}) ^{(a),(b)}	V_{SPAN}	25.0	45.0	75.0	mV
8	Zero Offset	V_{ZERO}	-2.0	+0.2	+2.0	mV
9	Pressure Hysteresis ^(d)	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 ^(c)	T_{COMP}	0		60	°C

0.15 PSI / 1.0 kPa

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

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

0.3 PSI / 2.1 kPa

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

NOTES:

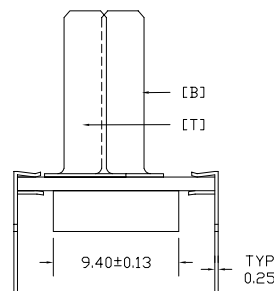
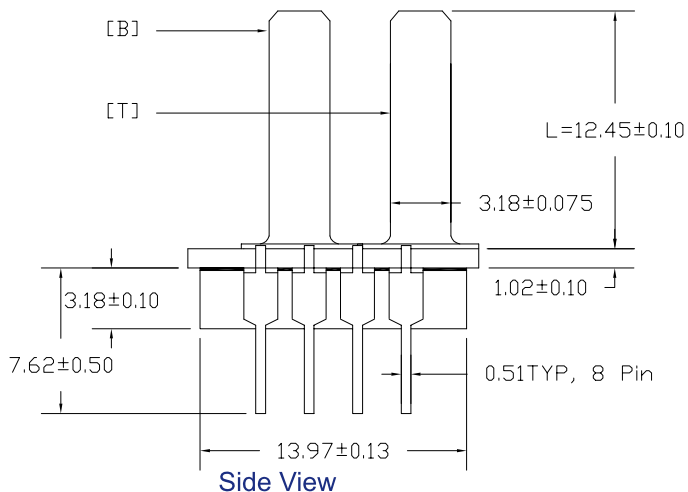
- (a) Positive Pressure is defined as entry on the bottom side of the die; gain, during factory calibration, is set using negative pressure.
- (b) Values given for top side.
- (c) Measured over a temperature range of 22°C to 58°C.
- (d) Tested on a sample basis.
- (e) For comp. temp. range, see spec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

QUALIFICATION STANDARDS

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

Product Number: SM5651

Package Dimensions & Pin-Out



PIN	DESCRIPTION
1	Sig-
2	lexc-
3	Sig+
4	lexc+
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

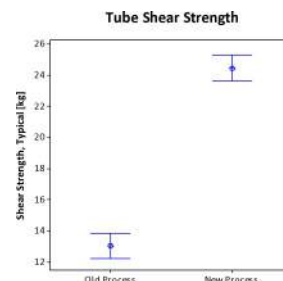
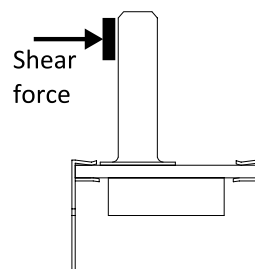
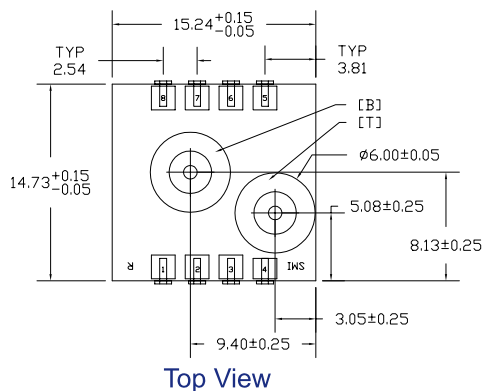
- Pins opposite direction of tube

Tube Length

- L: Long (12.45 mm \pm 0.10 mm)
- S: Short (8.25 mm \pm 0.10 mm)

Pressure Type

- D: Differential (2 Tubes)



