

## SM97A HARSH MEDIA BACKSIDE ABSOLUTE PRESSURE SERIES

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.

The SM97A has earned the AccuStable® quality label with proven span and offset shift of less than 1% at 150°C and 6V over a 10-year lifetime. All AccuStable® products qualify based on 1000 HTOL testing under specific operating conditions

This device is available in a full-scale range of 10 Bar 20 Bar and 50 Bar absolute (145,290 and 725 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. The chips optionally have backside metal for eutectic bonding.

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.

### Features

- Pressure Range: 10 Bar (145 PSIA), 20 Bar (290 PSIA), 50 Bar (725 PSIA)
- Support up to 5 to 25 times FS Burst Pressure
- Integrated temperature sensor
- Small die (1.2 mm x 1.33 mm)
- Backside entry for harsh environments
- Backside metal for eutectic bonding
- 90 to 105 Millivolt output at 5 V
- All-silicon construction
- Backside eutectic metallization is available as an option
- Proprietary design for enhanced proof & burst pressure robustness

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	

[CLICK HERE >](#)  
CONNECT WITH A SPECIALIST

## SM97A SERIES

### Absolute Maximum Ratings

All parameters are specified at  $V_{SUPPLY} = 5.00\text{ V}$  supply at  $25^{\circ}\text{C}$ , unless otherwise noted.

Characteristic	Symbol	Minimum	Typical	Maximum	Units
Supply Voltage	$V_{SUPPLY}$	-	-	6	V
Supply Current	$V_{SUPPLY}$	-	-	2.0 <sup>(b)</sup>	mA
Operating Temperature <sup>(a)</sup>	$T_{OP}$	-40	-	+150	$^{\circ}\text{C}$
Storage Temperature <sup>(a)</sup>	$T_{STG}$	-55	-	+150	$^{\circ}\text{C}$
ESD Rating – Human body model	$V_{ESD}$	-	-	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.

Product Number	Operating Pressure	Proof Pressure ( $P_{PROOF}$ ) <sup>(a, b)</sup>	Burst Pressure ( $B_{BURST}$ ) <sup>(a, c)</sup>	Stopper Pressure Range ( $P_{stop}$ ) <sup>(a)</sup>
SM97A-H-XX-010B-XXXXX	0 to 10 bars (145 PSIA)	6XFS (60 bar)	15XFS (100 bar)	>20 bar (290 PSIA)
SM97A-H-XX-020B-XXXXX	0 to 20 bars (290 PSIA)	6XFS (120 bar)	10XFS (200 bar)	>40 bar (580 PSIA)
SM97A-H-ND-050B-XXXXX	0 to 50 bar (725 PSIA)	6XFS (300 bar)	6XFS(300 bar)	>140 bar (2030 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

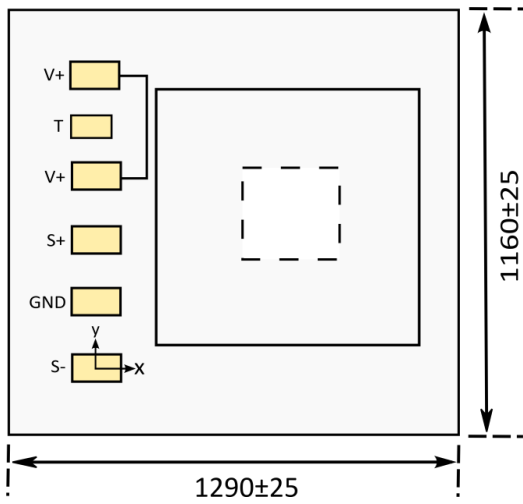
All parameters are specified at  $V_{SUPPLY} = 5.00\text{ V}$  supply voltage at  $25^{\circ}\text{C}$ , unless otherwise noted.

