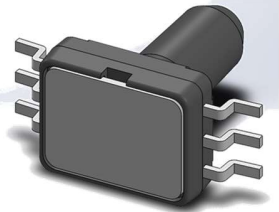


Analog Output Micro Pressure Sensor

MMS901 Data Sheet

DESCRIPTION



MMS901 is Analog output Micro Pressure Sensor, "High accuracy", "Small size", and "Low current consumption" in "Analog (only MEMS)" type. By using CMOS technology which is applied to the production of highly integrated semiconductor, our gauge pressure sensor is able to achieve a good offset voltage, span voltage and temperature variation characteristics.

FEATURES

- Small package: 6.1(W) × 4.7(D) × 8.2(H)mm
- Operating pressure range -50~+50kPa
- Supply current 0.1mA
- Offset voltage 0.0+4mV/-4mV
- Span voltage 42+5.5mV/-5.5mV

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INDEX

DESCRIPTION.....	1
FEATURES.....	1
BLOCK DIAGRAM.....	3
PIN CONFIGURATION.....	3
ABSOLUTE MAXIMUM RATINGS.....	4
RECOMMENDED OPERATING CONDITIONS.....	4
ELECTRICAL CHARACTERISTICS.....	5
Pressure sensor characteristics.....	5
Temperature sensor characteristics.....	5
Definition of characteristics.....	6
TYPICAL PERFORMANCE CHARACTERISTICS.....	7
DIMENSIONS.....	9
RECOMMENDED LAND PATTERN.....	10
HANDLING PRECAUTIONS.....	11

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BLOCK DIAGRAM

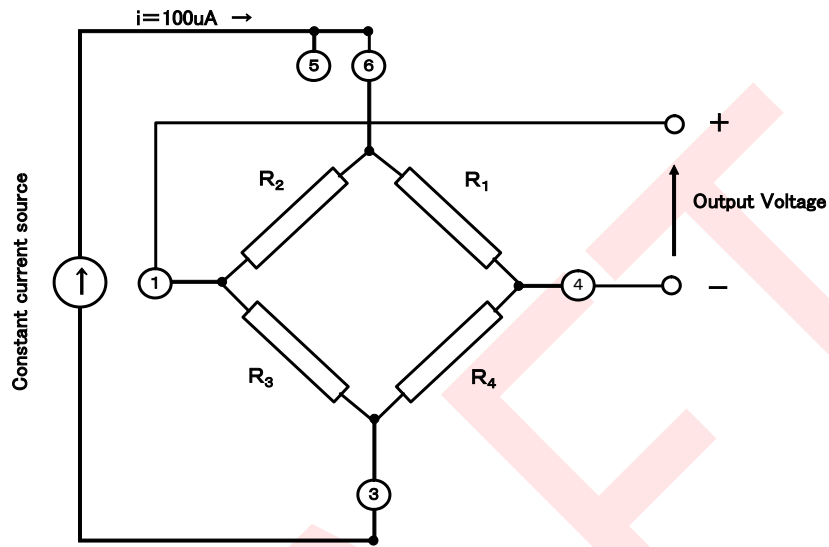
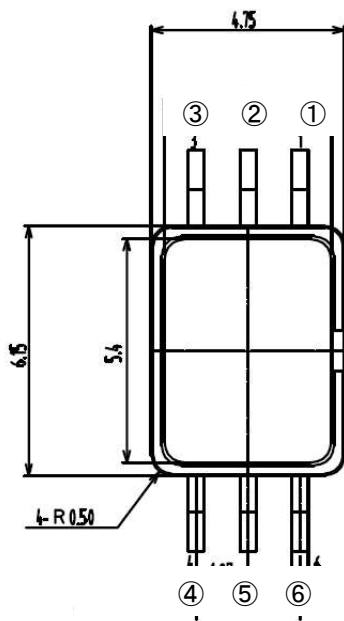


