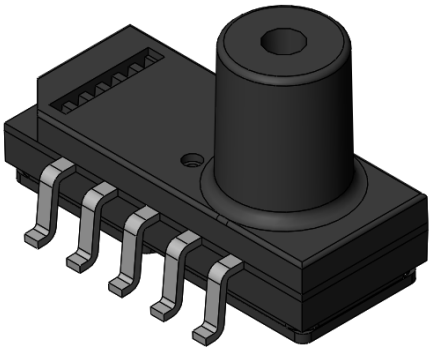
PRESSURE SENSORS

Medium Pressure Digital Sensor

SM1291-HGL-S-200-000
Gauge Pressure Sensor



FEATURES

- Pressure range of 0 to 200 kPa gauge output
- 16-bit digital, pressure calibrated and temperature compensated output
- I^2C Digital and Analog Interface
- Digital accuracy: ±1% full scale (1.5% analog accuracy)
- Compensated temperature range: 0 to +85°C
- Insensitive to mounting orientation
- Robust JEDEC SOIC-10 package for automated assembly
- Manufactured according to ISO9001 and ISO/TS 16949 standards

DESCRIPTION

The SM1291 is a digital, medium pressure MEMS sensor, with an optional analog output, offering state-of-the-art pressure transducer technology and CMOS mixed signal processing technology to produce a digital or analog, fully conditioned, pressure and temperature compensated sensor in JEDEC standard SOIC-10 package with vertical port. It is a gauge pressure sensor.

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 output interface. This eliminates the need for additional circuitry, such as a compensation network or microcontroller containing a custom correction algorithm.

The SM1291 is available for shipment in sticks or tape & reel.

+1-(408) 577-0100 / sales@si-micro.com / www.si-micro.com

1. Absolute Maximum Ratings

No.	Characteristic	Symbol	Minimum	Maximum	Units
1	Supply Voltage	V_{DD}	-0.3	6.0	V
2	Digital IO Voltage	$V_{IO,DIG}$	-0.3	VDD+0.3	V
3	Max. Digital IO Current (DC)	$I_{IO,DIG}$	-10	+10	mA
4	Storage Temperature[a]	T_{STG}	-40	+125	°C

No.	Characteristic	Symbol	Minimum
5	Proof Pressure[a, b, c]	P_{Proof}	310 kPa
6	Burst Pressure[a, b, d]	P_{Burst}	510 kPa

Notes:

a. Tested on a sample basis.
b. Clean, dry gas compatible with wetted materials. Wetted materials include plastic, silicon and RTV.
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
1	ESD HBM Protection at all Pins	$V_{ESD(HBM)}$	-2	2	kV

3. External Components

No.	Description	Symbol	Min.	Typ.	Max.	Units
1	Supply bypass capacitor*	C_{VDD}		100		nF
2	Pull Up Resistance at Analog Out Pin*	R_{LP}	2			kΩ
3	Pull Down Resistance at Analog Out Pin*	R_{LU}	2			kΩ
4	Load Capacitance at Analog Out Pin*	CL			22	nF
5	I^2C Data and clock pull up resistors*	R_P		4.7		kΩ

* Not tested in production

4. Recommended Operating Conditions

The recommended operating conditions must not be exceeded in order to ensure proper functionality of the device. All parameters specified in the following sections refer to these recommended operating conditions unless stated otherwise.

No.	Description	Symbol	Min.	Typ.	Max.	Units
1	Supply Voltage	V_{VDD}	3.0	3.3	3.6	V
2	Low level input voltage at SDA, SCL	$V_{IN,I2C,lo}$	-0.3		0.9	V
3	High level input voltage at SDA, SCL	$V_{IN,I2C,hi}$	0.8 * V_{VDD}		V_{VDD}+0.3	V
4	Compensated Temperature	T_{COMP}	0		+85	°C
5	Operating Temperature	T_A	0		+85	°C

5. Operating Characteristics Table

All parameters are specified at Vdd = 5V DC supply voltage at 25°C, unless otherwise noted.

