NOVA SENSOR
AN AMPHENOL COMPANY

P883

Medium and High Pressure MEMS Pressure Sensor Die

Description

The NovaSensor P883 die products utilize four piezoresistors combined in Wheatstone bridge circuit. When excited by either constant voltage or constant current, the P883 die produces a differential millivolt output signal directly proportional to the applied pressure. Available as gage (differential) or absolute, the P883 sensor die also features high sensitivity, excellent overload capability and small temperature hysteresis over a wide temperature range. The product is 100% visually inspected and electrically probed. Samples from each wafer are tested for resistance, sensitivity, linearity, offset, temperature coefficients and hysteresis. The products are available in standard configuration with 63 mil (1.60 mm) and 93 mil (2.36 mm) thick glass support and low-profile configuration with 22 mil (0.56 mm) thick glass support and no glass support.

Applications

- Process Control
- Automotive Systems
- Pneumatic Controls
- Hydraulic Systems
- Level Sensing

Features

- High Reliability MEMS sensor
- Available as absolute or gauge (differential)
- Available with different glass thickness or no glass at all (consult NovaSensor for more information)
- Designed to be temperature compensated using constant current or voltage
- NovaSensor's proprietary SenStable® process produces excellent long-term stability
- Pressure ranges available from 5 to 15,000 psi
- Media Compatibility – clean dry air, noncorrosive gases and liquids, other fluids compatible with silicon and borosilicate glass

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P883 Specifications - Standard Configuration

Parameter				
General		**Value**	**Units**	**Notes**
Pressure	Differential and absolute	5, 7, 15, 30, 70, 150, 300, 500, 800	psig / psia	Products may be qualified to a higher maximum pressure after additional testing
	Absolute only	1000, 1500, 3000, 5000, 10000, 15000	psia	
Maximum Pressure		6X pressure 5-150 psi		
		3X pressure 300-3000 psi		
		2X pressure 5000-15000 psi		
Environmental				
Electrostatic damage (ESD) Class 1				MIL-STD 883 method 3015
Temperature Range				
Operating		–40 to 140	°C	-40°F to 284°F, note 1
Storage		–55 to 150	°C	–67°F to 302°F
Mechanical				
Die Dimensions (L x W)	With Glass	1.99 mm x 1.99 mm. Options for glass thickness: 0.56 mm, 1.60 mm, 2.36 mm Die thickness: 0.96 mm, 2.0 mm, 2.75 mm		
	Without Glass	2.17 mm x 2.17 mm x 0.40 mm		
Weight		With 0.56 mm thick Glass - 0.007 grams, with 1.60 mm thick Glass - 0.016 grams With 2.36 mm thick Glass - 0.022 grams, without Glass - 0.002 grams		
Metalization		Pure aluminum		
Media Compatibility		Clean, dry air, and noncorrosive gases		

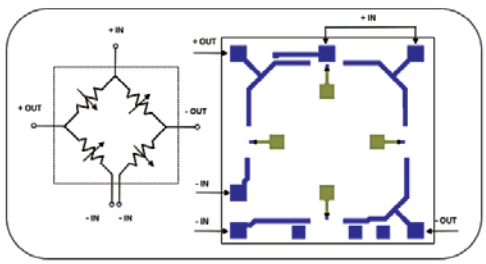
Electrical Performance @ 25°C (72°F), 1.0 mA						
Parameter	**Range**	**Min**	**Typical**	**Max**	**Units**	**Notes**
Recommended excitation	Current		1.0	1.6	mA	-
	Voltage	5.0	10	V		-
Input and Output Impedance		4000	5300	6000	Ohm	2
Zero Offset	5 to 7 psi	-10	within ±5	+10	mV/V	2, 3
	15 to 70 psi	-7.5	within ±2.5	+7.5		
	150 to 15000 psi	-5.0	-0.3	+5.0		
Full Scale Output (FSO or Span)	5 to 800 psi	100	130	166	mV	2, 4
	1000 to 5000 psi	120	140	180		
	15000 psi	215	250	275		
Linearity	5 psi	-0.30	-0.14	+0.30	%FSO	2, 5, 10
	7 psi	-0.20	-0.10	+0.20		2, 5 ,6
	15 to 5000 psi	-0.15	within ±0.1	+0.15		2, 5, 10
	15000 psi	-0.25	-0.07	+0.25		2, 5, 7
Zero Pressure Repeatability		-0.1	±0.01	+0.1	%FSO	2
Thermal Coefficient of Zero (TCO)	5 to 70 psi	-15	within ±5	+15	µV/V/°C	8, 9, 10
	150 to 15000 psi	-10	within ±2.5	+10		
Thermal Coefficient of Resistance (TCR)		0.32	0.38…0.40	0.48	%/°C	8, 9
Thermal Coefficient of Sensitivity (TCS)		-0.23	-0.21…-0.19	-0.15	%/°C	8, 9
Zero Thermal Hysteresis		-0.2	within ±0.02	+0.2	%FSO	8, 9, 10
FSO Thermal Hysteresis		-0.2	within ±0.03	+0.2	%FSO	8, 9, 10