Fig.1 Block diagram

PIN CONFIGURATION



Pin No.	Pin Name
1	Vout(+)
2	No Connect
3	GND
4	Vout(-)
5	N-sub
6	Icc

Fig. 2 Pin configuration (Top view)

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ABSOLUTE MAXIMUM RATINGS

(unless otherwise specified, Ta=25°C)

Item	Symbol	Min.	Max.	Unit
Storage temperature range	T _{STG}	-40	120	°C
Supply current	ICC _{MAX}	-	0.2	mA
Overpressure (note ¹)	P _{MAX}	-80	+120	kPa
Pressure medium (note ²)	-	AIR (don't dewfall)		-

note¹: Overpressure is the maximum pressure to which the device can be taken and still meet specifications when return to the Operating pressure range.

note²: Storage and operation in an environment of dry and non-corrosive gases.

RECOMMENDED OPERATING CONDITIONS

(unless otherwise specified, Ta=25°C)

Item	Symbol	Min.	Typ.	Max.	Unit
Operating temperature range	T _{OPR}	-20	-	100	°C
Supply current	ICC _{OPR}	-	0.1	-	mA
Operating pressure range	P _{OPR}	-50	-	+50	kPa

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ELECTRICAL CHARACTERISTICS

Pressure sensor characteristics
(unless otherwise specified, Ta=23°C, ICC=0.1mA)

Item	Min.	Typ.	Max.	Unit	Note
Bridge Resistance	18	20	22	kΩ	
Offset Voltage (note ³)	-4.0	0	4.0	mV	
Span Voltage (note ³)	36.5	42.0	47.5	mV	at 50[kPa] pressure
	-48.5	-43.0	-37.5		at -50[kPa] pressure
Non-Linearity (note ³)	0.3	-	1.3	%FS (note ³)	0~50[kPa]
	-0.3	-	0.7		-50~0[kPa]
Hysteresis (note ³)	-0.2	-	0.2	%FS (note ³)	0~50[kPa]
	-0.2	-	0.2		-50~0[kPa]

note³: For the meaning of the unit, characteristics, refer to Next Chapter.

Temperature sensor characteristics
(unless otherwise specified, Ta=23°C, ICC=0.1mA)

Item	Min.	Typ.	Max.	Unit	Note
Temp influence of Span	-1.0	1.0	3.0	%FS (note ³)	0[°C](0~50[kPa])
	-2.0	1.0	4.0		85[°C]0~50[kPa]
	-1.2	0.8	2.8		0[°C](-50~0[kPa])
	-1.8	1.2	4.2		85[°C](-50~0[kPa])
Temp influence of Offset	-4.0	-	7.0	%FS (note ³)	0~85[°C]/0~50[kPa]
	-4.0	-	7.0		0~85[°C]/-50~0[kPa]

note³: For the meaning of the unit, characteristics, refer to Next Chapter.

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Definition of characteristics

1) Offset Voltage

The output voltage at Null pressure. (0[kPa]).

2) Span Voltage

At positive pressure range (0~50[kPa])

It is calculated by subtracting the output voltage at Null pressure (0[kPa]) from the output voltage at Maximum rating pressure (50[kPa]).

At negative pressure range (-50~0[kPa])

It is calculated by subtracting the output voltage at Null pressure (0[kPa]) from the output voltage at Maximum rating pressure (-50[kPa]).

3) Non-Linearity

At positive pressure range (0~50[kPa])

The amount of gap from an ideal output straight line and the output voltage at any pressure within the specified range which makes the deviation maximum. An ideal output line is drawn by connecting the points of output voltage at Null pressure (0[kPa]) and at Maximum rating pressure (50[kPa]). %FS notation that is normalized on the Span voltage at the time of 25 deg-C can be used.

At negative pressure range (-50~0[kPa])

The amount of gap from an ideal output straight line and the output voltage at any pressure within the specified range which make the deviation maximum. An ideal output line is drawn by connecting the points of output voltage at Null pressure (0[kPa]) and at Maximum rating pressure (-50[kPa]). %FS notation that is normalized on the Span voltage at the time of 25 deg-C can be used.