No.	Characteristic	Symbol	Minimum	Typical	Maximum	Units
6	Current Consumption	I_{VDD}		4.5	5.6	mA
7	Pressure Output @ P_{MIN} = 0 kPa	OUT_{MIN}		-26,214		Counts
				10%		V_{DD}
8	Pressure Output @ P_{MAX} = 200 kPa	OUT_{MAX}		+26,214		Counts
				90%		V_{DD}
9	Full Scale Span	FSS		52,428		Counts
				80%		V_{DD}
10	Resolution			16		Bits
11	Update Rate			2000		Hz
12	Bandwidth			125		Hz
13	Digital Accuracy [e]	D ACC	-1		+1	%FS
14	Analog Accuracy [e]	A ACC	-1.5		+1.5	%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.

6. I²C Interface

No.	Description	Condition	Symbol	Min.	Typ.	Max.	Units
1	SDA output low voltage*	I_{SDA} = 3 mA	$V_{SDA,OL}$	0		0.4	V
2	Low-to-High transition threshold*	pins SA0, SCL	$V_{SDA,LH}$	50	60	70	%VDD
3	High-to-Low transition threshold*	pins SA0, SCL	$V_{SDA,HL}$	30	40	50	%VDD
4	I²C clock frequency*		f_{SCL}			400	kHz
5	Bus free time between a START and STOP condition*		t_{BUSF}	1300			ns
6	Clock low time*		t_{LO}	1300			ns
7	Clock high time*		t_{HI}	600			ns
8	START condition hold time*		t_{SH}	100			ns
9	Data setup time*		t_{SU}	100			ns
10	Data hold time*		t_H	0			ns
11	Setup time for repeated START condition*		t_{RSH}	600			ns
12	Setup time for STOP condition*		t_{PSU}	600			ns
13	Rise time of SDA and SCL signals*		t_R			300	ns
14	Fall time of SDA and SCL signals*		t_F			300	ns

