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ELECTRONICS WORLDWIDE

Analog & Sensors

Environmental Sensors – Highlights 2018

Agenda

- Gas Sensors
- CO2 Sensors
- Dust Sensors
- Barometric Pressure Sensors
- Contactless Temperature sensors

Sensirion – SGPC10

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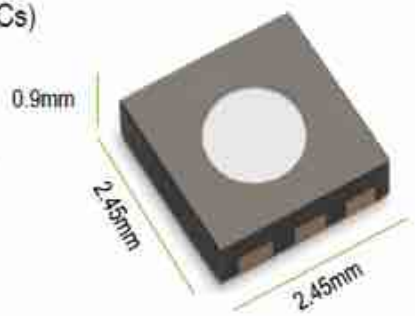
SGPC10 – MEMS Metal-Oxide Gas Sensor

Key Specifications

- IAQ sensor by measuring volatile organic compounds (VOCs)
- Multi-pixel technology for increased selectivity
- Exceptional long-term stability
- tVOC output, I²C interface, very small 6-pin DFN package
- Low power consumption: 40 mA at 1.8V
- Dust and water protection
- Tape and reel packaged, reflow solderable
- Fully JEDEC qualified



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SENSIRION THE SENSOR COMPANY

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Which Gases can be Measured?

Which gases CAN be measured with MOX sensors?

MOX sensors are sensitive to a large variety of gases, like

- Hydrogen (H_2)
- Carbon Monoxide (CO)
- Volatile Organic Compounds (VOCs like Ethanol, Acetone,…)
- Oxidizing gases like Ozone (O_3)
- …

Which gases CANNOT be measured with MOX sensors?

The most important gases are:

- Carbon Dioxide (CO_2)
- Inert Gases like Nitrogen (N_2) or Helium (He)
- …

Sensirion – SGPC10

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Long-Term Stability of MOX sensors

Current MOX sensors suffer from severe long-term stability problems in real-life applications due to the presence contaminating chemical compounds.

Contaminating compounds are present in most real-life applications:

cosmetics

rubber products

electronic devices

indoor environments

Sensirion's SGPC10 is world's first and only degradation-resistant, long-term stable MOX sensor.

Sensirion – SGPC10

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SGPC10

Sensirion supports projects >100k pcs earlier

Indoor air quality sensor USPs

Customer Benefit	Technical solution
Ease of integration	tVOC output, I²C interface & small package
Relevant air quality information	Multi-pixel technology for increased selectivity
Long-term stable VOC sensor	IP-Protected Sensirion material engineering
Ready to use	Application & design-in support, algorithm development
High reliability & low device-to-device variations	Sensirion industrialization & testing expertise, Fully JEDEC qualified

Main Target Markets

Air Purifier

IoT/smart Home

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Bosch – BME680

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BME680

Integrated Environmental Units

Operation range

Humidity:	0...100 % rH
Pressure:	300...1100 hPa
Temperature:	-40...+85 °C
Volatile Organic Compounds (VOC)	

Humidity sensor

Response time (τ 63%):	1 s
Accuracy tolerance:	±3 % relative humidity
Hysteresis:	+/-1.5% relative humidity
Size:	3.0 x 3.0 x 0.95 mm³

The gas sensor within the BME680 can detect a broad range of gases in order to measure indoor air quality for personal well-being, including Volatile Organic Compounds (VOC) from paints (such as formaldehyde), lacquers, paint strippers, cleaning supplies, furnishings, office equipment, glues, adhesives and alcohol.

Applications

- Indoor air quality measurement
- Personalized weather station
- Context awareness, e.g. skin moisture detection, room change detection
- Health monitoring/well-being
- Warning regarding dehydration or heat stroke
- Measurement of lung volume and air flow
- Home automation control (e.g. HVAC)
- GPS enhancement (e.g. time-to-first-fix improvement, dead reckoning, slope detection)
- Indoor navigation (change of floor detection, elevator detection)
- Altitude tracking and calories expenditure for sport activities

SCD30 CO2 Sensors

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Sensirion CO_2 Sensor Module

Preliminary Specifications – subject to change without notice

- Optical NDIR CO_2 sensor
- CMOSens® IR detection technology
- **Competitive price**
- **Dual-channel detection for superior stability**
- Small form factor: 40 mm x 20 mm x 7 mm
- Measurement range: 0 ppm – 10000 ppm
- **Accuracy: ±30 ppm / 3% relative error @ normal conditions**
- Power Consumption: 20 mW average
- Fully calibrated with digital interface UART or I2C
- **Integrated temperature and humidity sensor**