4) Hysteresis

At positive pressure range (0~50[kPa])

The maximum output voltage deviation at any pressure within the specified range when a pressure is repeatedly applied from Null pressure (0[kPa]) to Maximum rating pressure (50 [kPa]). %FS notation that is normalized on the Span voltage at the time of 25 deg-C can be used.

At negative pressure range (-50~0[kPa])

The maximum output voltage deviation at any pressure within the specified range when a pressure is repeatedly applied from Null pressure (0 [kPa]) to Maximum rating pressure (-50 [kPa]). %FS notation that is normalized on the Span voltage at the time of 25 deg-C can be used.

5) %FS

"Percent Full Scale". Target item and amount of change are normalized on the Span voltage at the time of 25 deg-C. The percentage notation can be used.

TYPICAL PERFORMANCE CHARACTERISTICS

(unless otherwise specified, Ta=25°C, ICC=0.1mA)

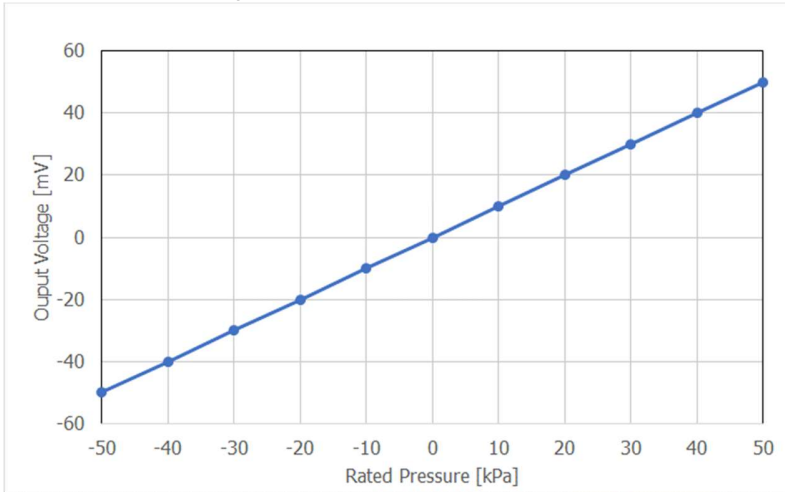


Fig.3.1 Output characteristic rated pressure of MMS901

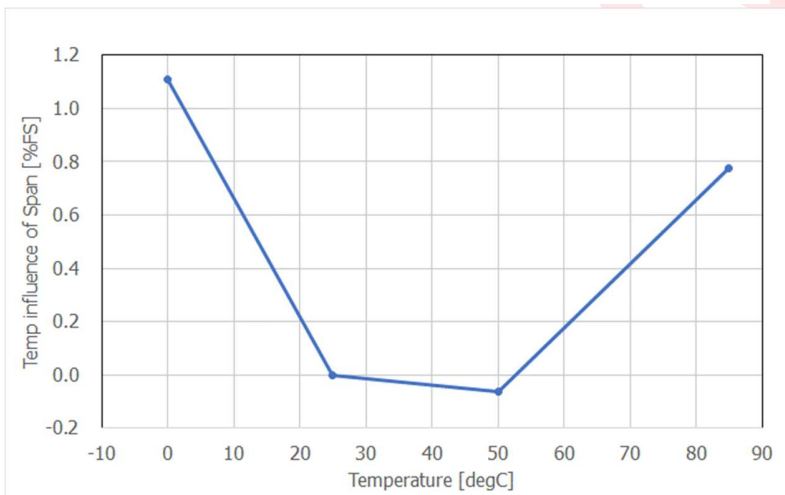


Fig.3.2 Temperature influence of Span voltage of MMS901

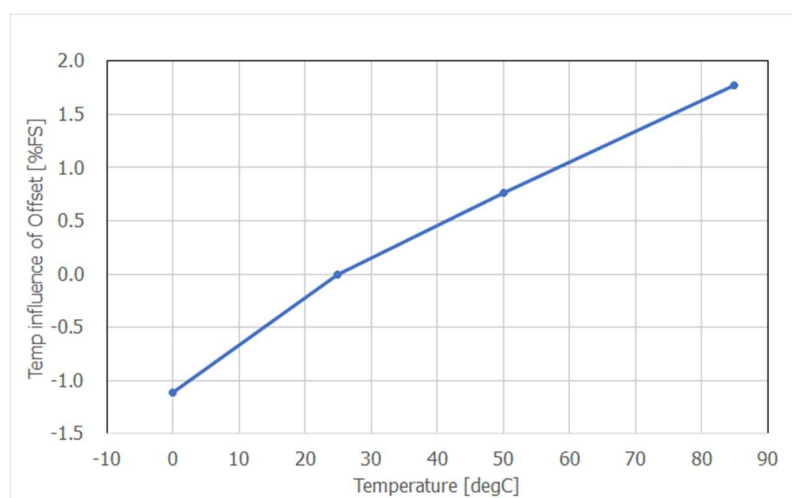
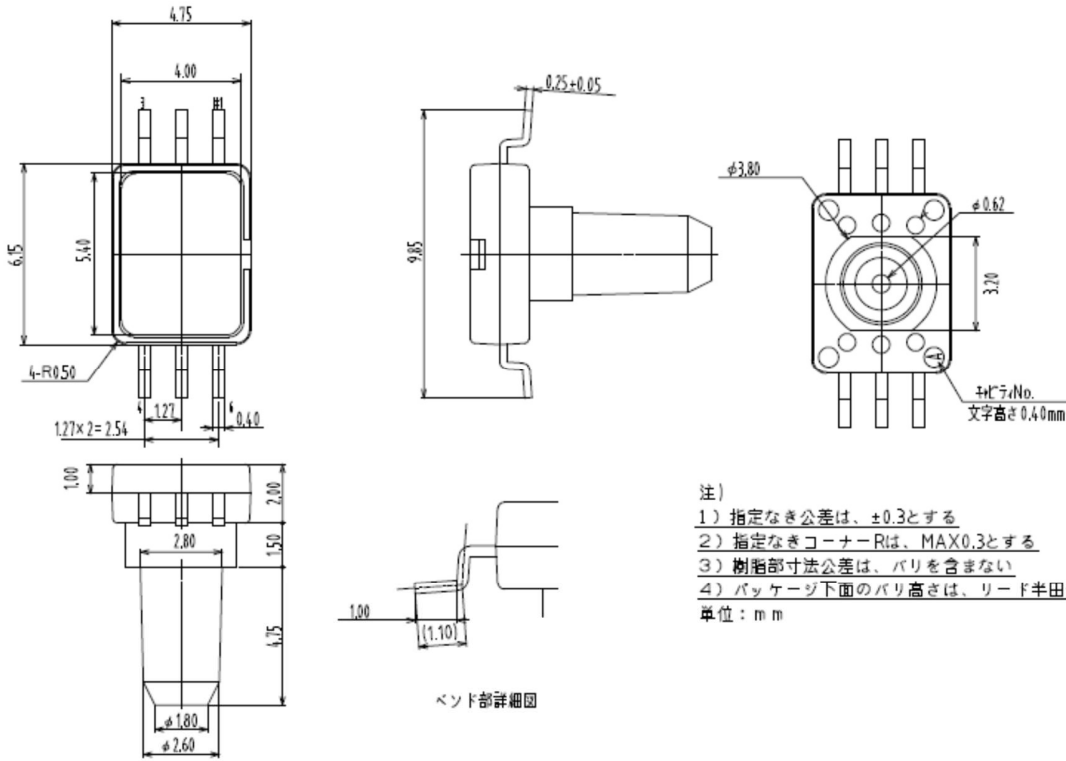


