

## KHS-EVAL-S-LEL Hydrogen Sensor Evaluation Board

### General Description

KHS-EVAL-S-LEL uses the KHS-200 micropellistor sensor, and detects hydrogen gas in the range of 0 to 100% LEL (0 to 40000 PPM or 0 to 4% hydrogen by volume in air).

Sensor detection Principle: microcatalytic oxidation reaction of hydrogen.

High selectivity to hydrogen with no cross-sensitivity to methane.

KHS-EVAL-S-LEL has an analog voltage output from 0 to 2 V that is linearly proportional to the hydrogen concentration from 0 to 100% LEL.

KHS-200 micropellistor is based on Kebaili Corporation's proprietary 1 mm<sup>2</sup> microchip die size MEMS microhotplate platform technology.

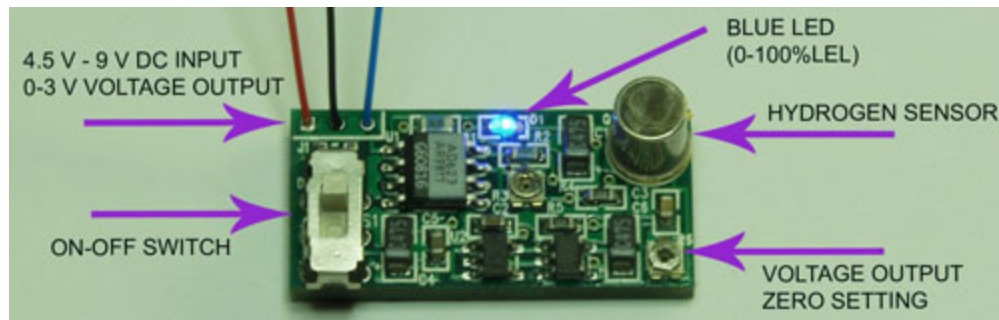


Figure 1. KHS-EVAL-S-LEL

Red wire = Input voltage

Black wire = Ground

Blue wire = Output voltage

KHS-200 MEMS micropellistor is based on the principle of conventional catalytic bead gas sensor.

KHS-200 consists of a catalytic sensing element and a reference element for temperature and humidity compensation. Hydrogen gas is catalytically oxidized with oxygen from the atmosphere at the catalytic sensing element. The microcatalytic oxidation of hydrogen is an exothermic reaction, which will increase the sensing element temperature and resistance. The change in the catalytic sensing element resistance due to the hydrogen oxidation, is directly proportional to the hydrogen concentration from 0 to 100% LEL (0 to 4% hydrogen by volume in air).

KHS-200 MEMS micropellistor is packaged in a standard 3-pin TO-18 style package with a metal cap and a metal mesh filter.

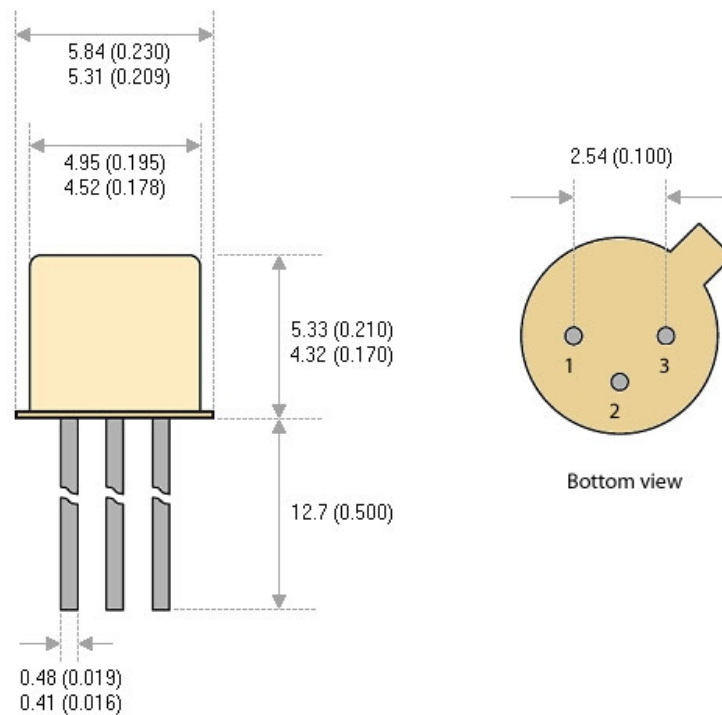
## Features

- Low power consumption and easy to use for battery powered operation
- Reverse battery voltage protection
- Short-circuit protection
- Blue color LED identification for 0 to 100% LEL hydrogen detection range
- Factory calibrated
- 10 years sensor life expectancy in normal operating conditions

## Electrical Specifications

- Temperature and humidity compensated sensor.
- Supply voltage: constant DC voltage from 4.5 V to 9 V
- Sensor: KHS-200 MEMS micropellistor
- Range: 0-100% LEL
- Response time: 1 second
- Recovery time: 2 seconds
- Power: 150 mW (30 mA with 5 V DC supply)
- Temperature range: -40°C to 85°C
- Humidity range: 0% to 100% RH (non-condensing)
- Dimensions: 25 mm x 13 mm (1" x 0.5")
- Weight: 2 g (0.07 oz)

