

# Medium Pressure Digital Sensor

**SM4331-BCE-S-005-000**  
**Differential Pressure Sensor**

## FEATURES

- Pressure range from -5 to 5 PSI; differential output
- 1.0%FS accuracy
- 16-bit digital, pressure calibrated and temperature compensated output
- I<sup>2</sup>C Digital Interface
- Compensated temperature range: -20 to 85°C
- Robust JEDEC SOIC-16 package for automated assembly
- Manufactured according to ISO9001 and ISO/TS 16949 standards



## DESCRIPTION

The SM4331 is a digital, medium pressure MEMS sensor offering state-of-the-art pressure transducer technology and CMOS mixed signal processing technology to produce a digital, fully conditioned, multi-order pressure and temperature compensated sensor in JEDEC standard SOIC-16 package with a dual vertical porting option. It is available in a differential pressure configuration.

Combining the pressure sensor with a signal-conditioning ASIC in a single package simplifies the use of advanced silicon micro-machined pressure sensors. The pressure sensor can be mounted directly on a standard printed circuit board and a high level, calibrated pressure signal can be acquired from the digital interface. This eliminates the need for additional circuitry, such as a compensation network or microcontroller containing a custom correction algorithm.

The SM4331 is shipped in sticks or tape & reel.

Medical	Industrial
Sleep Apnea	Airflow Measurement
CPAP	Pneumatic Gauges
Ventilators	Pressure Switches
Gas Flow Instrumentation	Safety Cabinets
Air Flow Monitors	Life Sciences
	Gas Flow Instrumentation
	HVAC

### 1. Absolute Maximum Ratings

All parameters are specified at Vdd = 3.3 V supply voltage at 25°C, unless otherwise noted.

No.	Characteristic	Symbol	Minimum	Typical	Maximum	Units
1	Supply Voltage	V <sub>DD</sub>	3.0		5.5	V
2	Supply Current	I <sub>VDD</sub>		3.2		mA
3	Compensated Temperature <sup>(b)</sup>	T <sub>COMP</sub>	-20		+85	°C
4	Operating Temperature <sup>(a)</sup>	T <sub>OP</sub>	-40		+105	°C
5	Storage Temperature <sup>(a)</sup>	T <sub>STG</sub>	-40		+125	°C
6	Proof Pressure <sup>(a, c)</sup>	P <sub>Proof</sub>			+/-25	PSI
7	Burst Pressure <sup>(a, d)</sup>	P <sub>Burst</sub>			+/-40	PSI

**Notes:**

- a. Tested on a sample basis.
- b. Clean, dry gas compatible with wetted materials. Wetted materials include silicon, epoxy, RTV (silicon), gold, aluminum and mold compound.
- c. Proof pressure is defined as the maximum pressure to which the device can be taken and still perform within specifications after returning to the operating pressure range
- d. Burst pressure is the pressure at which the device suffers catastrophic failure resulting in pressure loss through the device.

### 2. ESD

No.	Description	Symbol	Minimum	Maximum	Units
2.1	ESD HBM Protection at all Pins	V <sub>ESD(HBM)</sub>	-2	2	kV

### 3. External Components

No.	Description	Symbol	Min.	Typ.	Max.	Units
1	Supply bypass capacitor*	C <sub>VDD</sub>		100		nF
2	I2C Data and clock pull up resistors*	R <sub>p</sub>		4.7		kOhm

#### 4. OPERATING CHARACTERISTICS TABLE

All parameters are specified at V<sub>DD</sub> = 3.3 V DC supply voltage at 25°C, unless otherwise noted.

No.	Characteristic	Symbol	Minimum	Typical	Maximum	Units
9	Supply Voltage	V <sub>DD</sub>	3.0	3.3	3.6	V
10	Supply Current	I <sub>VDD</sub>		3		mA
11	Digital Pressure Output @ P <sub>MIN</sub> (-5 PSI)	OUT <sub>MIN</sub>		-26,214		Counts
12	Digital Pressure Output @ P <sub>MAX</sub> (5 PSI)	OUT <sub>MAX</sub>		+26,214		Counts
13	Digital Full Scale Span	FS		52,428		Counts
14	Resolution (Digital Output)			16		Bits
15	Update Rate			2000		S/sec
16	Bandwidth	BW		125		Hz
17	Digital Output Accuracy <sup>(e)</sup>	ACC	-1		+1	%FS

**Notes:**

e. The accuracy specification applies over all operating conditions. This specification includes the combination of linearity, repeatability, and hysteresis errors over pressure, temperature, and voltage.