Fig.3.3 Temperature influence of Offset voltage of MMS901

DIMENSIONS

UNIT	mm
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- 注)
- 1) 指定なき公差は、±0.3とする
 - 2) 指定なきコーナーRは、MAX0.3とする
 - 3) 樹脂部寸法公差は、バリを含まない
 - 4) パッケージ下面のバリ高さは、リード半田付け面までの距離以下であること
- 単位：mm

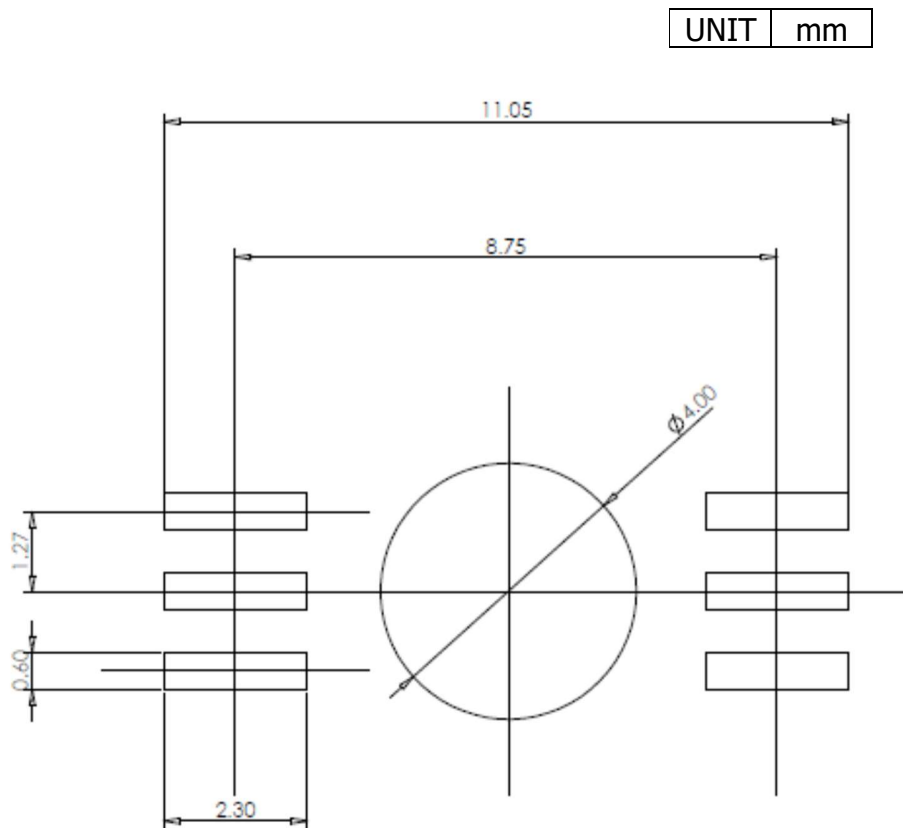
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RECOMMENDED LAND PATTERN



The dimension is for reference only and not guaranteed by design.

To design practically, correction should be made for optimized dimensions considering the effects of the board type to be mounted, mount (soldering) method, type and coating thickness of cream solder.

