

Kebaili MEMS Gas Sensor

KHS-100 Hydrogen Gas Sensor

General Description

KHS-100 Hydrogen gas sensor is a micro-machined silicon MEMS based micro-sensor packaged in a standard 4-pin TO-18 style package with a metal cap and a metal mesh protective filter. KH-100 detects hydrogen gas in the range of 0-100 LEL (Lower Explosive Limit).

Operating Principle

The measurement of hydrogen gas is based on reversible surface conductivity modification of the sensing element upon adsorption of hydrogen gas.

Sensor Description

KHS-100 hydrogen sensor consists of two resistive sensing elements on an electrically and thermally isolated micro hotplate.

The sensing element and the reference element are two identical resistive elements in the form of thin film metal alloy layer.

The adsorption of hydrogen gas by the sensing element causes a change of its resistance. The compensating (reference) element does not adsorb hydrogen gas, thus no change of its resistance occurs upon exposure to hydrogen gas.

The micro hotplate heater is used to maintain the sensing and reference elements at an optimum operating temperature for hydrogen gas adsorption.

The reference element is used for temperature and humidity compensation.

The sensing and reference elements form half of a Wheatstone bridge electronic circuit.

The output voltage of the Wheatstone bridge is proportional to the hydrogen gas concentration.

The sensor chip is electrically connected to a 4-pin TO-18 style package by gold wire bonding.

Features

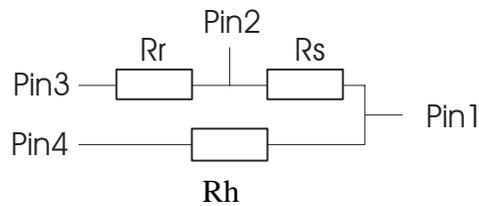
- Small size: TO-18 style package
- Low power consumption: 25 mW
- Sensitivity range: 0-100% LEL
- Response time: 15 sec
- Highly selective to hydrogen
- No cross-sensitivity to methane
- Temperature and humidity compensated sensor
- Chip dimensions: 1.00 mm x 1.00 mm x 0.38 mm

Specifications are subject to change without prior notice.

Electrical Characteristics

Weatstone bridge voltage:	2.7 Volts
Heater voltage:	0.5 Volt to 1.0 Volt
R sensing = Rs:	$1000 \pm 250 \Omega$
R reference = Rr:	$1500 \pm 500 \Omega$
R heater = Rh:	$150 \pm 50 \Omega$
Operating temperature:	0 - 50°C
Humidity range:	15 - 95 % RH

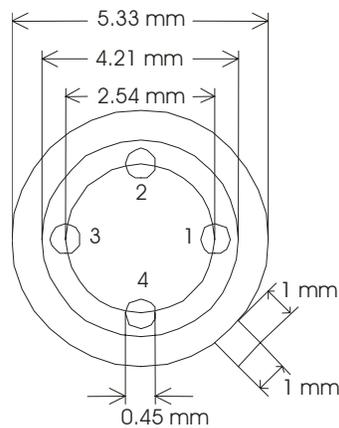
CAUTION: Exceeding the recommended values will cause permanent damage to the sensor. Extended exposure of the sensor to high concentration of hydrogen gas will shorten its life span.



Sensor Circuit Diagram

Packaging Characteristics

TOP VIEW

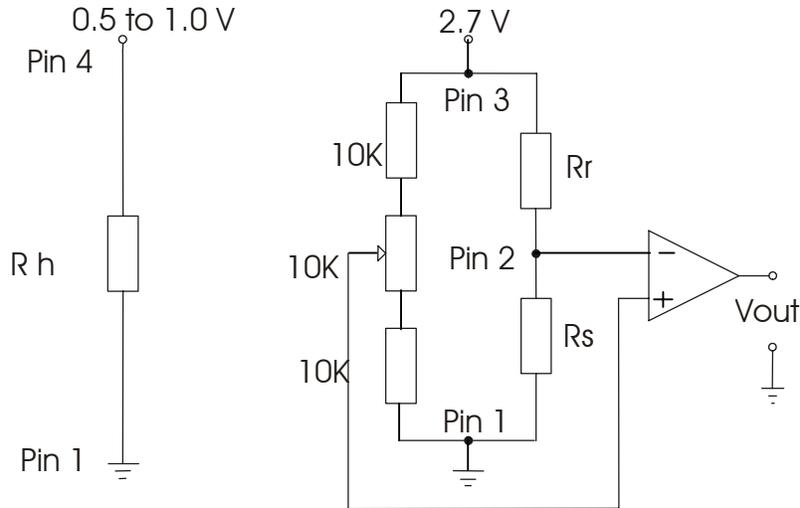


TO - 18 PACKAGE

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Application Circuit

The KHS-100 is used in a standard Wheatstone bridge configuration. An instrumentation amplifier such as AD623 from Analog Devices is used to amplify the bridge output signal.



