Solid State Pressure Sensor

V3.41

52-Series

FEATURES

- ✓ Compact SMD Package
- ✓ Increased Media Compatibility
- ✓ Standard, Customized or tailored
- ✓ Digital or Analog Output
- ✓ As low as 125 Pa
- ✓ Performance Ceramic

DESCRIPTION

The 52-Series is a miniature and robust pressure sensor with calibrated and temperature compensated SPI, I^2C or analog output . Multi-order compensation for correction of offset, sensitivity, thermal errors and nonlinearity are accomplished in factory via an internal DSP running a correction algorithm with calibration coefficients stored in on-chip EEPROM.

A variety of output configuration, including resolution, sampling rate, output interface are available to provide simple and ready-to-use solution for a wide rage of application. It can be operated in supply voltage of 3.3V or 5.0 V. Multiple chosen for pneumatic interface are suitable for system integration.

52-Series is not only excellent for differential pressure but also vented gauge and absolute from 125 Pa to 7 bar. Pinhole-free polymer coating is available. Please contact factory for detail.

Specifications – Basic

Parameters	Min	Typ	Max	Unit
Temp - Operating [1]	-20		85	℃
Temp - Compensated [2]	0		50	℃
Temp - Storage	-40		125	℃
Humidity [3]	0		95	%RH
Over-pressure [4, 7]	3x			FS
Burst Pressure [4, 8]	6x			FS
Long-term Stability [5]			1.0	%FS
Orientation Sensitivity [6]			0.04	%FS/g
ESD – HBM	-2		+2	kV
Vibration	20g, 10Hz to 2Hz			
Solder Reflow	J-STD-020 MSL 1			
Soldering Profile	260℃, 10 sec.			

NOTES:

1. -40 to 85 ℃ is available upon request.

2. Custom temperature compensation is available upon request.

3. Gas only, no condensation.

4. Range dependent. Refer to individual data sheet.

5. Zero stability to be tested with 120 hour hot storage at 85 ℃ , which is roughly equivalent to accelerated aging of the part for over a year at Room Temperature.

6. Measured orientation effect on the zero output of 0.15 psi sensor with a standard deviation of 0.035% Full-Scale/g.

7. Over-pressure (OP): the maximum pressure that may be applied to the sensor without causing a change in performance with respect to the specifications.

8. Burst-pressure (BP): The maximum pressure that may be applied to the sensor without a catastrophic failure.

Pressure Range		Accuracy			Accuracy after auto-zero		
psi	mbar	Max	Typ	Min	Max	Typ	Min
0.02	1.25	-2.5	±1.5	2.5	-2.0	±1.0	2.0
0.04	2.5	-2.5	±1.0	2.5	-1.25	±0.5	1.25
0.07	5	-2.5	±0.5	2.5	-1.0	±0.25	1.0
0.15	10	-1.5	±0.5	1.5	-1.0	±0.25	1.0
0.3	20	-1.5	±0.3	1.5	-1.0	±0.15	1.0
0.6/1.0	40/60	-1.5	±0.3	1.5	-1.0	±0.15	1.0
2/100	100/7000	-1.0	±0.25	1.0	N/A		

Table-1 Accuracy over 0/50°C

Ordering Information

52 A L – XXXX G – 3 8 1P

Series

Type of Output
A = Analog Output
D = Digital Output

Supply
Blank = 5.0 V
L = 3.3 V

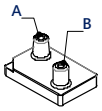
Type of Pressure
G: Gauge (+P at Port B)
A: Absolute (+P at Port A)
D: Differential (+P at Port B)
I: Negative (-P at Port B, offset output when P=0)
*Absolute is available only for pressure equal or greater than 1000 mbar/15 psi.

Output
2 = 10% to 90% of V_{DD}
3 = 4% to 96% of V_{DD}
8 = I^2C
9 = SPI
S = Special

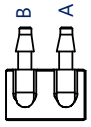
Configuration
1P = Standard
xP = Refer individual Data sheet

mbar		psi	
1.25	L12B	0.02	L02P
2.5	L25B	0.04	L04P
5	L50B	0.07	L07P
10	100B	0.15	L15P
20	200B	0.3	L30P
40	400B	0.6	L60P
60	600B	1	001P
100	101B	2	002P
200	201B	3	003P
500	501B	7	007P
1000	102B	15	015P
2000	202B	30	030P
4000	402B	60	060P
7000	702B	100	100P

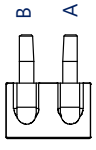
Tube Direction



= 3, Vertical flat



= 4, Side barb



= 5, Side flat

Notes:
Custom ranges and units are available upon request. Please contact factory.

