RSM711 - Air Quality Sensor

RSM711 for the detection of Air Contaminants

The sensing element is comprised of a metal oxide semiconductor layer formed on an alumina substrate of a sensing chip together with an integrated heater. In the presence of a detectable gas, the sensor's conductivity increases depending on the gas concentration in the air. A simple electrical circuit can convert the change in conductivity to an output signal which corresponds to the gas concentration.

The **RSM711** is a metal oxide semiconductor type sensor in which a sensor layer and a heater layer are formed on an alumina substrate. It can detect the gaseous air contaminants. In the sensor, the sensing materials are placed on the alumina substrate, and the resistance of the sensing material is varied according to the concentration of the air pollution gases.

The **RSM711** is fabricated on the TO-5 package with several holes. It can reduce the influence of interference gases as well as protect from humidity or dust.

CONTENTS

1. FEATURES

- Low power consumption
  - Approx. 200mW @ 5.0V supply
- High sensitivity to Air contaminant gases
  - Cigarette smoke, Cooking odors
  - CO / Ethanol / HCHO / etc.
- Small size
  - Metal Can Package (TO-5)
- Uses simple electrical circuit
- Low cost

Device information

Part No	Package	Size (mm)
RSM711	TO-5 metal can	Φ9.1 x 7.2

2. APPLICATIONS

- Air cleaners
- Ventilation control
- Indoor air quality measurement systems
- IoT devices for air quality monitors
- Gas alarm device

FIGURE 1. RSM711

The figure below represents typical sensitivity characteristics. All data having been gathered at standard test conditions (see reverse side of this sheet). The Y-axis is indicated as sensor resistance ratio (R_S/R_O) which is defined as follows:

- R_S=Sensor resistance in displayed gases at various concentrations
- R_O=Sensor resistance in fresh air

SENSITIVITY CHARACTERISTICS:

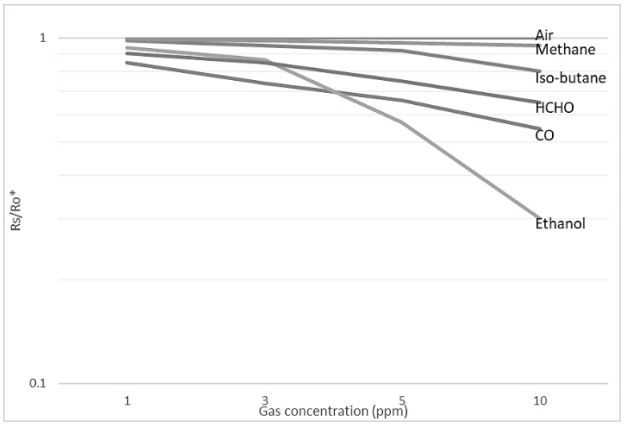


FIGURE 2. SENSITIVITY

The figure below represents typical temperature and humidity dependency characteristics.
The Y-axis is indicated as sensor resistance ratio (R_S/R_O) which is defined as follows:

- R_S=Sensor resistance in displayed gases at various Temperatures/humidities
- R_O=Sensor resistance in fresh air at 25℃ and 60%RH

TEMPERATURE / HUMIDITY DEPENDENCE:

3. DESCRIPTION

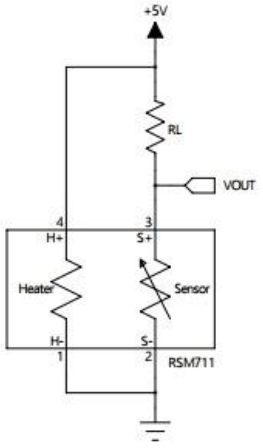
The sensing element is comprised of a metal oxide semiconductor layer formed on an alumina substrate of a sensing chip together with an integrated heater. In the presence of a detectable gas, the sensor's conductivity increases depending on the gas concentration in the air. A simple electrical circuit can convert the change in conductivity to an output signal which corresponds to the gas concentration.

The **RSM711** is a metal oxide semiconductor type sensor in which a sensor layer and a heater layer are formed on an alumina substrate. It can detect the gaseous air contaminants. In the sensor, the sensing materials are placed on the alumina substrate, and the resistance of the sensing material is varied according to the concentration of the air pollution gases. The RSM711 is fabricated on the TO-5 package with several holes. It can reduce the influence of interference gases as well as protect from humidity or dust.