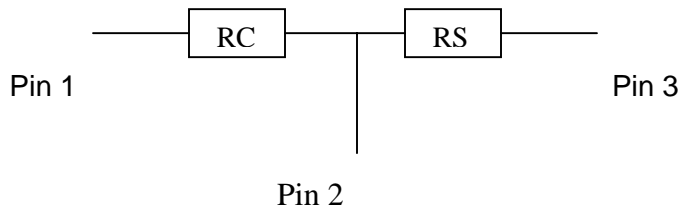
## KHS-200 Packaging Information



**Figure 2. KHS-200 MEMS Micropellistor 3-Pin TO-18 Package**

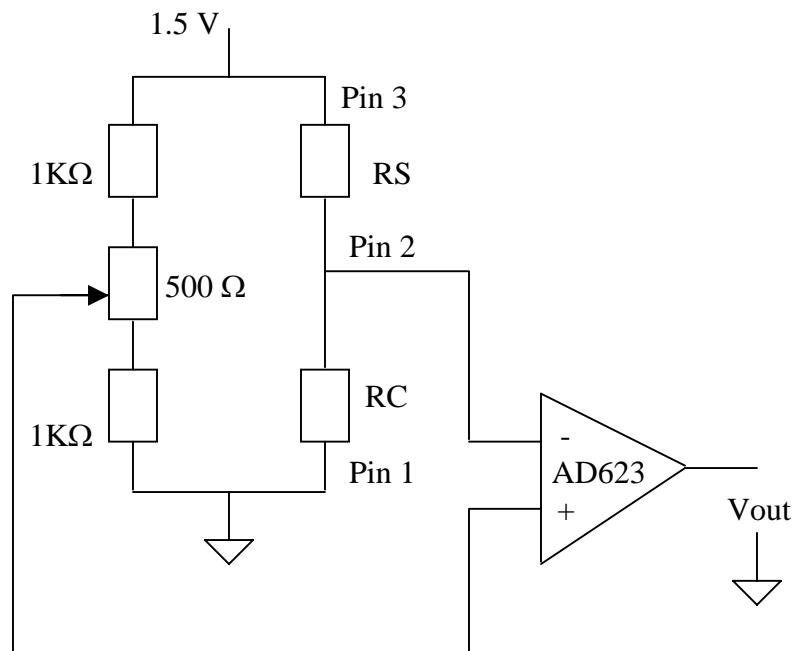
Specifications subject to change without prior notice.

**Application Circuit**



**Figure 3. KHS-200 MEMS Micropellistor Circuit Diagram**

KHS-200 MEMS micropellistor is used in a standard wheatstone bridge configuration. An AD623 instrumentation amplifier from Analog Devices is used to amplify the bridge output signal.



**Figure 4. KHS-200 MEMS Micropellistor Operating Circuit**

KHS-200 MEMS micropellistor response to hydrogen gas in the range of 0 to 100% LEL.

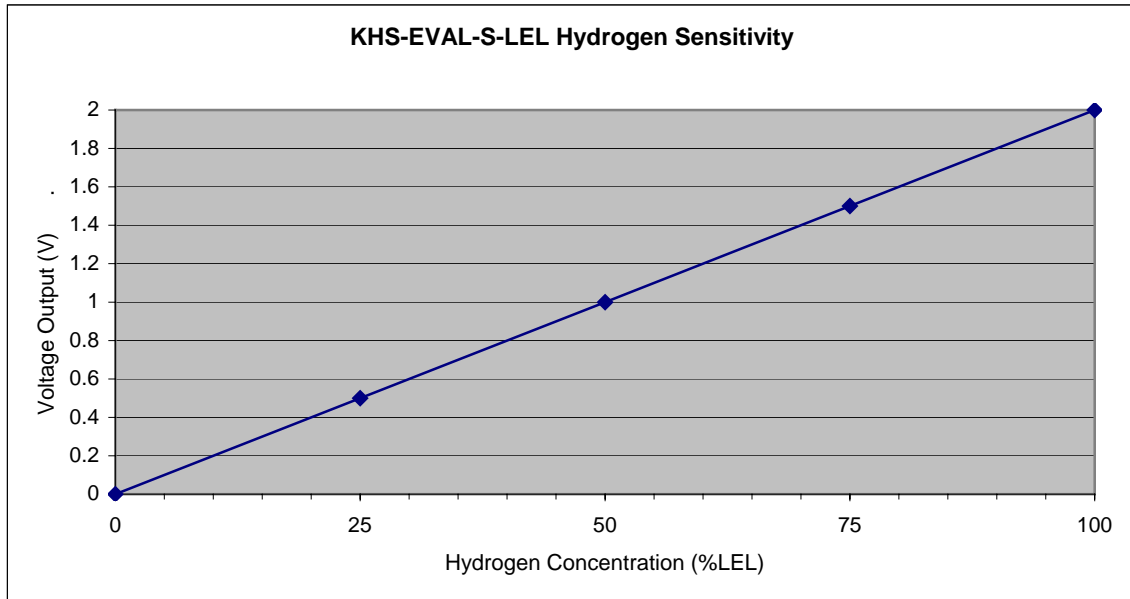


Figure 5. KHS-EVAL-S-LEL Output Voltage from 0 to 100% LEL

## Operating Mode

KHS-EVAL-S-LEL requires a DC input voltage between 4.5 V and 9 V.

A 9 V alkaline battery can be used for portable applications. To prevent damages to the board, make sure that the switch is in the off position before applying the DC input voltage. After switching on the input voltage, allow few minutes for the sensor to stabilize. The voltage output, which is linearly proportional to the hydrogen concentration present in the sensor area, can be connected to a digital voltmeter or a data acquisition system.

We recommend that the voltage output for 0% LEL should be set to a value between 200 mV and 500 mV by using the potentiometer (**VOLTAGE OUTPUT ZERO SETTING**) shown in figure 1. This preset offset value can be used as an indication that the sensor is operating correctly. The voltage output zero setting will not affect the amplified sensor output voltage, because the AD623 instrumentation amplifier output range is from 10 mV to 3 V and the dynamic range for 0 to 100% LEL is 0 to 2 V.

To prevent potential damage, make sure that the switch is in the off position before removing the DC input supply from the board.