PGS4100 Series

MEMS THERMAL CONDUCTIVITY HYDROGEN SENSOR

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DESCRIPTION

The PGS4100 series of hydrogen sensors detects hydrogen concentration in air by measuring the change in thermal conductivity of the gas mixture. Hydrogen and air have very different thermal conductivity, therefore variations in hydrogen concentration result in significant changes in the thermal conductivity of the gas mixture.

The PGS4100 series incorporates a relative humidity sensor and a barometric pressure sensor to compensate for thermal conductivity changes caused by the presence of humidity in air and by elevation. Humidity and pressure compensation make the PGS4100 more accurate in hydrogen concentration measurement, allowing it to comply with industry standards for flammable gas detection.

The PGS4100 series uses Posifa's second-generation thermal conductivity die, packaged in an SMD form factor. The sensor is excited with a pulsed waveform (400ms on and 1000ms off), resulting in a heater temperature that is almost the same as the ambient, lending intrinsic safety to the sensor. Posifa's thermal conductivity sensor has been tested with long term exposure to harsh environments, including hundreds of thermal cycles and freezing. It has shown excellent stability and robustness.

The PGS4100 series supports analog voltage and I²C digital outputs. In the future it will support MODBUS/UART and CAN bus. The PGS4100 is housed in a IP6K9 compliant enclosure with a wire harness that is terminated with an automotive-grade connector for enhanced durability.

FEATURES

- Humidity and pressure compensated.
- Remains accurate in harsh environments
- Non-reactive to "poisons" or contaminants
- Long term stability

APPLICATIONS

- Hydrogen leak detection
- Battery thermal runaway early detection
- Process monitoring

ABSOLUTE MAXIMUM RATINGS

- Operating temperature: -40 °C to 85 °C
- Storage temperature: -40 °C to 90 °C
- Supply voltage: 5.5 Vdc

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GENERAL SPECIFICATION

ELECTRICAL					
	MIN	TYP	MAX	UNIT	CONDITIONS
Supply Voltage	4.75	5	5.5	Vdc	
I²C Pullup Voltage		3		Vdc	
Power - Peak			190	mW	5 Vdc and TC sensors are turned on
Power - Average			50	mW	
Output Voltage	0.5		4.5	Vdc	0 - F.S. concentration

ENVIRONMENTAL					
	MIN	TYP	MAX	UNIT	CONDITIONS
Operating Temperature	-40		85	°C	
Storage Temperature	-40		90	°C	
Operating Relative Humidity	0		100	%RH	Max. 40 °C dew point
Operating Pressure	30		120	kPa	

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HYDROGEN DETECTION, Vdd = 5 Vdc					
SPECIFICATIONS	**MIN**	**TYP**	**MAX**	**UNIT**	**CONDITIONS**
Detection Gas		Hydrogen in air			Diffusion
Principle of Detection		Thermal conductivity			
Measurement Range		0 to 4		Vol %	H_2 in air
Resolution - Analog		10		ppm	
Resolution - Digital		2		ppm	
Accuracy [1]			1200	ppm	0 to 20000 ppm H_2 in air at 25 °C
			6	% reading	Above 20000 ppm H_2 in air at 25 °C
Temperature Drift			1000	ppm	From 25 to 85 °C, or from 25 to -40 °C
Long-Term Stability			1200	ppm	Over 5 years
Response Time t(90) [2]			1	s	
Warm-up Time [2]			1	s	

1. Errors include effects of pressure variation from 50 to 101 KPa, and relative humidity variation from 0 to 100% RH.
2. Customization for faster response time and warm-up time is available.

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OUTPUT DESCRIPTION

Analog Output (Volt)

Hydrogen concentration in ppm = (V_{out} - 0.5) * 10000

For example, when the output voltage = 1 V, the hydrogen concentration is 5000 ppm (or 0.5 % vol).

Digital Output (Count)

Hydrogen concentration in ppm = Count

For example, when the output cout = 5000, the hydrogen concentration is 5000 ppm (or 0.5 % vol).