Basic measuring Circuit

The sensor requires voltage input: Heater voltage (+5V). The heater voltage (H+, H-) is applied to the integrated heater in order to maintain the sensing element at a specific temperature which is optimal for sensing.

Also, input voltage (+5V) is applied to allow measurement of of voltage across a load resistor (RL) which is connected in series with the sensor. The value of the load resistor (RL) should be chosen to optimize the alarm threshold value, keeping power consumption of the semiconductor below a limit of 30mW. Power consumption will be highest when the value of Rs is equal to RL on exposure to gas.



4. SPECIFICATIONS

Model			RSM711
Sensing principle			MOS type
Standard package			TO-5 metal can
Target gases			Air contaminants (Hydrogen, ethanol, CO, etc.)
Typical detection range			1~500 ppm CO
Electrical characteristics under std test conditions	Heater voltage	V_H	5.0 V DC
	Heater Resistance	R_H	Approx. 83 Ω at RT
	Heater Current	I_H	40±4 mA
	Heater Power consumption	P_H	200 mW (typical)
	Sensor Resistance	R_S	10~50 MΩ in Air
	Sensitivity (change ratio of R_S)		0.4~0.5 (Rs-gas / Rs-air @CO 10ppm)
Standard test conditions	Test gas conditions		Normal air at 25±2℃, 60±5% RH
	Circuit conditions		Same as std circuit conditions
	Conditioning period before test		3-days or longer

5. APPLICATION GUIDE

Heater voltage is applied to the heater to maintain a specific temperature at which the sensing material is optimized for detection. DC voltage is required for the circuit.

Since the output of the sensor is a resistance, a conventional measurement part should have a current source in parallel with the output of the sensor to convert the resistance to voltage.

The change of the sensor resistance (R_S) is obtained as the change of the output voltage across a load resistor (R_L) which is connected in series with the sensor.

6. PIN CONFIGURATION AND DIMENSIONS

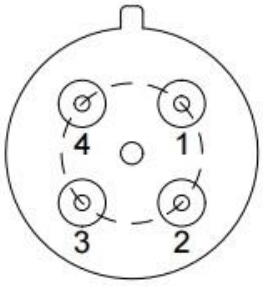


FIGURE 3. PIN CONFIGURATION

Pin functions

PIN		Type[1)]	FUNCTION
NAME	NO.	I/O	
HEAT-	1	G	Negative
SENS-	2	G	Negative
SENS+	3	O	Positive
HEAT+	4	P	Positive