Characteristic	Symbol	Minimum	Typical	Maximum	Units
Span (FS $P_{RANGE}$ )   10 & 20 Bar <sup>(a)</sup>	$V_{SPAN}$	70	90	110	mV
Span (FS $P_{RANGE}$ ) 50 Bar			105		mV
Offset	$V_{OFFSET}$	-50		+50	mV
TC Span <sup>(a, b)</sup>	TCS	-24	-18.7	-14.5	%FS/ $100^{\circ}\text{C}$
TC Offset <sup>(a, b)</sup>	TCZ	-15	-3	15	%FS/ $100^{\circ}\text{C}$
TC Resistance <sup>(a, b)</sup>	TCR	30	36	40	%RB/ $100^{\circ}\text{C}$
Linearity <sup>(a, c)</sup>	NL	-0.3	$\pm 0.08$	+0.3	%FS
Bridge Resistance	$R_B$	4400	5400	6400	$\Omega$
Pressure Hysteresis	$P_{HYS}$	-0.1		+0.1	%FS
Temperature Hysteresis	$T_{HYS}$	-0.2		+0.2	%FS
Diode Forward Voltage <sup>(d)</sup>	$V_F$	0.525	0.625	0.725	V
Change in Diode with Temperature <sup>(d)</sup>	$V_T$		-2.3		mV/ $^{\circ}\text{C}$

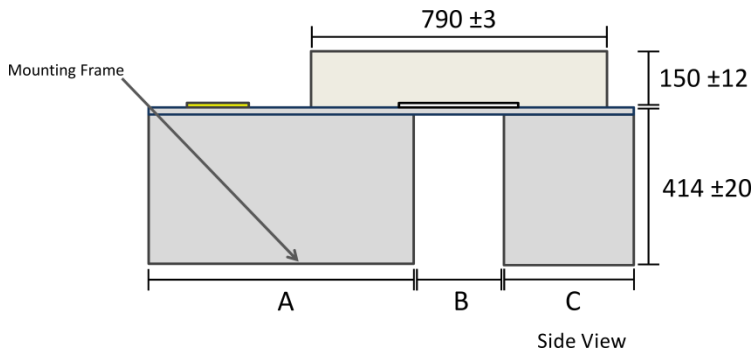
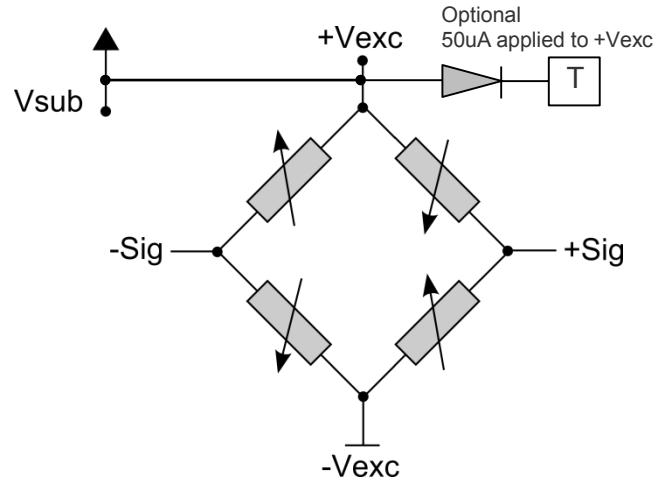
**Notes:**

- a) Tested on a sample basis
- b) Determined by measurements taken at  $-40^{\circ}\text{C}$  and  $+150^{\circ}\text{C}$ .
- 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.

