

MP-7217-TC Combined Flammable and Volume Percent Methane Sensor

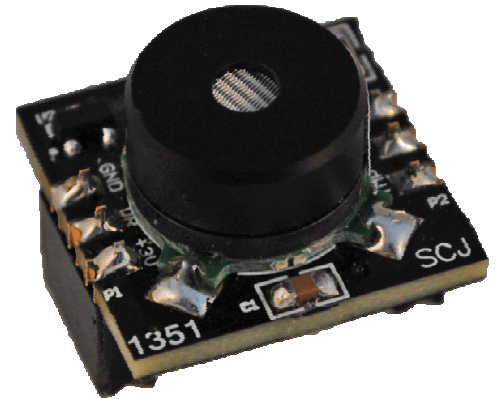
The MP-7217-TC gas sensor has been designed to measure Methane over the explosive concentration range and up to 100% by volume.

The explosive range is measured with the sensor in Catalytic mode where the target gas is reacted on the detector bead.

The 100% volume range is measured with the detector bead replaced by a resistor and the compensating bead measuring the target gas concentration by virtue of its change in thermal conductivity.

The sensor also contains an externally digital controllable on-board switch, facilitating the change from the catalytic mode to thermal conductivity mode and back again.

An on-board temperature sensor also provides a temperature output to allow an instrument microprocessor to carry out temperature compensation.



SENSOR FEATURES

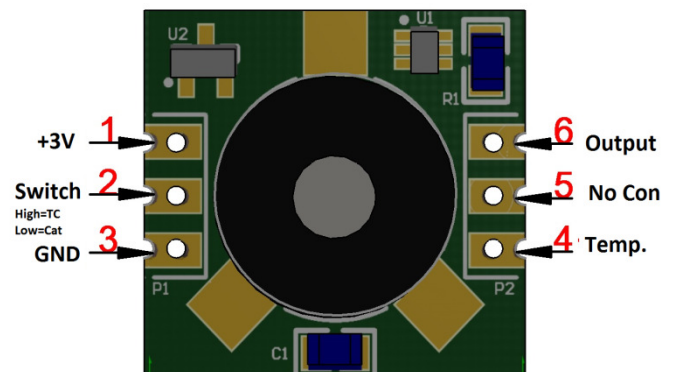
- Dual Range i.e. Methane 0-100% LEL; 0-100% Vol.
- Single sensor footprint
- Very low power
- Highly silicon poison resistant
- Highly H₂S resistant
- Mechanically robust to shock
- Low orientation effects
- High quality silicon wafer manufacture
- ATEX/IECEX certified package

The certification markings are:

 II 1G Ex ia IIC Ga and  I M1 Ex ia I Ma
 II 2G Ex d IIC Gb and  I M2 Ex d I Mb

See Page 3 for full certification data.

INTERFACE DIAGRAM



OPERATION

- It is recommended that the detector and compensator be run in a simple Wheatstone bridge circuit at a constant voltage.
- The output of the temperature sensor should be used to compensate for ambient temperature changes particularly in the case of operating in TC mode.
- It is recommended that the changeover switch from Catalytic to Thermal conductivity is software controlled e.g. switching off the catalytic mode when the gas concentration exceeds 60% LEL and switching off the TC mode when the Methane concentration drops below 50%LEL.

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GENERAL DATA

This information relates to the device operating continuously in the recommended bridge circuit

Operation Continuous

Supply voltage (see note 1) 2.9 to 3.1V

Sensor current (at $3.0 \pm 0.1V$) 39 to 42mA

Typical Sensitivity Methane

(Measured using 1% Methane balance air test gas)

Catalytic mode.....12 mV/ % Methane

TC mode.....3mV/% Methane

Zero offset range in clean air

(at $3.0 \pm 0.1V$)

Catalytic..... ± 20 mV max

TC Mode..... ± 50 mV max

Response times (t_{90}) (see note 2)

Catalytic... < 12 seconds

TC Mode.....<10 seconds

Maximum Gas concentration (see note 3)