1) Type: I=input, O=output, I/O=input and output, P=power supply, GND=ground

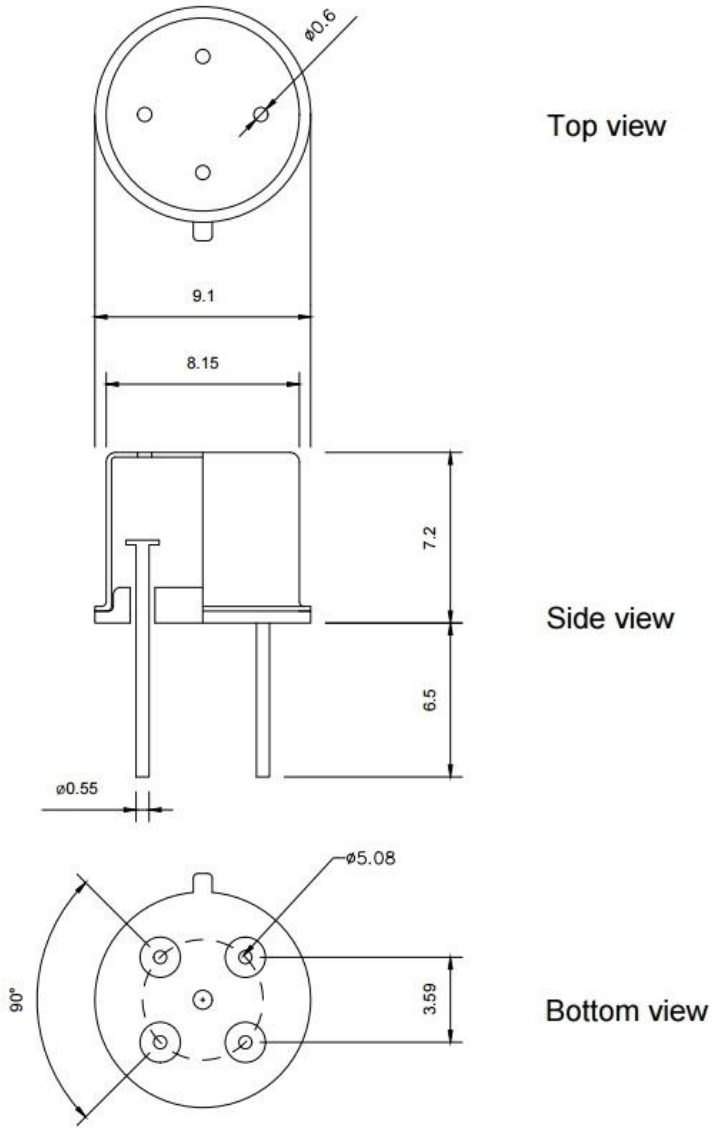
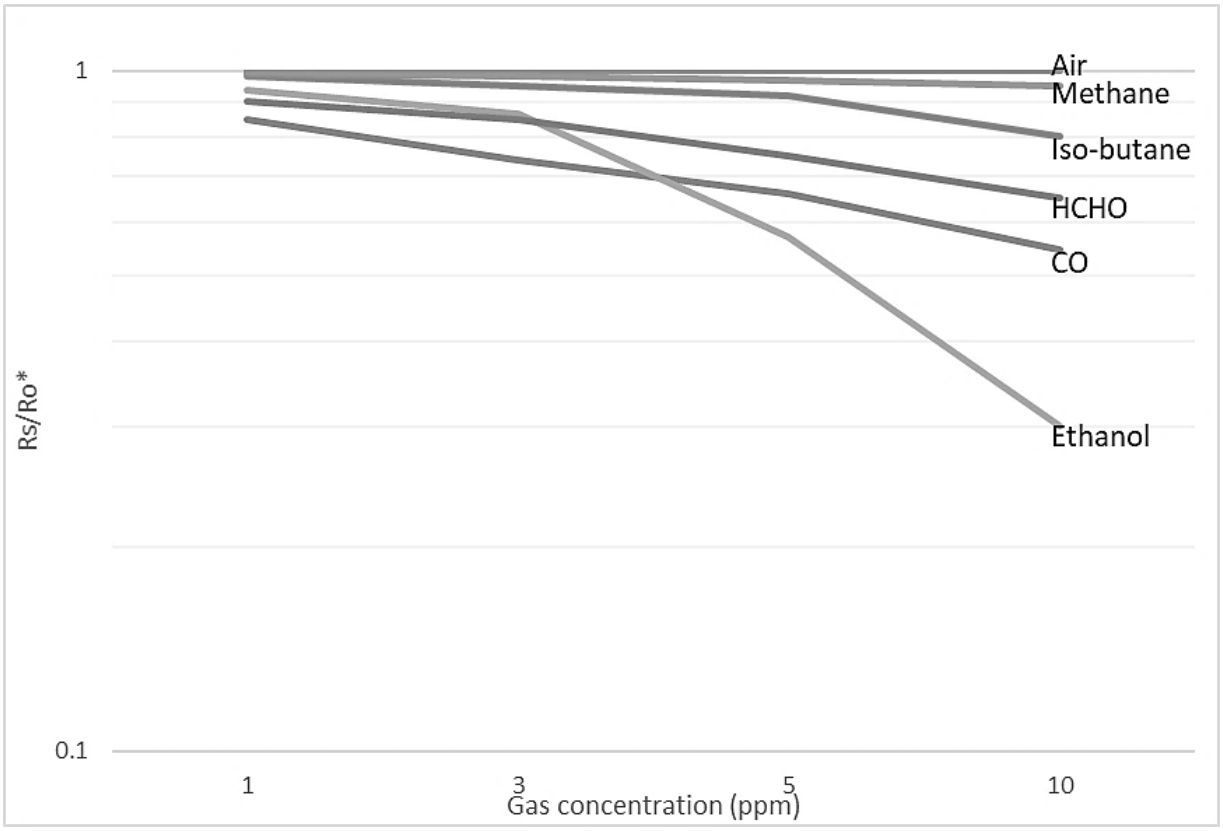


FIGURE 4. PACKAGE DIMENSION

7. TYPICAL CHARACTERISTICS



- Rs = Sensor resistance in displayed gases at various concentrations
- Ro = Sensor resistance in fresh air

8. REVISION HISTORY

Rev. No	Chapter	Description of modification	Date
0.1		Initial release	April. 2021

For inquiries about Gas Sensor products, please contact us below.

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