



PRESSURE SENSORS

Product Number: SM9221

HIGHLIGHTS

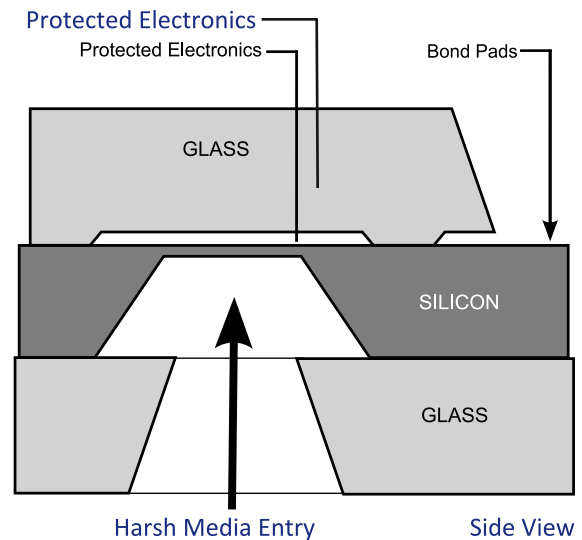
- Small profile
- For harsh fluid or gas media
- High volume, low-cost for OEM use
- Mountable on PC board substrates
- Available for proprietary packaging
- Harsh media applications

TYPICAL APPLICATIONS

- Automotive transmission
- Automotive exhaust gas
- TMAP
- Industrial printers
- Medical fluid or gas pressure sensing
- Home appliances
- Hand-held meters

FEATURES

- 30, 60, 150 & 300 PSI ranges (~ 2, 4, 10 & 20 bar)
(additional pressure ranges available on request)
- Small die (2 mm x 2 mm) for high-volume applications
- Backside entry design protects electronics
- Only silicon and glass exposed to media
- Constant current or constant voltage drive
- Millivolt output



DESCRIPTION

The SM9221 is a silicon micro-machined, piezoresistive pressure-sensing chip. The SM9221 is designed for harsh media where absolute pressure needs to be accurately measured. In contrast to traditional pressure-sensing chips the media only comes in contact with backside glass and silicon materials. Therefore, the electronic structures on the frontside of the die will not be affected during operation. This results in a durable pressure sensor suitable for challenging applications. These devices are available in full-scale ranges of 30, 60, 150 & 300 PSI and are ideal for OEM and high-volume applications.

Provided in die form, these sensors can be mounted on ceramic or PC board substrates as part of an OEM system. They also may be packaged into proprietary, or application specific sensor lines.

Dies are probed, diced, inspected, and shipped on tape.

Note: Product suitability for specific harsh environments must be validated by the customer.



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ABSOLUTE MAXIMUM RATING TABLE FOR SM9221 DIE

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 Voltage ^(a)	V_{SUPPLY}	—	—	10	V
2	Excitation Current ^(a)	I_{SUPPLY}	—	—	1.6	mA
3	Proof Pressure ^(b)	P_{PROOF}	3×	—	—	FS p_{RANGE}
4	Burst Pressure ^(b)	P_{BURST}	5×	—	—	FS p_{RANGE}
5	Operating Temperature ^(b)	T_{OP}	-40	—	+145	°C
6	Storage Temperature ^(b)	T_{STG}	-55	—	+150	°C

NOTES:

(a) Bridge may be driven with positive or negative voltage as long as V_{sub} is not connected.

(b) Tested on a sample basis

OPERATING CHARACTERISTICS FOR SM9221 DIE

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}) ^{(30, 60, 150 PSI)(b)}	V_{SPAN}	100	145	195	mV
8	Span (FS p_{RANGE}) ^{(300 PSI)(b)}	V_{SPAN}	65	110	155	mV
9	Sensitivity ^{(30, 60, 150 PSI)(b)}	S_V	133	193	260	$\mu V/V/PSI$
10	Sensitivity ^{(300 PSI/~20.7 bar)(b)}	S_V	44	74	103	$\mu V/V/PSI$
11	Offset	V_{OFFSET}	-50	0	+50	mV
12	TC Span ^(b)	TCS	-24	-20	-15.5	%FS/100°C
13	TC Offset ^(b)	TCZ	-15	-3	+15	%FS/100°C
14	TC Resistance ^{(b)(c)}	TCR	17	26	31	% R_B /100°C
15	Linearity ^{(b)(d)}	NL	-0.3	-0.15	0.3	%FS
16	Bridge Resistance	R_B	4.0	5.0	6.0	k Ω
17	Junction Leakage	I_{LEAK}	—	—	35	nA

