

## Description

The IDT SGAS701 is a solid-state chemiresistor sensor designed to detect hydrogen in air. The sensor uses an integrated heater with highly sensitive MOx material tailored for detection of hydrogen.

The chemiresistor sensors of IDT's SGAS family are based upon the principle that metal oxide materials undergo surface interactions (physisorption and chemisorption) with gas molecules at elevated temperatures, resulting in a measurable change in electrical resistance. As these materials are polycrystalline (i.e., composed of multiple grains with distinct grain boundaries), the adsorbed gases have significant electronic effects on the individual grains. These gas-solid interactions result in a change in electron (or hole) density at the surface (i.e., a space charge forms), which in turn changes the electrical conductivity of the oxide. IDT has developed a set of nanostructured gas sensing materials with excellent sensitivity and stability.

**Figure 1. Product Photo**



## Features

- High sensitivity to low hydrogen concentrations (< 10 to 1000 ppm)
- Fast response time (<15 seconds at 100ppm)
- Environmental temperature range of -20°C to 50°C
- Environmental humidity range of 0% to 90% RH, noncondensing
- Low dependence on flow rate
- Rugged, reliable sensor based on IDT's exclusive technology

## Typical Applications

- Leak Detection
- Gas Concentration Detection
- Breath Detection

## Available Support

- Evaluation Kit – SMOD701KITV1
- Application Notes
- Instruction Videos
- Reference Design

## Contents

1. Pin Assignments.....	4
2. Pin Descriptions.....	4
3. Sensor Specifications.....	4
4. Sensor Characteristics.....	5
5. Basic Measurement Circuit.....	6
6. Heater Driver Circuits and Control.....	7
6.1 Constant Voltage Drive.....	7
6.2 Constant Current Drive.....	8
6.3 Pulse-Width Modulation.....	8
6.4 Operating the Sensor at Temperature Extremes.....	9
7. Sensing Characteristics.....	10
7.1 Sensitivity.....	10
7.2 Response and Recovery Time.....	12
7.3 Cross-Sensitivity.....	13
8. Maximum ESD Ratings.....	14
9. Mechanical Stress Testing.....	14
10. Package Drawing and Dimensions.....	15
11. Applications and Use Conditions.....	16
12. Ordering Information.....	16
13. Revision History.....	16

## List of Figures

Figure 1. Product Photo.....	1
Figure 2. Pin Assignments for SGAS701 – Top View.....	4
Figure 3. Typical Sensor Response Characteristic.....	6
Figure 4. Basic Measurement Circuit.....	6
Figure 5. Three-Terminal Voltage Regulator.....	7
Figure 6. Voltage-Controlled Constant Current Circuit.....	8
Figure 7. Recommended Applied Heater Voltage as a Function of Environmental Temperature.....	9
Figure 8. Typical Sensor Response to a Range of Hydrogen Concentrations in a Background of 30% RH at Room Temperature.....	10
Figure 9. Typical Sensor Sensitivity to a Range of Hydrogen Concentrations in a Background of 30% RH at Room Temperature.....	11
Figure 10. Typical Sensor Response to Step Changes in Hydrogen Concentration for Four SGAS701 Sensors.....	12
Figure 11. Typical Sensor Response to other Common Gases.....	13
Figure 12. TO-39 Package (TO4) Outline Drawing PSC-4676.....	15