Examples:

52DL-L50BD-381P = -5mbar to 5mbar differential, digital

52DL-L50BG-381P = 0mbar to 5mbar differential or gauge (leave port A empty for gauge), digital

52A-400BD-321P = -40mbar to 40mbar differential, analog

Specifications – Digital Output

Parameters	Min	Typ	Max	Unit
Supply (V_{DD}) – 3.3V [1]	2.75	3.3	3.6	V
Supply (V_{DD}) – 5.0V [1]	4.75	5.0	5.25	V
Operating Current [2]		2.2	3.2	mA
Stand-by Current [3]		0.8	1.5	uA
Resolution - ADC	12	16	24	bits
Output (-P) [4]	6553 (dec) / 1999 (hex)			
Output (Zero) [4]	32767 (dec) / 7FFF (hex)			
Output (+P) [4]	58982 (dec) / E666 (hex)			
Accuracy [5]		±0.5		%FS
Overall Error [6]		± 2.5		%FS
Update Rate [7]		1.2		kHz
Start-up Time [8]			2	ms
Wake-up Time [9]		2	10	us
Input High Level [10]	0.7		1.0	V_{DD}
Input Low Level [10]	0		0.3	V_{DD}
Interface Clock – I^2C	0.1		3.4	MHz
Interface Clock – SPI	0.05	1	12	MHz

NOTES:

1. 3.3V or 5.0V supply should be ordered separately. Other supply voltage from 2.75 to 5.5V is available upon request. With external JFET, supply voltage from 5 to 48V can be applied providing a special configuration should be ordered.

2. 5V supply and analog output referenced. Current consumption are varied according to supply, response rate and resolution chosen. Normally sensing element is not always excited. Mean current consumption for one complete measurement cycle would be lower than the rated value.

3. Stand-by is for digital output only. Sensor automatically enters into Sleep mode after command execution for minimum current consumption, whereas the interface is still listening and accepts commands.

4. Unsigned integer. Resolution dependent and custom is applicable. For vented gauge, zero is 6553 (dec) 1999 (hex).

5. Combines errors at 25°C after reflow mounting and auto-zero. Pressure range dependent.

6. The maximum deviation in output from a Best Fit Straight Line (BFSL) fitted to the output measured over the pressure range and compensated temperature. Combines errors of NOL, hysteresis, and repeatability. Pressure range dependent.

7. Single measurement duration in 16-bit with SSC on-chip temperature sensor. Resolution dependent.

8. V_{DD} ramps up to activate Interface Communication.

9. Sleep mode to active state of interface communication

10. Referenced to external supply voltage V_{DD}

Specifications – Analog Output

Parameters	Min	Typ	Max	Unit
Supply (V_{DD}) – 3.3V [1]	2.75	3.3	3.6	V
Supply (V_{DD}) – 5.0V [1]	4.75	5.0	5.25	V
Operating Current [2]		2.2	3.2	mA
Resolution - DAC [3]		13	16	bits
Output (-P) [4]		10%		V_{DD}
Output (Zero) [4]		50%		V_{DD}
Output (+P) [4]		90%		V_{DD}
Accuracy [5]		±0.5		%FS
Overall Error [6]		± 2.5		%FS
Update Rate [7]		1.2		kHz
Start-up Time [8]			2.3	ms

NOTES:

1. 3.3V or 5.0V supply should be ordered separately. Other supply voltage from 2.75 to 5.5V is available upon request. With external JFET, supply voltage from 5 to 48V can be applied providing a special configuration should be ordered.

2. Continuously running measurement sequence is executed.

3. Higher resolution longer step response settling time. Dithering is available upon request and can be switched on or off.

4. VDD-ratiometric voltage. For vented gauge pressure, zero is 10%. Absolute voltage output (0/1V, 0/5V) is also available upon request.