Catalytic..... 5% volume Methane in Air

TC mode100% volume Methane

Long Term Behaviour

Catalytic

Long Term Zero drift (see note 4) < 1.0 mV/month

Long Term Sensitivity drift (see note 5) . . < 0.6 mV/month

TC mode

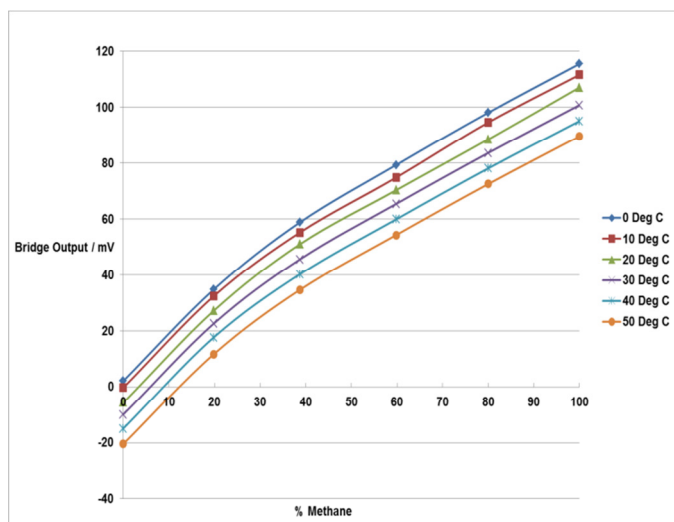
Long Term Zero & Sensitivity drift:

Customer dependent; compensation method used.

Temperature and Linearity

Catalytic- Linear up to a minimum of 4% Methane

TC Mode- See below for Linearity and effect of temperature



The responses exhibit a quadratic behaviour and tests have shown that a 3 point calibration at 0, ~40 & 100% Methane will generate factors which will meet the requirements of EN 60079-29-1 2007 part 5.4.3.2 i.e. within $\pm 3\%$ Methane or $\pm 5\%$ of indication

MAXIMUM RATINGS (Absolute values)

Input voltages between pins:

pins 2 and 3 3.2 V

Operation, storage in original packaging and shipping:

Temperature -40 to +60 °C
(certified -40 to +75 °C for intrinsic safety)

Humidity 0 to 95%RH non-condensing

NOTES

1. The polarity of the supply voltage may be reversed without harm. The only effect is to reverse the polarity of the output signal.
2. Responses measured at 3.0 ± 0.1 V using 1% Methane in an SGX test manifold at 500 sccm.
3. Exceeding these limits may change the sensitivity to Methane or the zero in air or in extreme cases permanently damage or destroy the sensor. The calibration of the sensor should be re-measured if the sensor voltage has exceeded 3.2 Volts.
4. Whilst operating, to gas concentrations greater than the Lower Explosive Limit.
5. Over 90 days period. Measured at 3.0 ± 0.1 V using 1% methane, over a 90 days period.

IMPORTANT PRECAUTIONS

Read the following instructions carefully before using the MP-7217TC described in this document to avoid erroneous readings and to prevent the device from permanent damage.

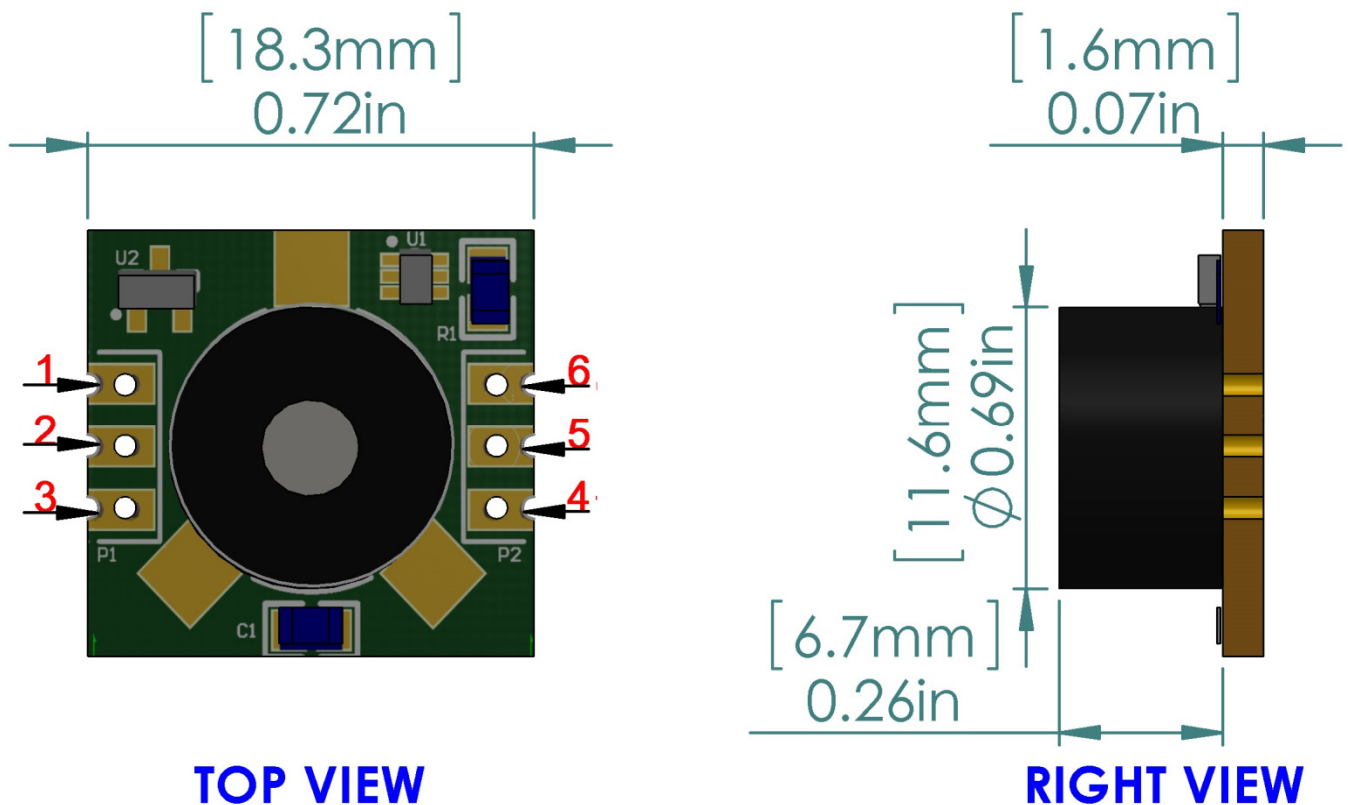
Some compounds are known to have detrimental effects on the response of catalytic detector bead to gas.

