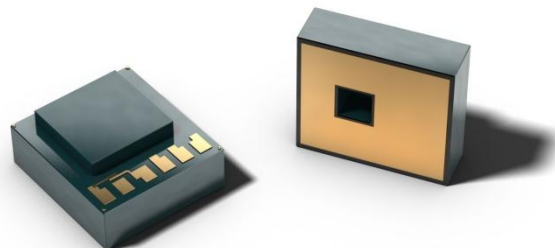


## SM97A Harsh Media Backside Absolute Pressure Series

### SM97A Series

#### FEATURES

- Pressure Range: 10 Bar (145 PSIA), 20 Bar (290 PSIA)
- Support up to 25 times FS Burst Pressure
- Integrated temperature sensor
- Small die (1.2 mm x 1.33 mm)
- Backside entry for harsh environments
- 90 Millivolt output at 5 V
- All-silicon construction
- Backside metal for eutectic bonding is available as an option
- Proprietary design for enhanced proof & burst pressure robustness



#### DESCRIPTION

The SM97A is a silicon micro-machined, piezoresistive pressure-sensing chip. The SM97A 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.

This device is available in a full-scale range of 10 Bar and 20 Bar absolute (145 and 290 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 eutectic metallization is available as an option.

Dies are probed, diced, inspected, and shipped on UV release tape or blue tape.

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



The AccuStable® quality label is earned by products with proven span and offset shift of less than 1% over a 10 year lifetime. Qualification of this device is based on 1000 hours HTOL testing at 150°C and 6V.

Automotive	Industrial
Selective Catalytic Reduction (SCR)	Industrial Controls
Oil Pressure	Compressors & Pumps
Transmissions	Pressure Switches
Exhaust Gas	Oil-Filled Packages
HVAC Compressor	
Fuel Vapor	
Heavy Duty Vehicle Tire Pressure	

**ABSOLUTE MAXIMUM RATINGS**

All parameters are specified at V<sub>SUPPLY</sub> = 5.00 V supply at 25°C, unless otherwise noted.

No.	Characteristic	Symbol	Minimum	Typical	Maximum	Units
1	Supply Voltage	V <sub>SUPPLY</sub>	-	-	6	V
2	Supply Current	I <sub>SUPPLY</sub>	-	-	2.0 <sup>(b)</sup>	mA
3	Operating Temperature <sup>(a)</sup>	T <sub>OP</sub>	-40	-	+150	°C
4	Storage Temperature <sup>(a)</sup>	T <sub>STG</sub>	-55	-	+150	°C
5	ESD Rating – Human Body Model	V <sub>ESD</sub>	-	-	2	kV

**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 <sub>PROOF</sub> ) <sup>(a, b)</sup>	Burst Pressure (B <sub>BURST</sub> ) <sup>(a, c)</sup>	Stopper Pressure Range (P <sub>stop</sub> ) <sup>(a)</sup>
6	SM97A-H-XX-010B-XXXXX	0 to 10 bar (145 PSIA)	6XFS (60 bar)	25XFS(250 bar)	>20 bar (290 PSIA)
7	SM97A-H-XX-020B-XXXXX	0 to 20 bar (290 PSIA)	6XFS (120 bar)	12.5XFS (250 bar)	>40 bar (580 PSIA)

**Notes:**

- a. Tested on a sample basis.
- b. Proof pressure is defined as Limit of pressure that can be used without influencing pressure sensor performance. After a proof pressure is applied and device is returned to operating conditions, the pressure sensor shall meet the specification without significant deterioration. Significant deterioration is defined as a change in offset or span of > 0.1% FS.
- 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 eutectic bond.

**OPERATING CHARACTERISTICS TABLE FOR SM97A DIE**

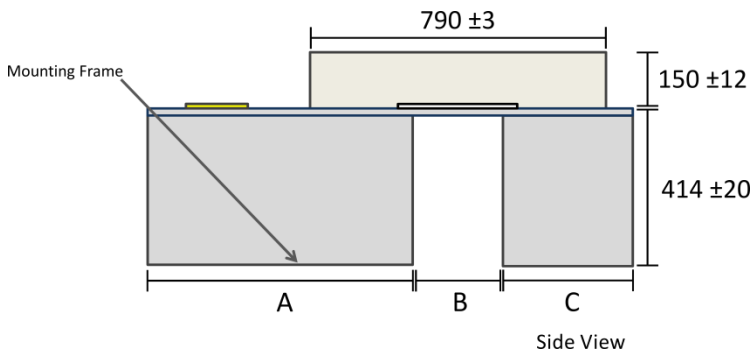
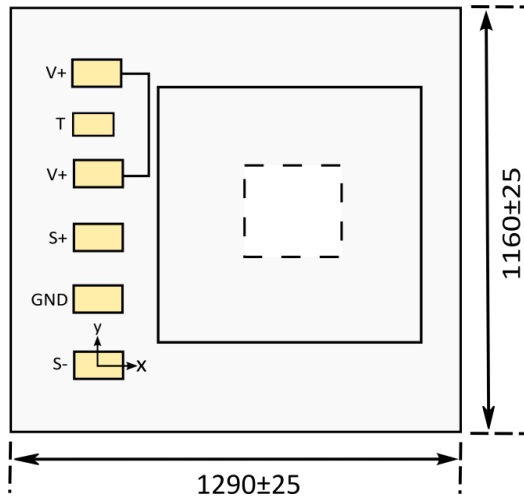
All parameters are specified at V<sub>SUPPLY</sub> = 5.00 V supply voltage at 25°C, unless otherwise noted.