5. Combines errors at 25°C after reflow mounting and auto-zero. Pressure range dependent.

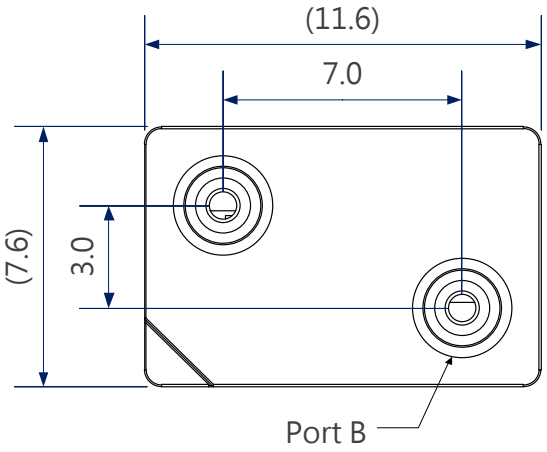
6. The maximum deviation in output from a Best Fit Straight Line (BFSL) fitted to the output measured over the pressure range and compensated temperature.. Combines errors of NOL, hysteresis, and repeatability. Pressure range dependent.

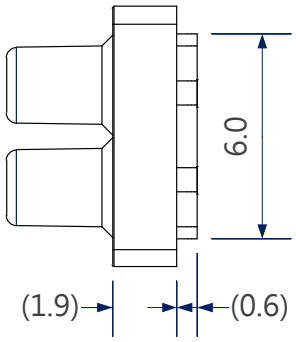
7. Single measurement duration in 16-bit with SSC on-chip temperature sensor. Resolution dependent.

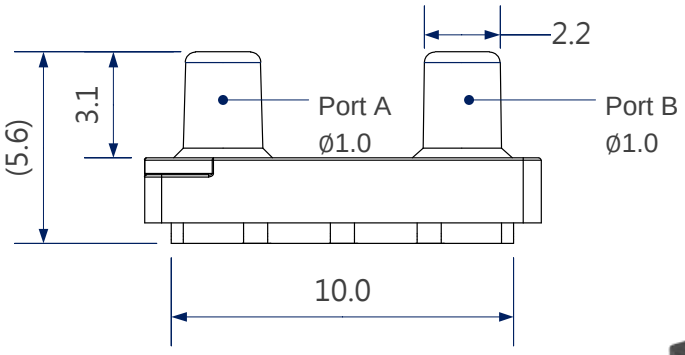
8. V_{DD} ramps up to activate Digital data to ADC plus DAC settling time.

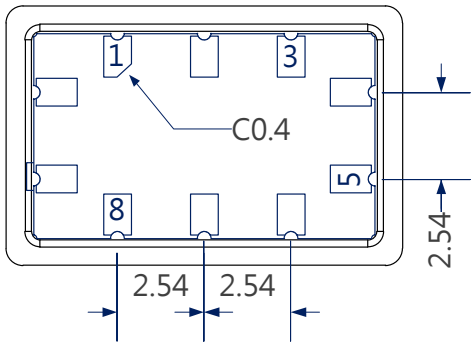
9. Recommended operating condition with external resistive load 1kΩ and capacitive load 10nF as low-pass filtering configuration at analog output for output bandwidth from 1kHz to 5kHz.