P883 Specifications - Low-Profile Configuration

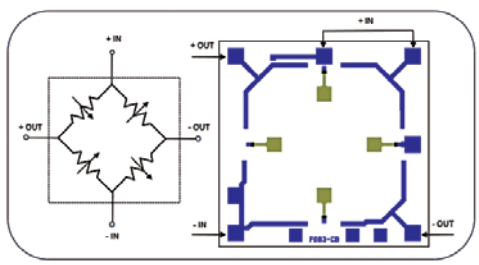
Parameter				
General		**Value**	**Units**	**Notes**
Pressure	Differential and absolute	5, 15, 30, 70, 150, 300	psig / psia	
Maximum Pressure		6X pressure 5-150 psi 3X pressure 300 psi		Products may be qualified to a higher maximum pressure after additional testing
Environmental				
Electrostatic damage (ESD) Class 1				MIL-STD 883 method 3015
Tempera-ture Range	Operating	–40 to 140	°C	–40°F to 284°F, note 1
	Storage	–55 to 150	°C	–67°F to 302°F
Mechanical				
Die Dimensions: With glass (L x W x H)		1.99 mm x 1.99 mm x 0.96 mm		
Without glass (L x W x H)		2.17 mm x 2.17 mm x 0.40 mm		
Weight		With 0.56 mm thick Glass - 0.007 grams, without Glass - 0.002 grams		
Metallization		Pure aluminum		
Media Compatibility		Clean, dry air, and noncorrosive gases		

Electrical Performance						
Parameter	**Range**	**Min**	**Typical**	**Max**	**Units**	**Notes**
Recommended excitation	Current	-	1.0	1.6	mA	
	Voltage	-	5.0	10	V	
Input and Output Impedance		4000	4800…5300	6000	Ohm	2
Zero Offset	5 psi	-10	within ±5	+10	mV/V	2, 3
	15 to 70 psi	-7.5	within ±2.5	+7.5		
	150 to 300 psi	-5.0	-0.3	+5.0		
Full Scale Output (FSO or Span)	5 psi	100	115	166	mV	2, 4
	15 to 300 psi	100	130	166		
Linearity	5 psi	-0.30	-0.12…-0.20	+0.30	%FSO	2, 5, 10
	15 to 300 psi	-0.15	within ±0.1	+0.15		2, 5, 10
Zero Pressure Repeatability		-0.1	±0.01	+0.1	%FSO	2
Thermal Coefficient of Zero (TCO)		-15	within ±5	+15	µV/V/°C	8, 9, 10
Thermal Coefficient of Resistance (TCR)		0.32	0.40	0.48	%/°C	8, 9
Thermal Coefficient of Sensitivity (TCS)		-0.23	-0.19	-0.15	%/°C	8, 9
Zero Thermal Hysteresis	With glass	-0.2	within ±0.02	+0.2	%FSO	8, 9, 10
	Without glass	-0.25	within ±0.05	+0.25		
FSO Thermal Hysteresis	With glass	-0.2	within ±0.03	+0.2	%FSO	8, 9, 10
	Without glass	-0.25	within ±0.05	+0.25		