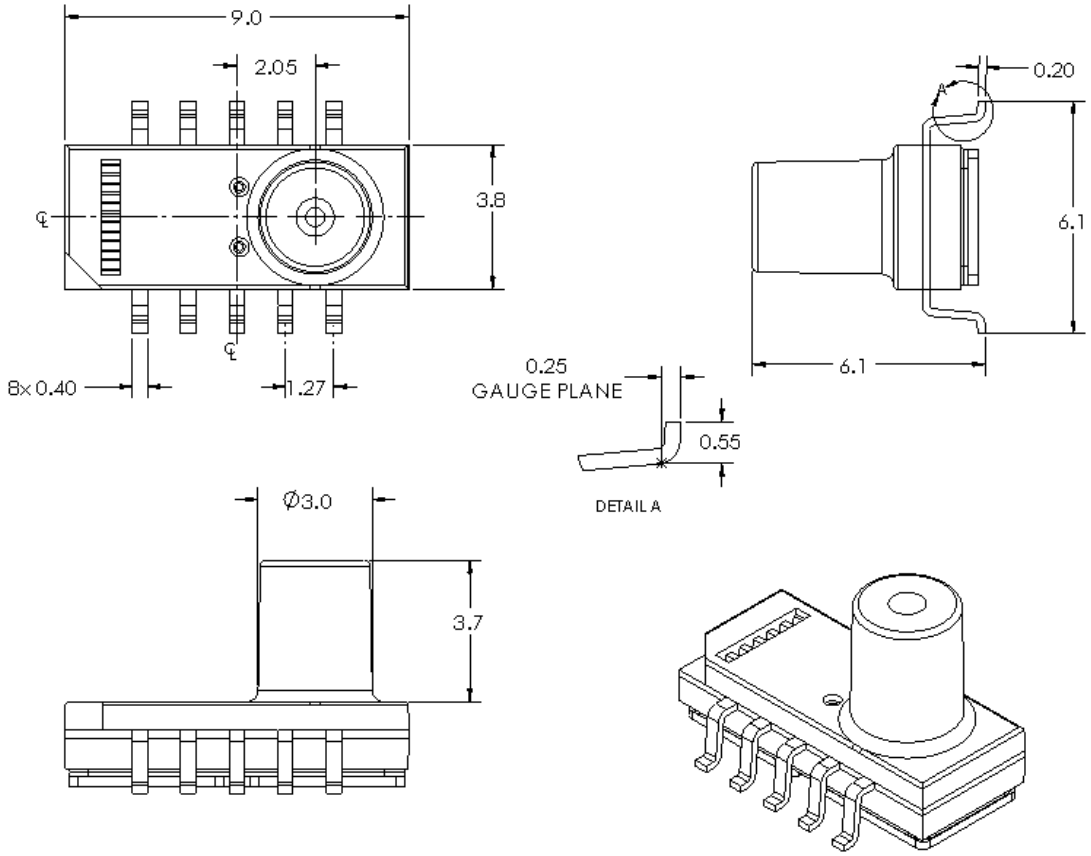
* Not tested in production

Qualification Standards

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

7. Package Reference

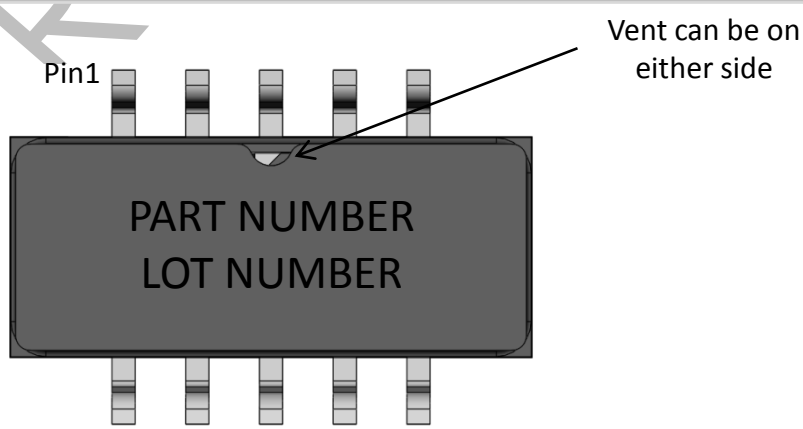
SM1291 Package Dimensions



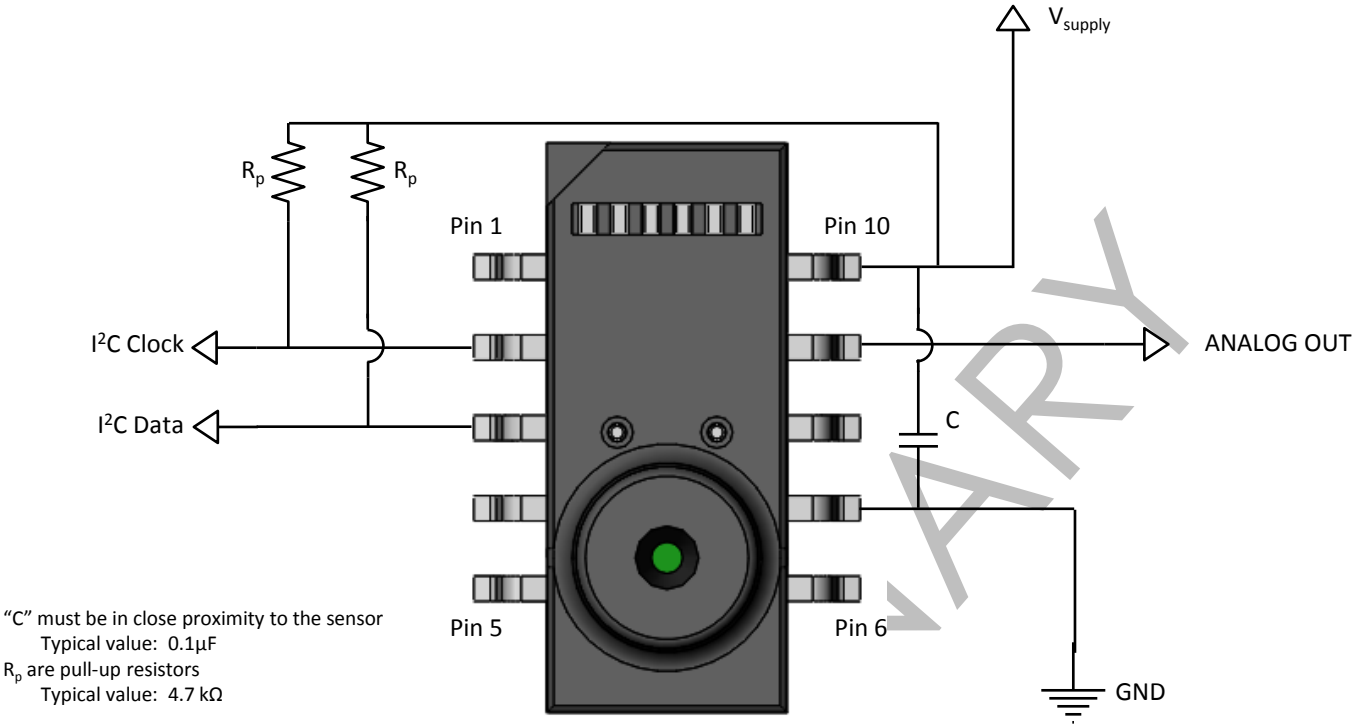
Notes:

- All dimensions in units of [mm]
- Moisture Sensitivity Level (MSL): Level 1
- Wetted materials: Silicon, RTV, Plastic

Part & Lot Number Identification



SM1291-Pin out Diagram



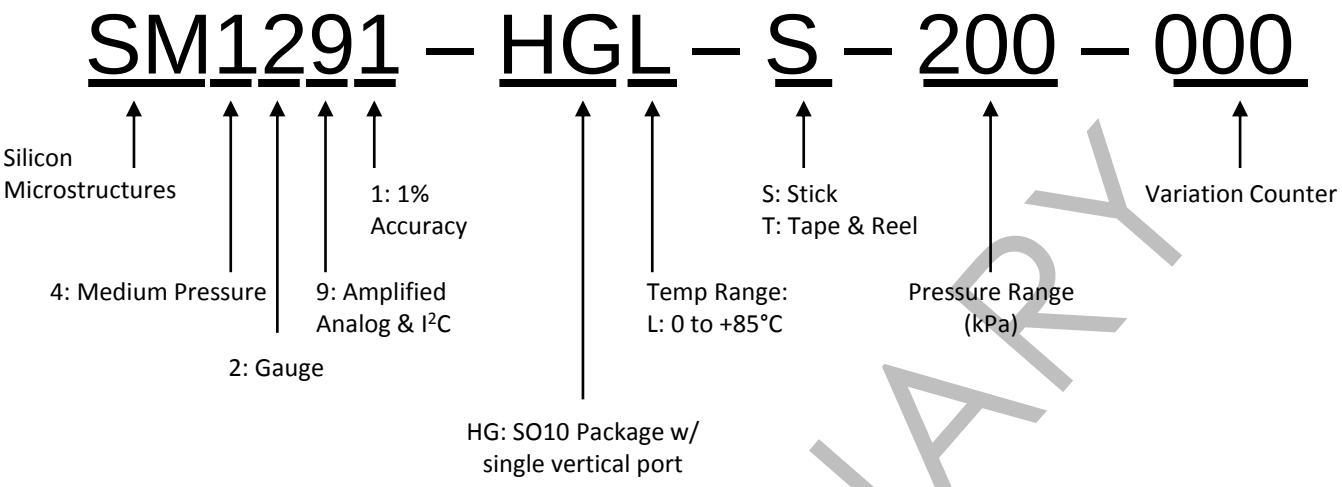
"C" must be in close proximity to the sensor
Typical value: 0.1µF
R_p are pull-up resistors
Typical value: 4.7 kΩ

Pin No.	Pin Function
1	NC
2	SCL
3	SDA
4	NC
5	NC
6	NC
7	GND
8	NC
9	Analog Out
10	Power

NOTES:

- Do not connect to NC pins

8. Part Number Legend



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