Typical Operating Circuit

The built-in KHS-100 heater is used to allow the sensing and reference elements to operate at the right operating temperature conditions. A voltage between 0.5 and 1.0 Volt applied to R_h heater will accomplish that.

The user can select the appropriate heater voltage, based on the ambient operating temperature, and the trade off between the sensor power consumption and the sensor sensitivity.

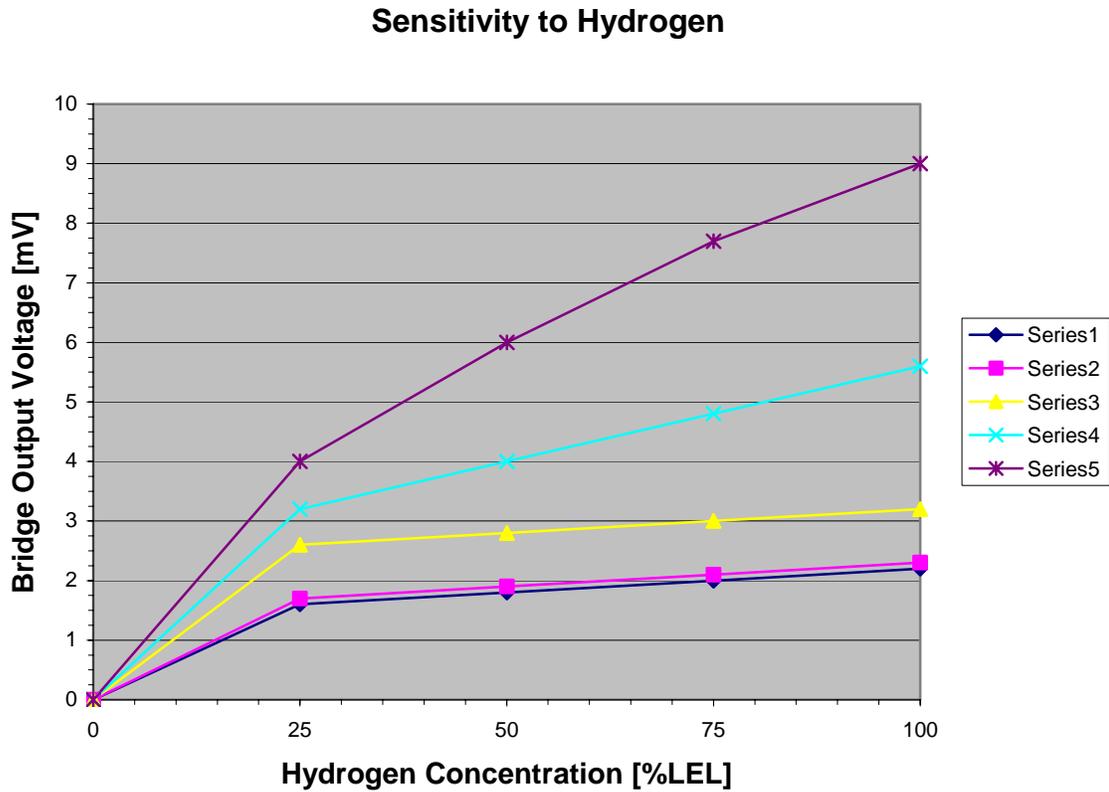
A lower heater voltage will reduce the sensor power consumption, and slightly decrease the sensitivity, but will extend the sensor life span.

A higher heater voltage will increase the sensor power consumption, will increase the sensor sensitivity, but will reduce the sensor life span.

Specifications are subject to change without prior notice.

KHS-100 Response to hydrogen Gas

The following plots show KHS-100 sample sensors typical response to hydrogen gas in the range of 0 to 100% LEL.



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