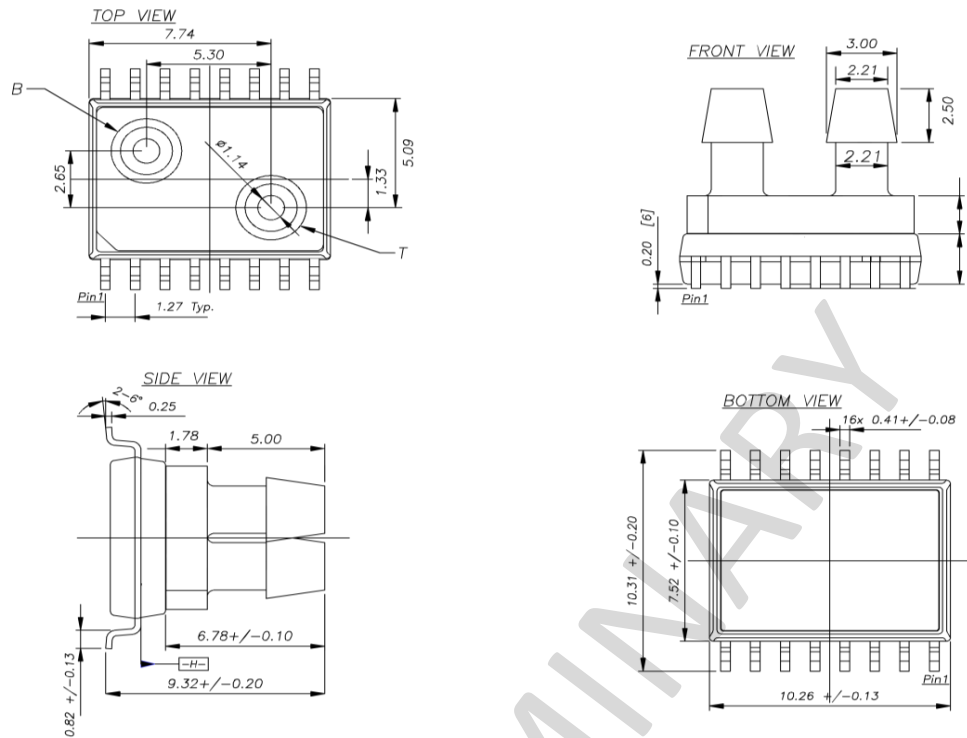
PRELIMINARY

#### Qualification Standards

- REACH Compliant
- RoHS Compliant
- PFOS/PFOA Compliant
- For qualification specifications, please contact Sales at sales@si-micro.com



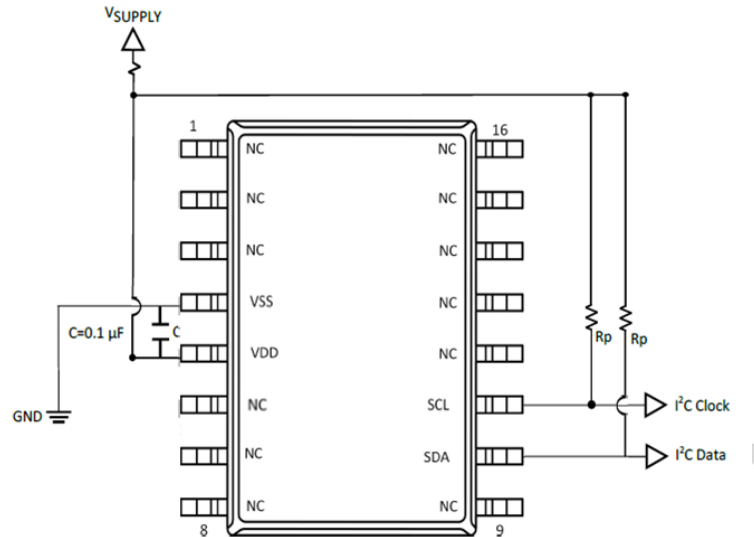
SOIC-16 Dual Vertical Package Dimensions



**Notes:**

- All dimensions in units of [mm]
- Moisture Sensitivity Level (MSL): Level 3
- Wetted materials: silicon, RTV (silicone), gold, aluminum, epoxy and mold compound.
- Tolerance on all dimensions  $\pm 0.13$  mm unless otherwise specified.
- [B] is tube connected to bottom side of sensor die.
- [T] is tube connected to top side of sensor die. Topside pressure is positive pressure. An increase in topside pressure will result in an increase in sensor output

SM4331 Applications Circuit



**NOTES:**

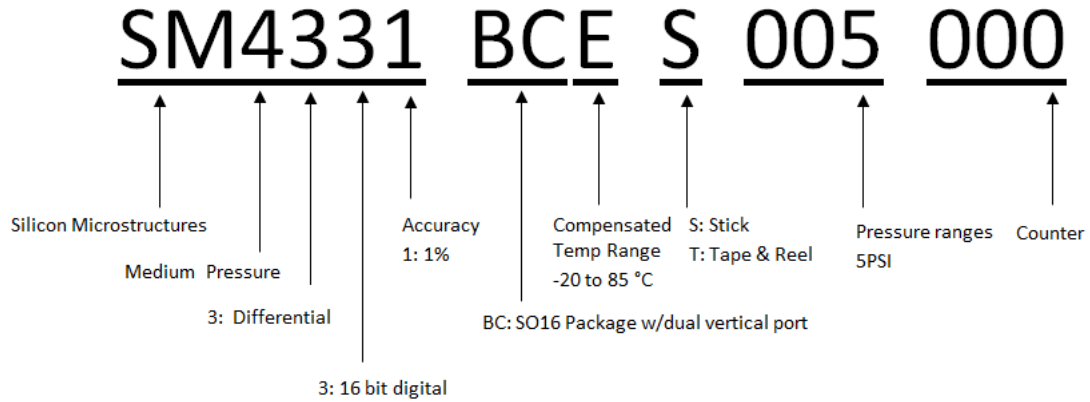
- The bypass capacitor C should be placed in close proximity to the device.

Package Labeling	
Pin No.	Pin Function
1	NC (No Connect)
2	NC
3	NC
4	VSS
5	VDD
6	NC
7	NC
8	NC
9	NC
10	SDA
11	SCL
12	NC
13	NC
14	NC
15	NC
16	NC

**NOTES:**

- Do not connect to NC pins

## Part Number Legend



PRELIMINARY

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