



MS52XX-C&T

SMD Pressure Sensor

SPECIFICATIONS

- 1, 4, and 7 bar absolute pressure range
- Piezoresistive silicon micromachined sensor
- Surface mount 6.2 x 6.4 mm
- LCP plastic cap for easy connection
- Uncompensated
- Optional trimmed offset
- Low noise, high sensitivity, high linearity

The MS52xxC&T SMD pressure sensor series is designed for industrial pressure sensor systems with highest demands on resolution, accuracy and reliability. The device consists of a silicon micromachined pressure sensor die mounted on a 6.2 x 6.4 mm ceramic carrier protected by a plastic cap. The MS52xxC&T SMD can be delivered with many different sensitivities and linearities. When you have a need, please feel free to ask us.

| | Untrimmed offset | | | Trimmed offset | | | |
|------------------------|------------------|-----------------------|------------|----------------|--------------------|------------------------|--|
| Full scale pressure | Product code | Full scale span | Linearity | Product code | Full scale span | Offset at 1013 mbar | |
| 1 bar | MS5201-CP | 240 mV | ±0.15 % FS | MS5201-TP | On request | On request | |
| 4 bar | MS5204-CP | 225 mV | ±0.15 % FS | MS5204-TP | 225 mV | 17 mV | |
| 7 bar | MS5207-CP | 392 mV | ±0.15 % FS | | | | |

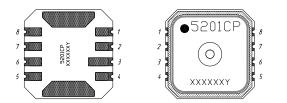
FEATURES

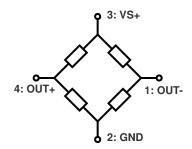
- Low cost SMD ceramic package
- Small size
- High reliability, low drift
- -40 °C to +125 °C operation range
- Trimmed offset available
- Simple to interface with nozzle port

APPLICATIONS

- Absolute pressure sensor systems
- High resolution altimeters, variometers
- Barometers
- Engine controls
- Industrial applications
- Pressure monitoring systems

PIN CONFIGURATION





PIN DESCRIPTION

| Pin Name | Pin No | Function |
|----------|--------|--|
| OUT- | 1 | Negative output voltage of Wheatstone bridge |
| GND | 2 | Ground |
| VS+ | 3 | Supply voltage of Wheatstone bridge |
| OUT+ | 4 | Positive output voltage of Wheatstone bridge |

ABSOLUTE MAXIMUM RATINGS

| Parameter | Symbol | Conditions | Min | Max | Unit | Notes |
|------------------------|--------|------------|-----|------|------|-------|
| Supply voltage | VS+ | Ta = 25 °C | - | 20 | V | |
| Storage temperature | Ts | | -40 | +125 | °C | |
| Overpressure MS5201-CP | | | | 5 | | |
| MS5204-TP | Р | Ta = 25 °C | | 21 | bar | 1 |
| MS5207-CP | | | | 21 | | |

NOTES

1) The MS52xx-C&T is aimed for air pressure applications. There is no gel protection on the silicon sensing element.

ELECTRICAL CHARACTERISTICS

UNTRIMMED VERSIONS

| | | | | | (Vs+ = 5 V | ; Ta = 25 °C) |
|------------|---------------------------------------|--------|--------|--------|------------|---------------|
| | Parameter | Min | Тур | Max | Unit | Notes |
| NOF224 OD | Operating pressure range | 0 | - | 1 | Bar | |
| | Full-scale span (FS) | 190 | 240 | 290 | mV | |
| MS5201-CP | Sensitivity | 190 | 240 | 290 | mV/bar | |
| | Linearity | - | ±0.15 | ±0.4 | % FS | 1, 6 |
| | Operating pressure range | 0 | - | 7 | Bar | |
| MS5207-CP | Full-scale span (FS) | 322 | 392 | 462 | mV | |
| | Sensitivity | 46 | 56 | 66 | mV/bar | |
| | Linearity | - | ±0.15 | ±0.4 | % FS | 1, 6 |
| All ranges | Operating temperature range | -40 | - | 125 | °C | |
| | Zero pressure offset | -40 | 0 | 40 | mV | |
| | Pressure hysteresis | - | - | ±0.20 | % FS | 2, 6 |
| | Temperature hysteresis | - | 0.3 | 0.8 | % FS | 3, 6 |
| | Repeatability | - | - | ±0.20 | % FS | 4, 6 |
| | Bridge resistance | 3.0 | 3.4 | 3.8 | kΩ | |
| | Temperature coefficient of resistance | +2'400 | 2'900 | +3'300 | ppm/°C | 5, 6 |
| | Temperature coefficient of span | -1'500 | -1'900 | -2'300 | ppm/°C | 5, 6 |
| | Temperature coefficient of offset | -80 | - | +80 | μV/°C | 5, 6 |

NOTES

- 1) Deviation at one half full-scale pressure from the least squares best line fit over pressure range.
- 2) Maximum difference of output voltage after 1 pressure cycle at any pressure within the operating pressure range.
- 3) Maximum difference in offset after one thermal cycle from -40°C to +125°C.
- 4) Same as 2) after 10 pressure cycles.
- 5) Slope of the end-point straight line from 25°C to 60°C.
- 6) Not 100% tested.

ELECTRICAL CHARACTERISTICS (CONT.)

