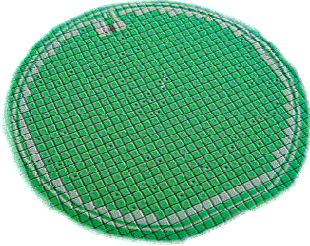


MS7801

PRESSURE SENSOR DIE (0-1 BAR)



- 0 to 100 kPa range (1 bar or 14.5PSI)
- Absolute/differential pressure sensors
- RoHS-compatible & Pb-free¹

DESCRIPTION

The sensor element of the MS7801 consists of a silicon micro-machined membrane. Implanted resistors make use of the piezo-resistive effect. The absolute pressure sensor employs a sealed vacuum reference cavity underneath the membrane. The Pyrex glass wafer used for this sealing has a thickness of 0.2 mm (MS7801-A_0.2) or 0.5 mm (MS7801-A_0.5). There are two gauge versions available: one with a drilled Pyrex glass (MS7801-D) and the other without Pyrex glass (MS7801-S).

FEATURES

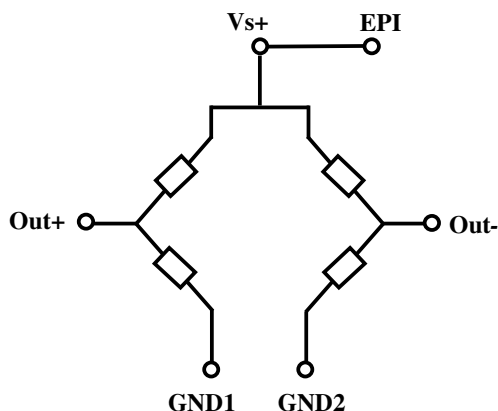
- Uncompensated pressure sensor die
- Output Span 150mV @ 5V
- Temperature Range -40°...+125°C
- Linearity 0.05% (typical)
- Small Die Size 1.96 x 2.10 mm (MS7801-A)
- Low Cost, High reliability

APPLICATION

- For absolute or differential pressure sensor systems
- Barometers, Altimeters
- Variometers

ELECTRICAL CONNECTIONS

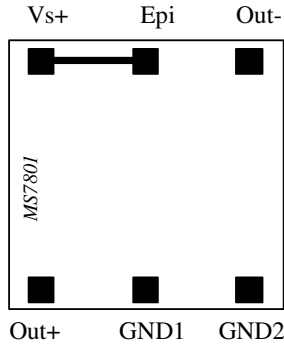
Positive output for pressure applied topside



- Vs+ : Supply voltage of Wheatstone bridge
- Epi : Connection of epitaxial layer (membrane)
- Out- : Negative output
- Out+ : Positive output
- GND1 : Ground
- GND2 : Ground

¹ The European RoHS directive 2002/95/EC (Restriction of the use of certain Hazardous Substances in electrical and electronic equipment) bans the use of lead, mercury, cadmium, hexavalent chromium and polybrominated biphenyls (PBB) or polybrominated diphenyl ethers (PBDE).

BOND PAD CONFIGURATION



Important remarks:

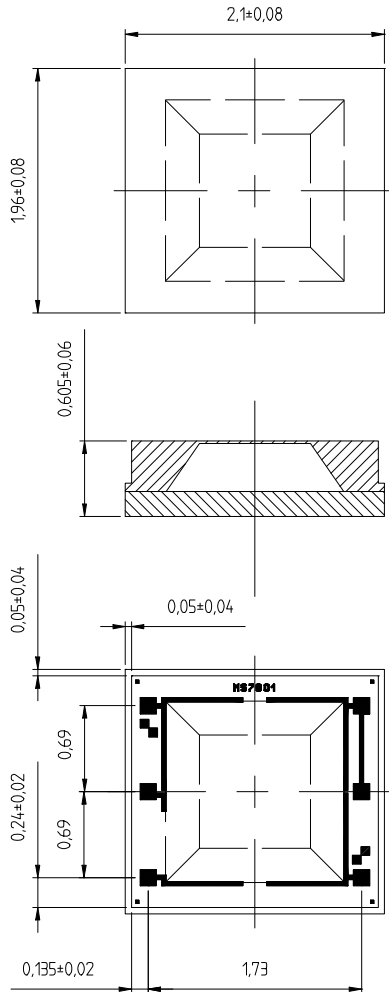
As the sensing elements are diffused resistances, the voltage applied on the ground pads (GND1 and GND2) has to be lower than the voltage applied on supply voltage pad (Vs+).

The epitaxial layer is connected to the Vs+ pin on the die.

Gold ball bonding or aluminium wedge bonding can be used to wire-bond the sensor. The quality of the wire-bonding is equipment and process dependant. For this reason, it is strongly recommended that a thorough wire-bonding qualification is made by the end user if the sensor is going to be operated over an extended temperature range.