- I. Long term exposure to silicones (by far the most significant poison), hydrogen sulfide (other sulfur containing compounds), phosphates and organometallic compounds will irreversibly poison the sensor. High concentrations of flammable gas could also permanently affect the response of the sensor in catalytic mode.
- II. Long term exposures to Hydrogen Sulfide can cause temporary or permanent loss of catalytic sensor response. Other vapours such as Halogenated hydrocarbons (e.g. freon, trichloroethylene, methyl chloride, etc.), can cause the same type of effect to a lesser degree.
- III. Specific protection is needed in applications where poisons or inhibitors are present.

SGX strongly recommends using ESD protection equipment to handle the sensor. For any additional questions, contact SGX.

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INSTRUCTIONS SPECIFIC TO HAZARDOUS AREA

INSTALLATIONS (Ref EU ATEX Directive 94/9/EC, Annex II, 1.0.6)

1. The MP-7217-TC Gas Sensor is component approved only and may not be used as a stand-alone item in a hazardous area without further protection.
2. The component is only certified for operation in ambient temperatures between -40°C and $+60^{\circ}\text{C}$ and should not be used outside this range. For intrinsic safety the component is certified for operation in extended ambient temperatures between -40°C and $+75^{\circ}\text{C}$.
3. The MP-7217-TC Gas Sensor shall be used in conjunction with apparatus providing an intrinsically safe supply having a maximum output power (PO) not greater than 1.1 W.
4. When this component is utilized in equipment that is intended to be used in group I applications, it shall be suitably protected to ensure that it will withstand impact energy in excess of the 7 J low risk of impact value specified in EN60079-0: clause 26.4.
5. The MP-7217-TC Gas Sensor has not been assessed as a safety device (EHSR 1.5).
6. There are no user-serviceable parts in the component.
7. The end-user/installer should be aware that the certification of the MP7217-TC Gas Sensor relies on the following materials used in its construction, which are suitable for most common applications:
Enclosure PEI-ULTEM 1000
Mesh Flame Arrestor Stainless Steel

In accordance with the Note in EN60079-0: Clause 6.1(a), the end-user/installer shall inform the manufacturer of any adverse conditions that the MP-7217-TC Gas Sensor may encounter. This is to ensure that the MP-7217-TC Gas Sensor is not subject to conditions that may cause degradation of these materials.

8. The certification markings for the MP-7217TC Gas Sensor are:

 II 1G Ex ia IIC Ga and  I M1 Ex ia I Ma; in compliance with EN60079-0 : 2012, EN60079-11 : 2012
 LCIE 13 ATEX 3064 U
 $U_i \leq 6.0\text{V}$, $I_i \leq 185\text{mA}$, $P_i \leq 1100\text{mW}$, $C_i=0$, $L_i=0$, Ambient temperature : -40°C to $+75^{\circ}\text{C}$

 II 2G Ex d IIC Gb and  I M2 Ex d I Mb; in compliance with EN60079-0 : 2012, EN60079-1 : 2007
 LCIE 13 ATEX 3065 U
 Rated voltage: 2.9 to 3.1 V Rated current:
 39 to 41 mA Power: $< 150\text{mW}$
 Ambient temperature : -40°C to $+60^{\circ}$

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