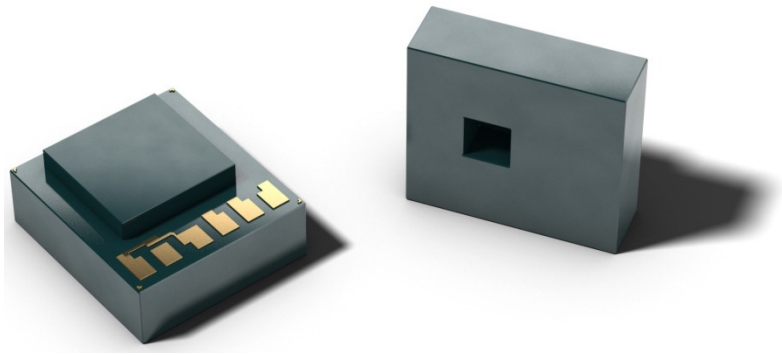
SM98A Harsh Media
Backside Absolute Pressure Series

SM98A Series

FEATURES

- Pressure Range: 10 Bar (145 PSIA), 20 Bar (290 PSIA)
- On-Board temperature sensing diode
- Small die (1.2 mm x 1.33 mm)
- Backside entry for harsh environments
- Backside metal option for eutectic bonding
- 80 Millivolt output at 5V
- All-silicon construction
- 50 Bar version in development



TYPICAL APPLICATIONS

- Selective catalytic reduction (SCR)
- Oil Pressure
- Automotive transmission
- Automotive exhaust gas
- TMAP
- Truck tire pressure
- Medical fluid or gas pressure sensing

DESCRIPTION

The SM98A is a silicon micro-machined, piezoresistive pressure-sensing chip. The SM98A 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 silicon materials. Therefore, the electronic structures on the front side of the die will not be affected during operation. This results in a durable pressure sensor suitable for challenging applications. The family has been qualified using AEC-Q100 Level 0 Automotive standards.

This device is available in a full-scale range of 10 Bar and 20 Bar absolute (145 and 280 PSIA) and is 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. Backside metal for eutectic bonding is available.

Dies are probed, diced, inspected, and shipped on tape. Devices with backside metal are shipped on UV release tape.

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

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ABSOLUTE MAXIMUM RATINGS

All parameters are specified at VSUPPLY = 5.00 V supply at 25°C, unless otherwise noted.

No.	Characteristic	Symbol	Minimum	Typical	Maximum	Units
1	Supply Voltage	V_{SUPPLY}	-	-	6	V
2	Supply Current	I_{SUPPLY}	-	-	2.0[b]	mA
3	Operating Temperature [(a)]	T_{OP}	-45	-	+150	°C
4	Storage Temperature [(a)]	T_{STG}	-55	-	+150	°C

Notes:

a. Tested on a sample basis

b. Voltage must not exceed 6 V under any operating conditions. Values in this datasheet were determined for constant-voltage operation.

No.	Product Number	Operating Pressure	Proof Pressure (P_{PROOF})[(a, b)]	Burst Pressure (B_{BURST})[(a, c)]
5	SM98A-H-XD-010B-XXXXX	0 to 10 bar (145 PSI)	20 bar (290 PSI)	150 bar (2175 PSI)
6	SM98A-H-XD-020B-XXXXX	0 to 20 bar (290 PSI)	40 bar (580 PSI)	200 bar (2900 PSI)[d]
7	SM98A-H-XD-050B-XXXXX	0 to 50 bar (725 PSI)	TBD	TBD

Notes:

a. Tested on a sample basis.

b. Proof pressure is defined as the maximum pressure the device can be subjected to and still perform within specification after returning to specified operating conditions

c. Burst pressure is defined as the pressure at which the catastrophic failure results in fluid leaking through the device. These values were determined for devices using epoxy die attach. Eutectic bond strength may be lower than burst pressure strength.

d. Actual value to be determined

OPERATING CHARACTERISTICS TABLE FOR SM98A DIE

All parameters are specified at V_{SUPPLY} = 5.00 V supply voltage at 25°C, unless otherwise noted.

No.	Characteristic	Symbol	Minimum	Typical	Maximum	Units
8	Span (FS p_{RANGE}) – 10 and 20 Bar [a]	V_{SPAN}	65	80	95	mV
9	Offset	V_{OFFSET}	-20		+20	mV
10	TC Span [a]	TCS	-0.22		-0.15	%FS/°C
11	TC Offset [a]	TCZ		0.05	0.06	%FS/°C
12	TC Resistance [a, e]	TCR	0.31		0.36	%RB/°C
13	Linearity [a, f]	NL		± 0.03	± 0.1	%FS
14	Bridge Resistance	R_B	4000	5250	6000	Ω
15	Pressure Hysteresis	P_{HYS}	-0.1		+0.1	%FS
16	Temperature Hysteresis	T_{HYS}	-0.2		+0.2	%FS
17	Diode Forward Voltage [g]	V_F	0.525	0.625	0.725	V
18	Change in Diode with Temperature [g]	V_T		-2.3		mV/ºC

Notes:

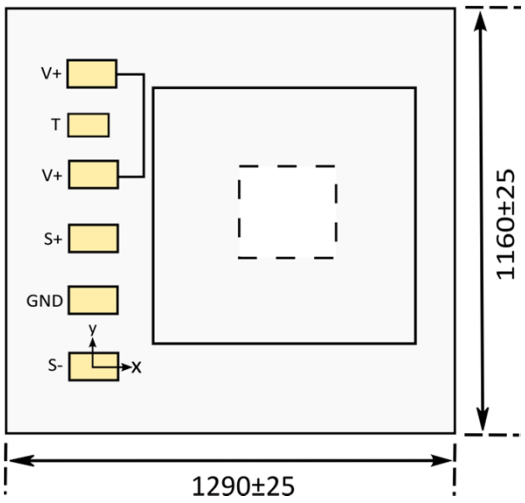
a. Tested on a sample basis

e. Determined by measurements taken at -40°C and +150°C.

f. Defined as terminal based.

g. Diode is driven with a 50uA current source between the T pad and V+ and cannot be operated at the same time as the pressure sensor. The diode forward Voltage is measured between the V+ and T bond pads

SM98A Diagrams & Dimensions



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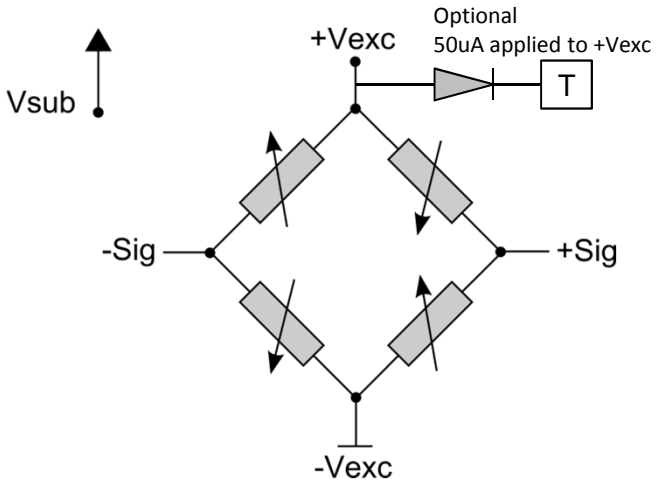

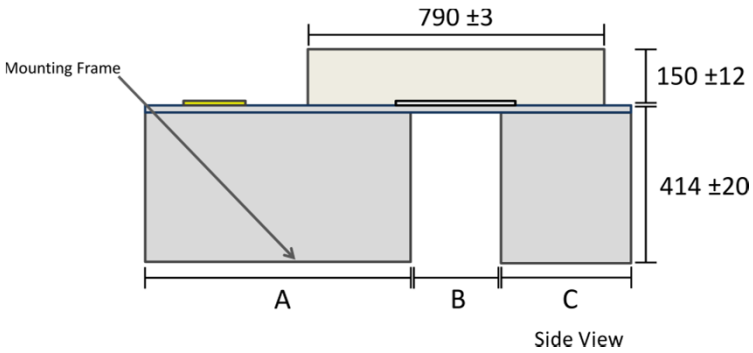

Side View

Notes:

- Each bondpad is 120µm x 170µm
- (x,y) coordinates, from center of S- pad to pad center in microns
- Dimension "B" is the backside cavity hole

TYPICAL OPERATION				Coordinates			Dimensions	
PAD	DESCRIPTION	TYPE	VALUE	DESCRIPTION	X	Y	BOND AREA DIMENSIONS	
1	V+	Power	+5 V	V+	0	898	A	680µm +/- 16µm
2	T		50µA	T	0	726	B	240µm +/- 5µm
3	V+	Power	+5 V	V+	0	516	C	370µm +/- 9µm
4	S+	Analog Out	-	S+	0	344		
5	GND	Power	0 V	GND	0	172		
6	S-	Analog Out	-	S-	0	0		

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

Ordering Information

Order Code Bad Die Identified on Wafermap, Diced on Tape (Eutectic Metal die shipped on UV Release tape)	Full-Scale Pressure Range	Back Surface
SM98A-H-ND-010B-0000A	10 bar / 145 PSIA	Standard
SM98A-H-ND-020B-0000A	20 bar / 290 PSIA	Standard
SM98A-H-NV-010B-0001A	10 bar / 145 PSIA	Eutectic Metal
SM98A-H-NV-020B-0001A	20 bar / 290 PSIA	Eutectic Metal

Order Code Bad Die Inked, Diced on Tape (Eutectic Metal die shipped on UV Release tape)	Full-Scale Pressure Range	Back Surface
SM98A-H-ID-010B-0000A	10 bar / 145 PSIA	Standard
SM98A-H-ID-020B-0000A	20 bar / 290 PSIA	Standard
SM98A-H-IV-010B-0001A	10 bar / 145 PSIA	Eutectic Metal
SM98A-H-IV-020B-0001A	20 bar / 290 PSIA	Eutectic Metal

Shipping Format

Wafers are 6” / 150mm in diameter and are shipped on UV tape. UV tape must be released by exposure to UV light before picking die from tape. Each wafer will have 7162+/- 10% usable die.

UV Tape Release

The recommend procedure for releasing die from UV tape is exposing the backside of the diced wafer to 90 seconds of UV exposure @ 19 mJ / second prior to die picking.

QUALIFICATION STANDARDS

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

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