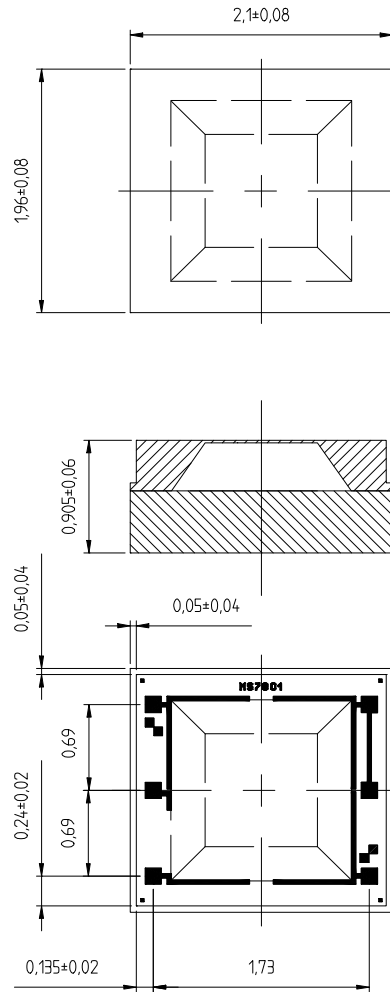
LAYOUT (Absolute sensors)

MS7801-A_0.2



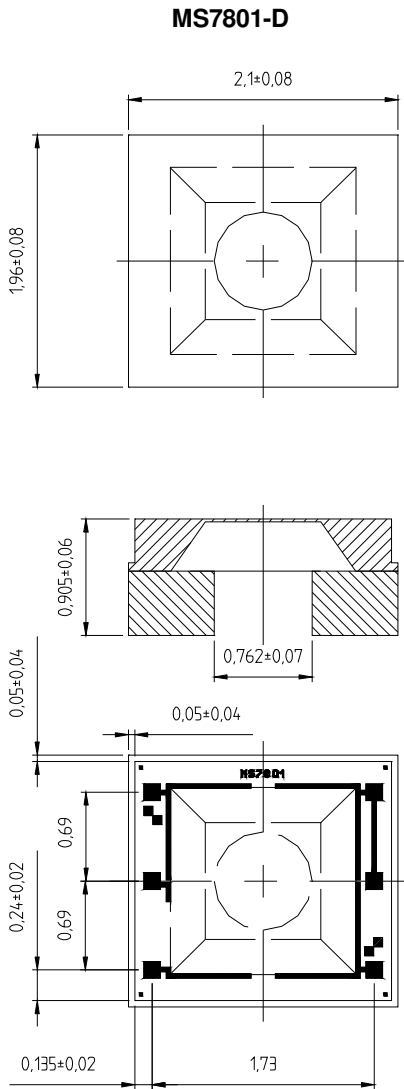
Bondable area = 100 x 100 um

MS7801-A_0.5

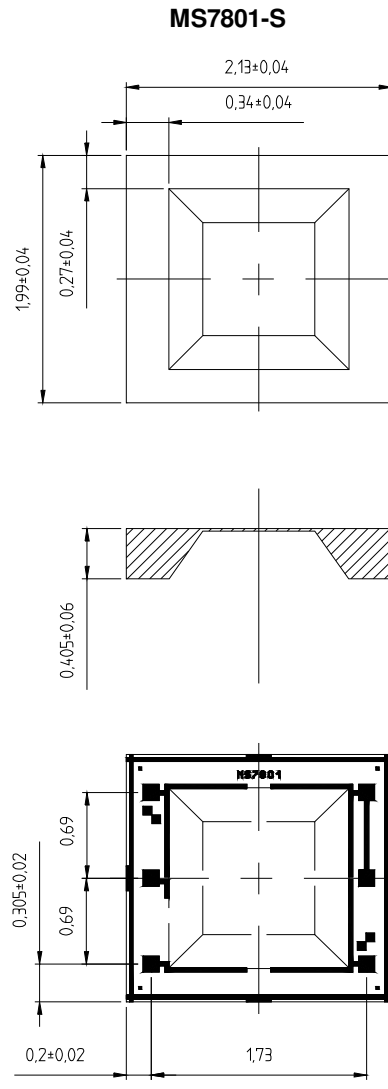


Bondable area = 100 x 100 um

LAYOUT (Gauge sensors)



Bondable area = $100 \times 100 \mu\text{m}$



Bondable area = $100 \times 100 \mu\text{m}$

FULL SCALE PRESSURE

| kPa | bar | mbar | PSI | atm | mm Hg | m H ₂ O | Inches H ₂ O |
|-----|-----|------|------|-------|-------|--------------------|-------------------------|
| 100 | 1 | 1000 | 14.5 | 0.987 | 750 | 10.197 | 401 |