HANDLING PRECAUTIONS

1) Product handling

- ① Only air can be used as pressure media on the products directly. It is prohibited to use pressure media including corrosive gases (e.g. organic solvents gases, sulfur dioxide and hydrogen sulfide gases), fluid and any other foreign materials.
- ② The products are not water proof. The products shall be kept dry in use excluding the sensor port.
- ③ The products shall not be used under dew-condensing conditions. Frozen fluid on sensor chips may cause fluctuation of sensor output and other troubles.
- ④ Do not put foreign materials (e.g. a wire or a pin) into the connecting tube. It may cause breakage of pressure sensor chips or fluctuation of sensor output caused by clogging the tube.
- ⑤ The products shall be used within rated pressure. Usage at pressure out of the range may cause breakage.
- ⑥ The products shall not be used under high-frequency vibration including ultrasonic wave.
- ⑦ The output of the MEMS pressure-sensitive part may fluctuate when exposed to light, so be careful not to expose it to light.
- ⑧ The products may be damaged by static electricity. Charged materials (e.g. a workbench and a floor) and workers should provide measures against static electricity, including ground connection. The products have the ESD rating of 1000 V. (Human body model.)
- ⑨ Overpowering pins may deform terminals and detract solder abilities of sensor terminals. The products shall not be dropped and handled roughly.
- ⑩ The products shall not be used under humid or dusty condition.
- ⑪ The product terminal connections shall be made according to the terminal diagram.
- ⑫ Do not connect the product terminal direction upside down. If the terminals are connected in the opposite direction, the output may fluctuate or malfunction.
- ⑬ The output may fluctuate due to the influence of external noise, so take measures against external noise.
- ⑭ There is a possibility that the peripheral circuit board or some electronic parts generate heat while driving this product. Please handle with care.
- ⑮ The products do not have protecting circuit. Do not give electrical load over absolute maximum rating even for moment. Please install a protecting circuit in your equipment.

2) Environmental conditions for transport and storage

- ① The products shall not be kept with corrosive gases (e.g. organic solvents gases, sulfur dioxide and hydrogen sulfide gases).
- ② The products are not water proof. The products shall be kept dry during storage excluding the sensor port.
- ③ The strength of the outer box deteriorates depending on the storage period, humidity of the storage location, and the stage, so please follow the principle of first-in first-out. Also, avoid rough handling such as throwing down or dropping.
- ④ If the inner box is dropped, the stopper may come off from the plastic sleeve and the product may pop out, causing damage to the product.
- ⑤ An anti-static treatment has been applied to the sleeves. Please note the following points.
 - (a). Getting wet may remove anti-static treatment and eliminate its effect.
 - (b). The sleeves may become sticky under the hot and humid condition in the nature of an anti-static treatment.
 - (c). Anti-static treatment has degradation. It is prohibited to keep the sleeves for more than six months. The sleeves are also non-reuse.
- ⑥ Store within an appropriate temperature and humidity range.
 - Temperature : from 5 to 30 degree C, humidity : from 40 to 60 %

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- ⑦ The terminals are Ag-plated and may discolor depending on the storage conditions. Discoloration after delivery is not covered by the warranty, so please be careful about the storage method.
 - ⑧ The products shall not be kept under humid or dusty condition.
 - ⑨ The products shall not be kept in condensation.
- 3) Mounting
- ① The products shall be soldered on the printed-circuit boards to which the sensor can be securely fixed.
 - ② The pin No.2 shall be soldered on the printed-circuit boards to keep the mechanical strength.
 - ③ The pin No.2 need not be electrically connected.
- 4) Soldering
- ① Due to its small size, the thermal capacity of the pressure sensor is low. Therefore, take steps to minimize the effects of external heat.
 - ② Solder temperature shall not be over 260 deg C when soldering the products. Soldering the products shall be within 10 sec at one side of the sensor, 3 pins.
 - ③ The product's case shall not be heated, heat only pins. Do not use a reflow furnace. This is because the product's case is also heated.
 - ④ Only non-corrosive resin type flux shall be used. Since the pressure sensor chip is exposed to the atmosphere, do not allow flux to enter inside the sensor's case.
 - ⑤ If the conditions other than the above are chosen, please confirm the soldering quality before using.
- 5) Cleaning
- ① Since the pressure sensor chip is exposed to the atmosphere, cleaning fluid shall not be allowed to enter inside the sensor's case.
 - ② Ultrasonic cleaning is prohibited for the products since ultrasonic may cause breaks or disconnections in the wiring.
- 6) Coating
- ① The products shall not be coated, after mounted on the print circuit board.
 - ② The products shall not be washed, after mounted on the print circuit board. Otherwise, the detergent may remain on the surface of the pressure sensor.

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Notes:

Any products mentioned this datasheet are subject to any modification in their appearance and others for improvements without prior notification. The details listed here are not a guarantee of the individual products at the time of ordering. When using the products, you will be asked to check their specifications.

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