## SM97A SERIES

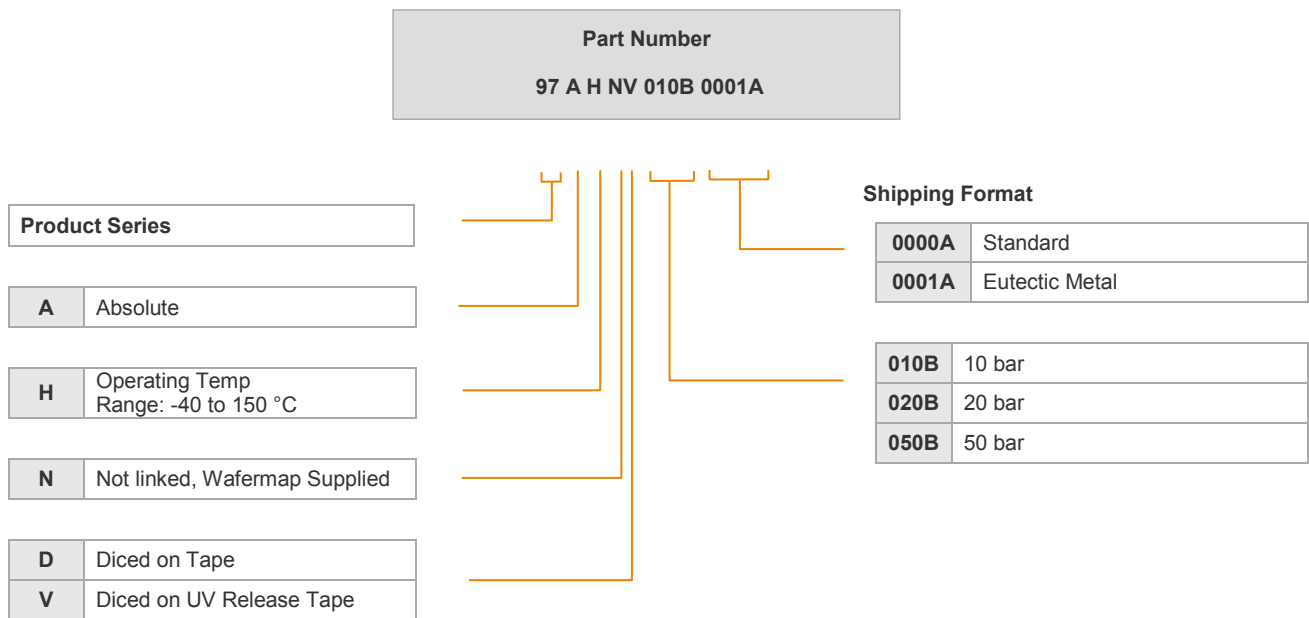
### Ordering Information (Standard Configurations)

Order Code <sup>(a)</sup>	Catalog Number	Full-Scale Pressure Range	Back Surface
97A-H-ND-010B-0000A	SM97A-H-ND-010B-0000A	10 bar / 145 PSIA	Standard
97A-H-ND-020B-0000A	SM97A-H-ND-020B-0000A	20 bar / 290 PSIA	Standard
97A-H-ND-050B-0000A	SM97A-H-ND-050B-0000A	50 bar / 725 PSIA	Standard
97A-H-ND-010B-0001A	SM97A-H-NV-010B-0001A	10 bar / 290 PSIA	Eutectic Metal
97A-H-ND-020B-0001A	SM97A-H-NV-020B-0001A	20 bar / 290 PSIA	Eutectic Metal
97A-H-ND-050B-0001A	SM97A-H-NV-050B-0001A	50 bar / 725 PSIA	Eutectic Metal

**Notes:**

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

### Part numbering key



## SM97A SERIES

### 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 TE connectivity



[CLICK HERE >](#)  
**CONNECT WITH A SPECIALIST**



#### your distributor

AMSYS GmbH & Co.KG

An der Fahrt 4, 55124 Mainz, Germany

Tel. +49 (0) 6131 469 875 0

[info@amsys.de](mailto:info@amsys.de) | [www.amsys.de](http://www.amsys.de)

#### GLOBAL

Tel +1 408 577 0100

[customercare.mlpt@te.com](mailto:customercare.mlpt@te.com)

### te.com/sensors

TE Connectivity, TE, TE Connectivity (logo) and Every Connection Counts are trademarks. All other logos, products and/or company names referred to herein might be trademarks of their respective owners

The information given herein, including drawings, illustrations and schematics which are intended for illustration purposes only, is believed to be reliable. However, TE Connectivity makes no warranties as to its accuracy or completeness and disclaims any liability in connection with its use. TE Connectivity's obligations shall only be as set forth in TE Connectivity's Standard Terms and Conditions of Sale for this product and in no case will TE Connectivity be liable for any incidental, indirect or consequential damages arising out of the sale, resale, use or misuse of the product. Users of TE Connectivity products should make their own evaluation to determine the suitability of each such product for the specific application.

© 2021 TE Connectivity Corporation. All Rights Reserved.

Version 07/2021