Dimension – Vertical Tube



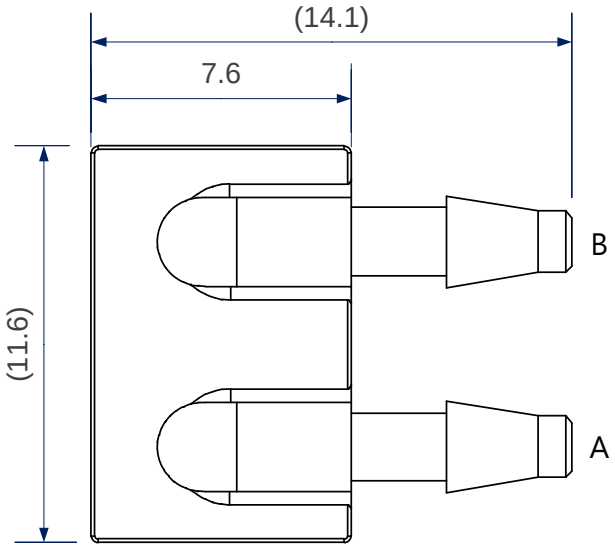


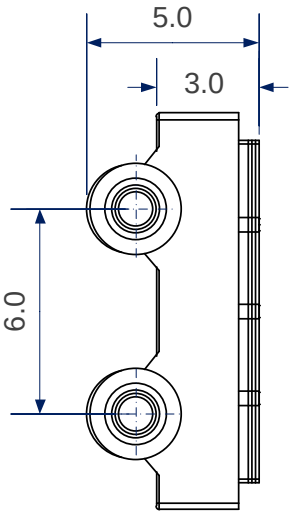


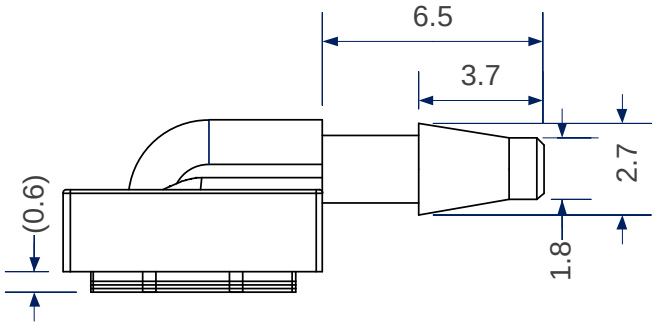


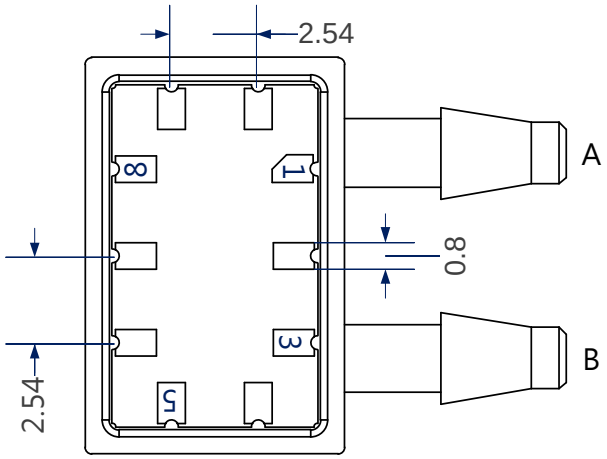
Bottom View

Dimension – Side barb tube



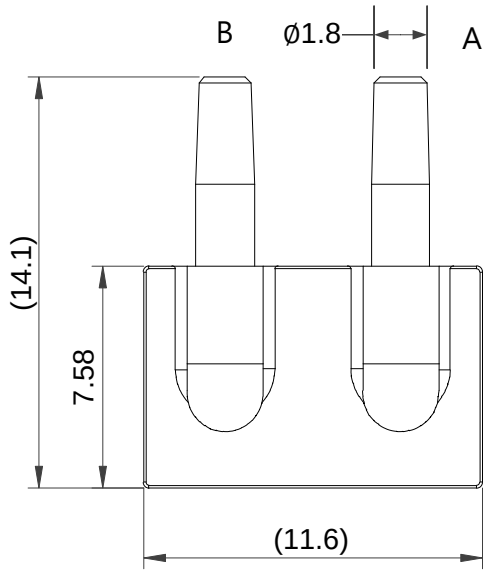


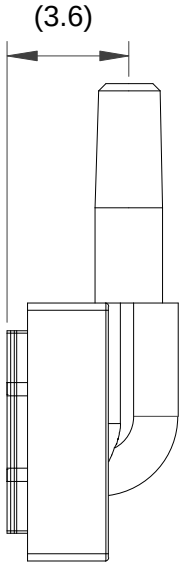


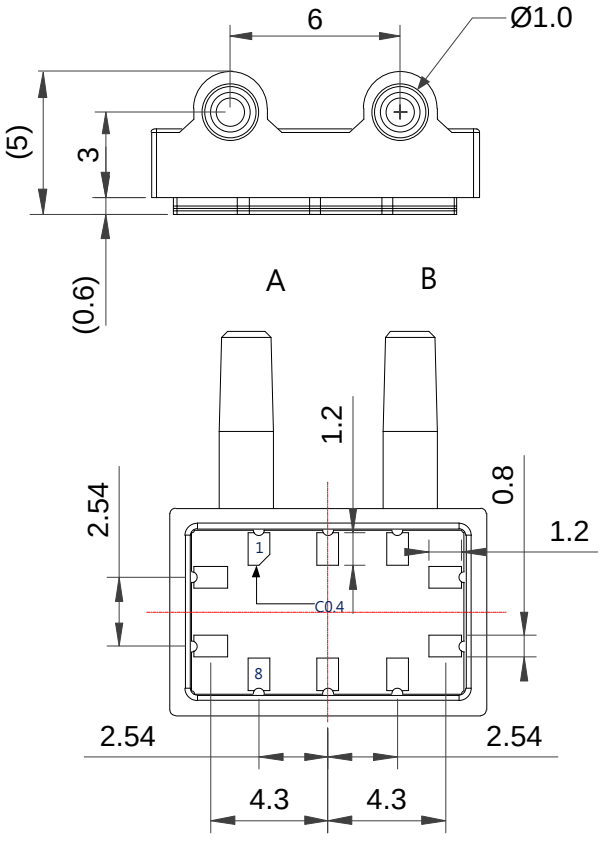


Bottom View

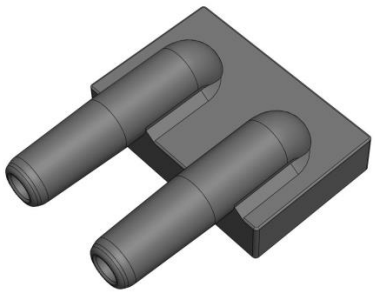
Dimension – Side flat tube



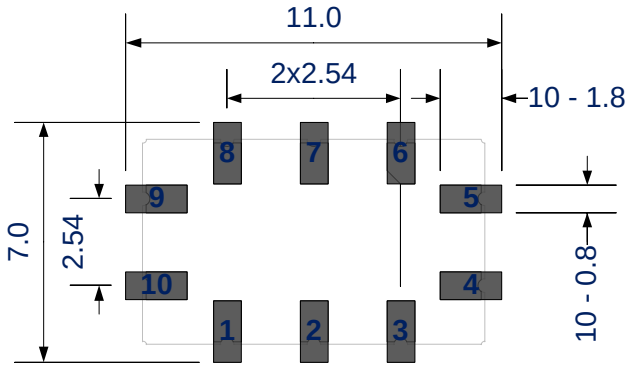




Bottom View



Foot Print



Pinout Assignment

Pad	Description
1	N.C.
2	N.C.