TRIMMED VERSION

| | | | | | (Vs+ = 5 V | ; Ta = 25 °C) |
|-----------|---------------------------------------|--------|--------|--------|------------|---------------|
| | Parameter | Min | Тур | Max | Unit | Notes |
| | Operating pressure range | 0 | - | 4 | Bar | |
| | Full-scale span (FS) | 200 | 225 | 250 | mV | |
| | Sensitivity | | 56 | | mV/bar | |
| | Linearity | | ±0.15 | ±0.4 | % FS | 1, 6 |
| | Operating temperature range | -40 | - | 125 | °C | |
| | Pressure offset at 1013 mbar | 15 | 17 | 19 | mV | |
| MS5204-TP | Pressure hysteresis | - | - | ±0.20 | % FS | 2, 6 |
| | Temperature hysteresis | - | 0.3 | 0.8 | % FS | 3, 6 |
| | Repeatability | - | - | ±0.20 | % FS | 4, 6 |
| | Bridge resistance | 3.0 | 3.4 | 3.8 | kΩ | |
| | Temperature coefficient of resistance | +2'400 | 2'900 | +3'300 | ppm/°C | 5, 6 |
| | Temperature coefficient of span | -1'500 | -1'900 | -2'300 | ppm/°C | 5, 6 |
| | Temperature coefficient of offset | -80 | - | +80 | μV/°C | 5, 6 |

NOTES

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- 6) Not 100% tested.

APPLICATION INFORMATION

GENERAL

The MS52xxC&T is a miniaturized absolute pressure sensor series which has been designed for surface mounting applications. Its main advantages are the high reliability of the semiconductor sensor and a design which makes it suitable for applications requiring small-scale and cost-efficient solutions.

The sensor element of the MS52xxC&T consists of a micromachined silicone membrane with borosilicate glass wafer-bonded under vacuum to the backside for reference pressure. Implanted resistors make use of the piezo-resistive effect to sense pressure applied to the membrane. The sensor is mounted in a special process allowing best-offset stability making the part suitable for direct PCB assembly.

Typical applications for this miniaturized pressure sensor MS52xxC&T are altitude measurements and the measurement of atmospheric reference pressure in medical and industrial equipment as well as in automotive and household applications, consumer electronics and pneumatics.

| Full scale pressure | Untrimmed Versions | Trimmed Versions |
|---------------------|----------------------------------|--|
| 1 bar | Variometer, Altimeter, Barometer | - |
| 4 bar | - | Engine control, Industrial Applications, Pressure monitoring systems |
| 7 bar | Electronic scale | - |

LIGHT SENSITIVITY

The MS52xxC&T is sensitive to sunlight, especially to infrared light sources. This is due to the strong photo effect of silicon. As the effect is reversible there will be no damage, but the user has to take care that in the final product the sensor cannot be exposed to direct light during operation. This can be achieved for instance by placing mechanical parts with holes in such that light cannot pass.

CONNECTION TO PCB

The package outline of the module allows the use of a flexible PCB to connect it. This can be important for applications in watches and other special devices, and will also reduce mechanical stress on the device. For applications subjected to mechanical shock, it is recommended to enhance the mechanical reliability of the solder junctions by covering the rim or the corners of MS52xxC&T ceramic substrate with glue or Globtop-like material.

SOLDERING

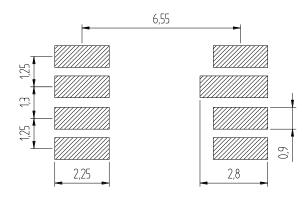
Please refer to the application note AN808 for all soldering issues.

CLEANING

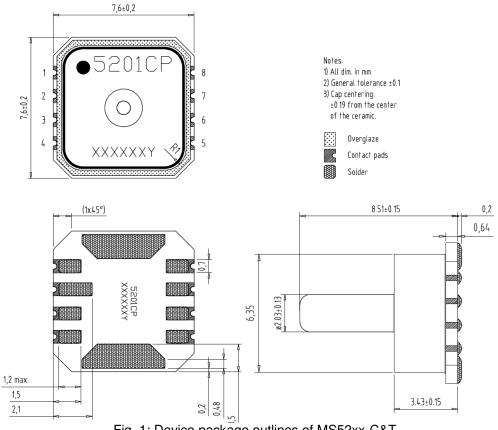
The MS54XX has been manufactured under cleanroom conditions. Each device has been inspected for cleanness. It is therefore recommended to assemble the sensor under class 10'000 or better conditions. Should this not be possible, it is recommended to protect the sensor opening during assembly from entering particles and dust. To avoid cleaning of the PCB, solder paste of type "no-clean" shall be used. Cleaning might damage the sensor.

RECOMMENDED PAD LAYOUT

Recommended pad layout for soldering of the MS52xx on a printed circuit board



PACKAGE OUTLINES



ORDERING INFORMATION

| Product code | Product | Art. No |
|--------------|---------------------------------------|--------------|
| MS5201-CP | SMD Pressure sensor, 1 bar, untrimmed | 325201004-00 |
| MS5204-TP | SMD Pressure sensor, 4 bar, trimmed | 325204000-00 |
| MS5207-CP | SMD Pressure sensor, 7 bar, untrimmed | 325207000-00 |

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