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CONNECTION INTERFACE

PGS4100-T

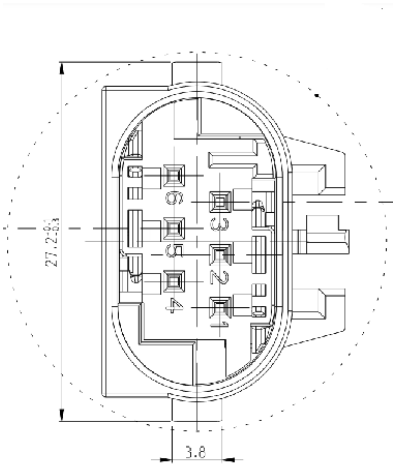
Connector: 1-967587-1 (TE)

Wire: AESSX 0.3f (Sumitomo)

Wire length: 75 mm

Connector Specification

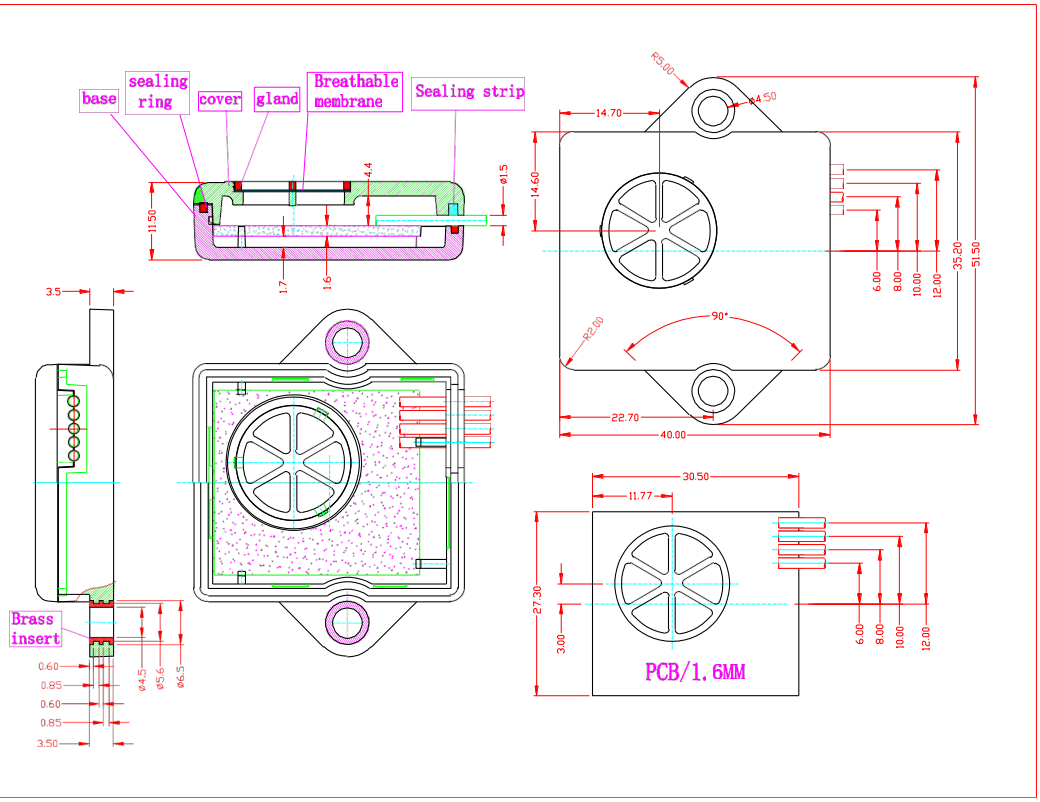
PIN	Description	Wire Color
1	+5Vdc	Red
2	Ground	Black
3	SCL	Green
4	SDA	Yellow
5	N/C	
6	Signal	Blue



PGS4100/PGS4100D

Wire length: 75 mm

Connector Specification



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INSTALLATION

The PGS4100 must be exposed to measured air at all times. The location must be chosen so as to maximize air exchange; dead spaces must be avoided. Preferably, the vent in the module should be facing downward. If this is not possible, it should be vertical, but should never be facing upward, to prevent accumulation of dirt, and water.

ORDERING INFORMATION

PART NUMBER	SPECIFICATIONS
PGS4104-T	0 to 4 % vol, analog and I^2C output, TE connector terminated
PGS4104D	0 to 4 % vol, I^2C output, connector terminated
PGS4104V	0 to 4 % vol, analog 0.5 to 4.5 V, pigtail, unterminated