3	N.C.
4	SDA
5	SCL
6	N.C.
7	N.C.
8	N.C.
9	Vdd
10	Vss

Table 1 - I^2C

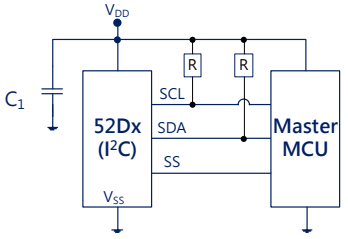
Pad	Description
1	N.C.
2	N.C.
3	N.C.
4	MOSI
5	SCLK
6	MISO
7	SS
8	N.C
9	Vdd
10	Vss

Table 2 - SPI

Pad	Description
1	N.C.
2	N.C.
3	N.C.
4	N.C.
5	N.C.
6	OUT
7	N.C.
8	N.C.
9	Vdd
10	Vss

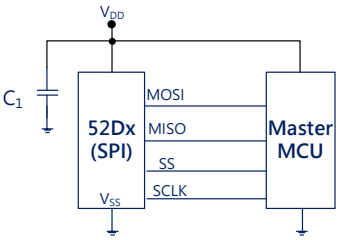
Table 2 - Analog

Application Circuit

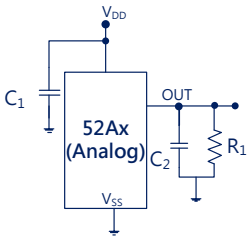


I^2C

R = 10k
C_1 = 0.1µ



SPI



Analog

R_1 = 1k
C_2 = 10nF

We are here for you. Addresses and Contacts.

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