Ordering information

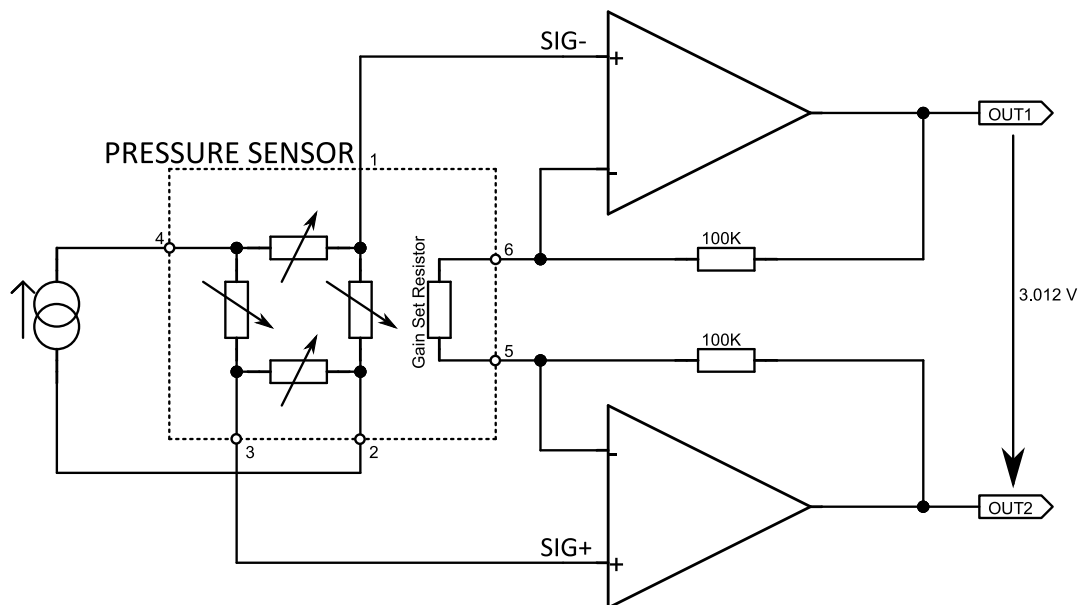
Order Code	Pressure Type	Full-Scale Pressure Range	Tube Length
5651-001-D-3-LR	Differential	0.15 PSI / 1.0 kPa	Long
5651-001-D-3-SR	Differential	0.15 PSI / 1.0 kPa	Short
5651-003-D-3-SR	Differential	0.3 PSI / 2.1 kPa	Short
5651-015-D-3-SR	Differential	1.5 PSI / 10.3 kPa	Short

For samples, please contact sales@si-micro.com.

Product Number: SM5651

Wiring Diagrams

Typical Circuit Configuration for SM5651



Product Number: SM5651

Silicon Microstructures Warranty and Disclaimer:

Information in this document is provided solely to enable software and system implementers to use Silicon Microstructures, Inc. products and/or services. No express or implied copyright licenses are granted hereunder to design or fabricate any silicon-based microstructures based on the information in this document.

Silicon Microstructures, Inc. makes no warranty, representation, or guarantee regarding the suitability of its products for any particular purpose, nor does Silicon Microstructures, Inc. assume any liability arising out of the application or use of any product or silicon-based microstructure, and specifically disclaims any and all liability, including without limitation consequential or incidental damages. "Typical" parameters which may be provided in Silicon Microstructure's data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals", must be validated for each customer application by customer's technical experts. Silicon Microstructures, Inc. does not convey any license under its patent rights nor the rights of others. Silicon Microstructures, Inc. makes no representation that the circuits are free of patent infringement. Silicon Microstructures, Inc. products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the Silicon Microstructures, Inc. product could create a situation where personal injury or death may occur. Should Buyer purchase or use Silicon Microstructures, Inc. products for any such unintended or unauthorized application, Buyer shall indemnify and hold Silicon Microstructures, Inc. and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that Silicon Microstructures, Inc. was negligent regarding the design or manufacture of the part.

Silicon Microstructures, Inc. warrants goods of its manufacture as being free of defective materials and faulty workmanship. Silicon Microstructures, Inc. standard product warranty applies unless agreed to otherwise by Silicon Microstructures, Inc. in writing; please refer to your order acknowledgement or contact Silicon Microstructures, Inc. directly for specific warranty details. If warranted goods are returned to Silicon Microstructures, Inc. during the period of coverage, Silicon Microstructures, Inc. will repair or replace, at its option, without charge those items it finds defective. The foregoing is buyer's sole remedy and is in lieu of all warranties, expressed or implied, including those of merchantability and fitness for a particular purpose. In no event shall Silicon Microstructures, Inc. be liable for consequential, special, or indirect damages.

While Silicon Microstructures, Inc. provides application assistance personally, through its literature and the Silicon Microstructures, Inc. website, it is up to the customer to determine the suitability of the product for its specific application. The information supplied by Silicon Microstructures, Inc. is believed to be accurate and reliable as of this printing. However, Silicon Microstructures, Inc. assumes no responsibility for its use. Silicon Microstructures, Inc. assumes no responsibility for any inaccuracies and/or errors in this publication and reserves the right to make changes without further notice to any products or specifications herein

Silicon Microstructures, Inc.TM and the Silicon Microstructures, Inc. logo are trademarks of Silicon Microstructures, Inc. All other service or product names are the property of their respective owners.

© Silicon Microstructures, Inc. 2001-2010. All rights reserved.