No.	Characteristic	Symbol	Minimum	Typical	Maximum	Units
8	Span (FS p <sub>RANGE</sub> ) 10 & 20 bar <sup>(a)</sup>	V <sub>SPAN</sub>	70	90	110	mV
9	Offset	V <sub>OFFSET</sub>	-50		+50	mV
10	TC Span <sup>(a, b)</sup>	TCS	-24	-18.7	-14.5	%FS/100°C
11	TC Offset <sup>(a, b)</sup>	TCZ	-15	-3	15	%FS/100°C
12	TC Resistance <sup>(a, b)</sup>	TCR	30	36	40	%RB/100°C
13	Linearity <sup>(a, c)</sup>	NL	-0.3	± 0.08	+0.3	%FS
14	Bridge Resistance	R <sub>B</sub>	4400	5400	6400	Ω
15	Pressure Hysteresis	P <sub>HYS</sub>	-0.1		+0.1	%FS
16	Temperature Hysteresis	T <sub>HYS</sub>	-0.2		+0.2	%FS
17	Diode Forward Voltage <sup>(d)</sup>	V <sub>F</sub>	0.525	0.625	0.725	V
18	Change in Diode with Temperature <sup>(d)</sup>	V <sub>T</sub>		-2.3		mV/°C

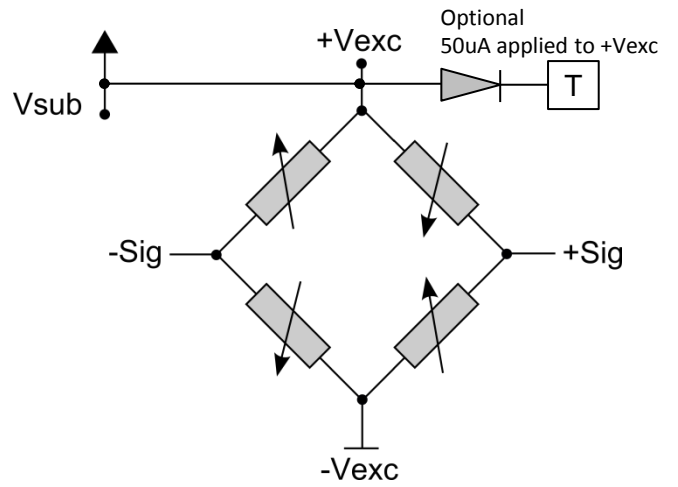
**Notes:**

- a. Tested on a sample basis
- b. Determined by measurements taken at -40°C and +150°C.
- c. Defined as best fit straight line.

SM97A Diagrams & Dimensions



SM97A Diagrams & Dimensions



Notes:

- Each bondpad is 120 μm x 170 μm
- (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	645 μm
2	Tdiode		50 μA	T	0	726	B	300 μm
3	V+	Power	+5 V	V+	0	516	C	345 μm
4	S+	Analog Out	-	S+	0	344		
5	GND	Power	0 V	GND	0	172		
6	S-	Analog Out	-	S-	0	0		

Media compatibility:

Backside media compatible with silicon and silicon dioxide. Contact factory for backside eutectic bonding compatibility.  
 Front side media compatibility clean, dry and non-corrosive gases.

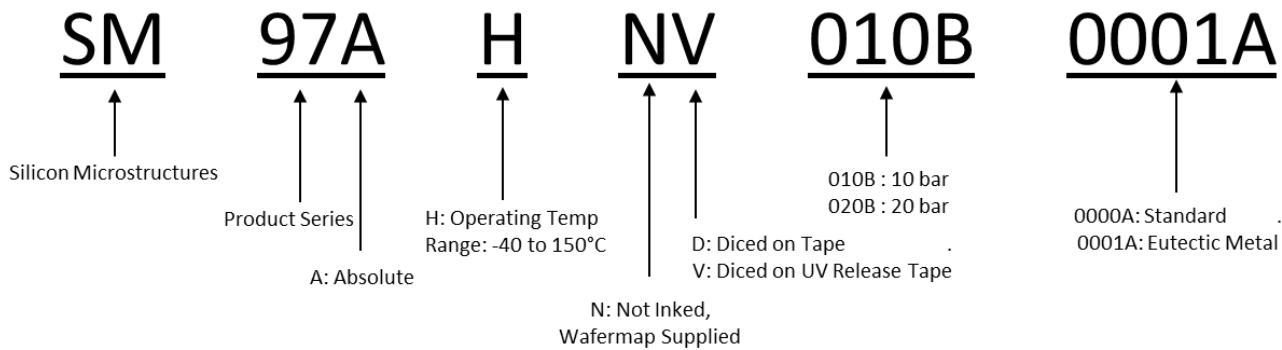
**Ordering Information**

Order Code <sup>(a)</sup>	Full-Scale Pressure Range	Back Surface
SM97A-H-ND-010B-0000A	10 bar / 145 PSIA	Standard
SM97A-H-ND-020B-0000A	20 bar / 290 PSIA	Standard
SM97A-H-NV-010B-0001A	10 bar / 145 PSIA	Eutectic Metal
SM97A-H-NV-020B-0001A	20 bar / 290 PSIA	Eutectic Metal

**Notes:**

a. Bad Die Identified on Electronic Wafermap, Diced on UV Release tape (NV option) or blue tape (ND option)

**Part Number Legend**



**Shipping Format**

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

**UV Tape Release**

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

**QUALIFICATION STANDARDS**

For qualification specifications, please contact Sales at [sales@si-micro.com](mailto:sales@si-micro.com)

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