QUALIFICATION STANDARDS

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

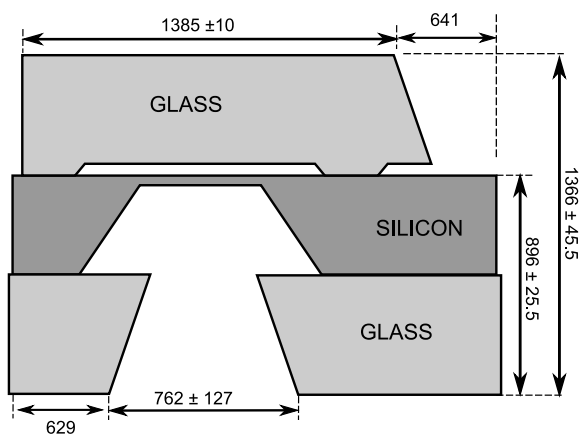
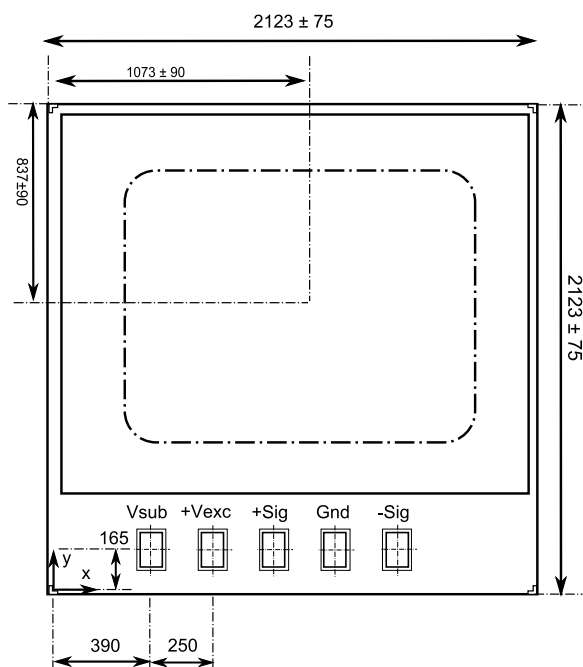
NOTES:

(c) Determined by measurements taken at 25°C and 75°C.

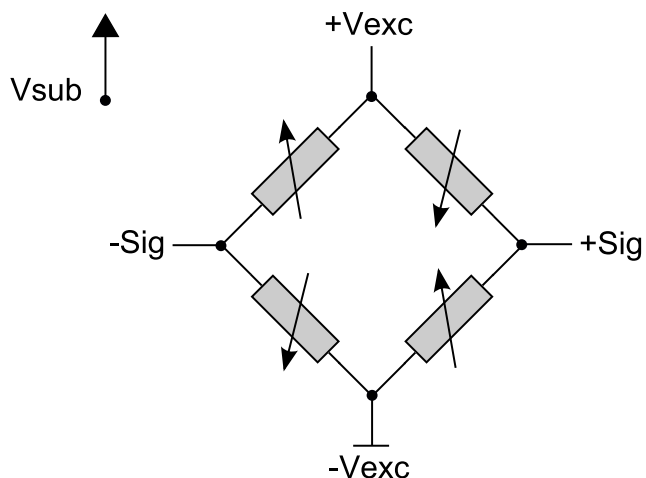
(d) Defined as best fit straight line.

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SM9221 Diagrams and Dimensions



SM9221 Pad-Out



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Typical Operation

PIN	DESCRIPTION	TYPE	VALUE
1	Vsub	Power	+5 V
2	+Vexc	Power	+5 V
3	+Sig	Analog Out	-
4	Gnd	Power	0 V
5	-Sig	Analog Out	-

Pad Sizes = 170 x 120

Pitch: 250

Coordinates (x, y)

Vsub (390, 165)

+Vexc (640, 165)

+Sig (890, 165)

-Vexc (1140, 165)

-Sig (1390, 165)

All Dimensions are in MICRON

Ordering information

Order Code	Full-Scale Pressure Range	Pressure Type	Minimum Order Quantity
SM9221-030-A-D	30 PSI / 207 kPa	Absolute	1 wafer ≈ 2,400 pieces ≈ 2,400 Die Per Wafer (Actual die quantity subject to +/- 10% yield variance)
SM9221-060-A-D	60 PSI / 414 kPa		
SM9221-150-A-D	150 PSI / 1034 kPa		
SM9221-300-A-D	300 PSI / 2068 kPa		

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

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