1. The die passed qualification testing in –40°C…150°C temperature range. Additional testing in this temperature range may be required for some applications.
2. Tested using 1.0 mA excitation at 25°C.
3. 0 kPaA for absolute sensors, 0 kPaG for differential or gage sensors.
4. Part for 5000 psi can be used for 7500 psi and 10,000 psi. Part for 15,000 can be used for 10,000 psi.
5. Best fit straight line.
6. Part for 7 psi can be used for 5 psi for pressure non-linearity within ±0.20.
7. Typical pressure non-linearity is provided based on testing at 10,000 psi.
8. Parameter is evaluated between 86°F and 176°F (30°C and 80°C) by testing samples from each wafer, typical range.
9. Between -40°F and 284°F (–40°C and 140°C) with respect to 25 °C, typical range.
10. Die mounting may have a large impact of sensor hysteresis, linearity, and TCO when low profile die is used.



P883 Schematic and wire bonding diagram



P883-CB (closed bridge) Schematic and wire bonding diagram

Shipping and Handling

The standard products are available on tape with metal frame and are shipped in protective plastic containers. Electrical rejects and visual rejects are inked. Each wafer will have the following information: Lot #, Wafer #, Part #, and the number of good (yielded) die.

Warranty

NovaSensor warrants its products against defects in material and workmanship for 12 months from date of shipment. Products not subject to misuse will be repaired or replaced. THE FOREGOING IS IN LIEU OF ANY OTHER EXPRESSED OR IMPLIED WARRANTIES. NovaSensor reserves the right to make changes without further notice to any products herein. NovaSensor makes no warranty, representation or guarantee regarding the suitability of its products for any particular application, nor does NovaSensor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims and all liability, including without limitation consequential or incidental damages.

Ordering Information

Standard Configuration

63 mil (1.60 mm) Glass – Standard			
Part No.	Gage / Abs.	Pressure range	
		Psi	Bar
71322	G	5	0.34
71837	G	7	0.48
71323	G	15	1.03
71324	G	30	2.06
71325	G	70	4.82
71326	G	150	10.3
71327	G	300	20.6
71405	G	500	34.5
71744	G	800	55.2
71346	A	5	0.34
71838	A	7	0.48
71328	A	15	1.03
71329	A	30	2.06
71330	A	70	4.82
71331	A	150	10.3
71332	A	300	20.6
71776	A	500	34.5
71821	A	800	55.2
71588	A	1000	68.9
71589	A	1500	103
71590	A	3000	206
71591	A	5000	345
		10000	689
71621	A	15000	1034

93 mil (2.36 mm) Glass – Optional			
Part No.	Gage / Abs.	Pressure Range	
		Psi	Bar
71333	G	5	0.34
71334	G	15	1.03
71335	G	30	2.06
71336	G	70	4.82
71337	G	150	10.3
71338	G	300	20.6
71347	A	5	0.34
71339	A	15	1.03
71340	A	30	2.06
71341	A	70	4.82
71342	A	150	10.3
71343	A	300	20.6

Low Profile Configuration

22 mil (0.56 mm) Glass – Low profile			
Part No.	Gage / Abs.	Pressure Range	
		Psi	Bar
51632	G	5	0.34
51634	G	15	1.03
51636	G	30	2.06
51638	G	70	4.82
51640	G	150	10.3
51642	G	300	20.6
51839	A	5	0.34
51633	A	15	1.03
51635	A	30	2.06
51637	A	70	4.82
51639	A	150	10.3
51641	A	300	20.6

No glass – Low Profile			
Part No.	Gage / Abs.	Pressure Range	
		Psi	Bar
51643	G	5	0.34
51644	G	15	1.03
51645	G	30	2.06
51646	G	70	4.82
51647	G	150	10.3
51648	G	300	20.6

No Glass with Au Metallization			
71625	G	5	0.34
71610	G	15	1.03

Note:
All products are supplied on 6” wafers.
Minimum release quantity: 2500 die.

The code number to be ordered may be specified as follows:

Code	Glass Type
7XXXX	Standard / optional glass No glass in case of Au metalization
5XXXX	Low profile / no glass

Code	Circuit Configuration
Not specified	Wheatstone bridge open at Ground
CB	Closed Wheatstone bridge

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