ABSOLUTE MAXIMUM RATINGS

| Parameter | Symbol | Conditions | Min | Max | Unit |
|---------------------|----------------|------------------------|-----|------|------|
| Supply voltage | VS+ | T _a = 25 °C | | 20 | V |
| Storage temperature | T _s | | -40 | +150 | °C |
| Pressure overload | | | | 5 | Bar |

ELECTRICAL CHARACTERISTICS

(Reference conditions: Supply Voltage $V_{S+} = 5 \text{ Vdc}$; Ambient Temperature $T_a = 25^\circ\text{C}$)

| Parameter | Min | Typ | Max | Unit | Notes |
|---|--------------------------|------------------|--------------------------|--|-------|
| Operating Pressure Range | 0 | | 1 | Bar | |
| Operating Temperature Range | -40 | | 125 | $^\circ\text{C}$ | |
| Bridge Resistance | 3.0 | 3.4 | 3.8 | $\text{k}\Omega$ | |
| Full-scale span (FS) | 120 | 150 | 180 | mV | |
| Zero Pressure Offset | -40 | 0 | 40 | mV | |
| Linearity | | ± 0.05 | ± 0.2 | % FS | 1 |
| Temperature Coefficient of Resistance Span Offset | + 2400 - 1500 - 80 | + 2800 - 1900 | + 3300 - 2300 + 80 | ppm/ $^\circ\text{C}$ ppm/ $^\circ\text{C}$ $\mu\text{V}/^\circ\text{C}$ | 2 |
| Pressure Hysteresis | | ± 0.05 | ± 0.15 | % FS | 3 |
| Repeatability | | ± 0.05 | ± 0.15 | % FS | 4 |
| Temperature Hysteresis | | | 0.3 | % FS | 5 |

NOTES

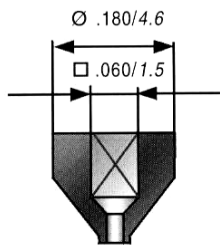
- 1) Deviation at one half full-scale pressure from the least squares best line fit over pressure range (0 to 1 bar).
- 2) Slope of the endpoint straight line from 25°C to 60°C .
- 3) Output deviation at any pressure within the specified range, when this pressure is cycled to and from the minimum or maximum rated pressure, at 25°C .
- 4) Same as 3) after 10 pressure cycles
- 5) Maximum difference in offset after one thermal cycle from -40°C to $+125^\circ\text{C}$.

PICKING TOOLS

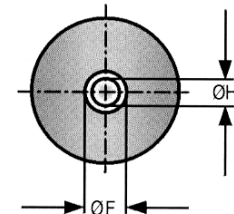
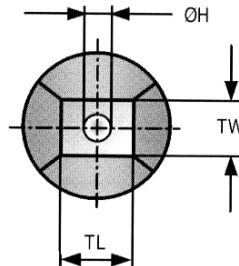
The MS7801 sensors have a sensitive membrane of $0.9 \times 0.9 \text{ mm}$ and outer dimensions of $2.10 \times 1.96 \text{ mm}$ (MS7801-A_0.2, MS7801-A_0.5 and MS7801-D) or $2.13 \times 1.99 \text{ mm}$ (MS7801-S). The pick and place tool has to be of a soft material as rubber (Hardness 78-97 Shore A). Its external size must fit the sensor and the vacuum cavity must be as large as the membrane itself. Successful test where done with specific SPT tools, see SPT drawing and references below).

Ensure that the ejection pins do not touch the membrane for gauge versions.

| SPT references | RTR-A1-060x060 | CTR-A1-080 |
|---------------------|--|--|
| External dimension | TL & TW: 0.06 inch / 1.52 mm | $\varnothing\text{F}$: 0.08 inch / 2.03 mm |
| Internal dimensions | $\varnothing\text{H}$: 0.035 inch / 0.89 mm | $\varnothing\text{H}$: 0.035 inch / 0.89 mm |



Type A



ORDERING INFORMATION

| Product Code | Type | Product | Art.-Nr. |
|--------------|--------------|---|-----------|
| MS7801-A_0.5 | Absolute | 1 bar Pressure Sensors 0.5 mm Pyrex sawn on b/f | 780125021 |
| MS7801-A_0.2 | Absolute | 1 bar Pressure Sensors 0.2 mm Pyrex sawn on b/f | 780125022 |
| MS7801-D | Differential | 1 bar Pressure Sensors sawn on b/f | 780125121 |
| MS7801-S | Differential | 1 bar Pressure Sensor no Pyrex sawn on b/f | 780125221 |

The MS7801 dice are supplied sawn on blue foil, mounted on plastic rings.

FACTORY CONTACTS

NOTICE

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