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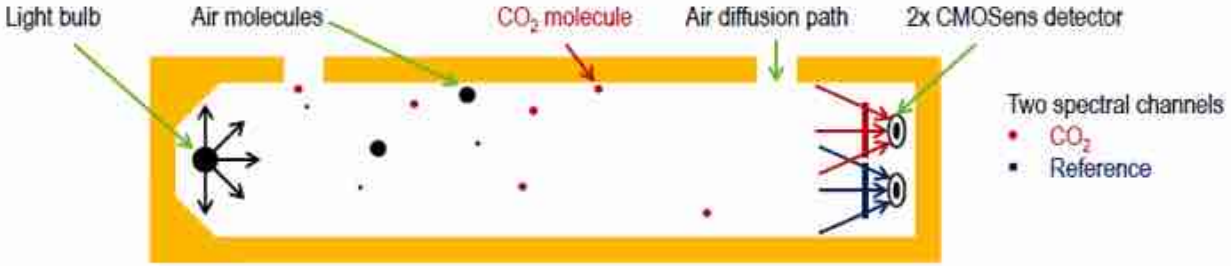
SCD30 CO2 Sensors

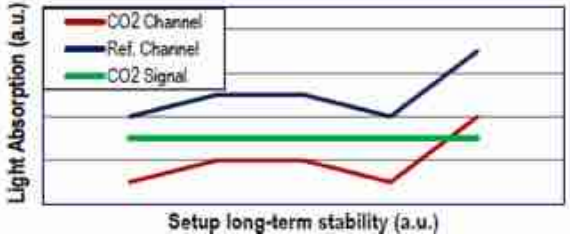
Sensirion CO_2 Sensor Module – Technology

Optical NDIR measurement principle with reference channel

- Drifts of optical power, reflectivities, setup geometry, temperature and humidity are zeroed out by comparison of CO_2 measurement channel and reference channel



Sensirion can consider opportunities >10k pcs/annum earlier.



Fine Dust Sensors

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A leap forward in PM2.5 technology

Cutting-edge innovation and know-how shaping new industry standards

- Superior accuracy in mass-concentration sensing
- Precise measurements for different types of air particulate compositions
- Reliable and stable performances
- Complete on-board signal processing
- Fully calibrated digital output
- Sensirion industrialization capabilities

POTENTIAL INDUSTRIAL APPLICATIONS

- HVAC:
  - Air conditioners
  - Air quality monitors
  - Environmental monitoring
- Consumer products:
  - Air cleaners
  - Air conditioners
  - Air purifiers
  - Car air cleaners
  - Handheld air quality detectors

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Honeywell – HPM Series

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Particle Sensor
HPM Series

Table 1. Specifications

Characteristic	Parameter
Operating principle	laser scattering
Detection[1]	PM2.5 or PM10
Output data[1]	PM2.5 in µg/m³ (PM10 in µg/m³ with additional programming)
Concentration range	0 µg/m³ to 1,000 µg/m³
Accuracy (at 25°C ±5°C): 0 µg/m³ to 100 µg/m³ 100 µg/m³ to 1000 µg/m³	 ±15 µg/m³ ±15 %
Response time	6 s
Supply voltage	5 V±0.2V
Standby current (at 25°C ±5°C)	<20 mA
Supply current (at 25°C ±5°C)	<80 mA
Temperature: operating storage	 -10°C to 50°C [-14°F to 122°F] -30°C to 65°C [-22°F to 149°F]
Humidity (operating and storage)	0 %RH to 95 %RH non-condensing
Output protocol[2]	UART; baud rate: 9600, databits: 8, stopbits: 1, parity: no
Operating time: continuous mode intermittent mode	 20,000 hr depends on duty cycle
ESD	±4 kV contact, ±8 kV air per IEC 61000-4-2
Radiated immunity	1 V/m (80 MHz to 1000 MHz) per IEC 61000-4-3
Fast transient burst	±0.5 kV per IEC61000-4-4
Immunity to conducted disturbances radiated emissions	3 V per IEC61000-4-6
Radiated emissions	40 dB 30 MHz to 230 MHz; 47 dB 230 MHz to 1000 MHz per CISPR 14
Conducted emissions	0.15 MHz to 30 MHz in compliance with CISPR 14

[1] PM2.5 is particulate matter ≤2.5 µm in diameter; PM10 is particulate matter ≤10 µm in diameter.

Infineon – DPS310

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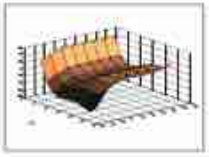
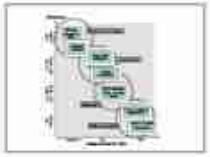
DPS310 Key advantages

Infineon

I Ultra-high resolution	±0.005hPa resolution that equals to ±5 cm	
II Most accurate solution	Very good temperature stability due to a linear temperature dependency. Relative accuracy ±0.06hPa	
III Lower system power	Integrated FIFO can store up to 32 pressure / temperature measurements	
IV Optimized energy usage	The sensor is configurable for different use cases to optimize the energy usage	

Infineon – DPS310

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Applications – drones

- Pressure sensor is part of the control loop
- Low noise pressure sensor keeps drone flying stable

Applications – navigation

- Both indoor and outdoor navigation
- Weather forecasting and storm warning

Contactless temperature sensors

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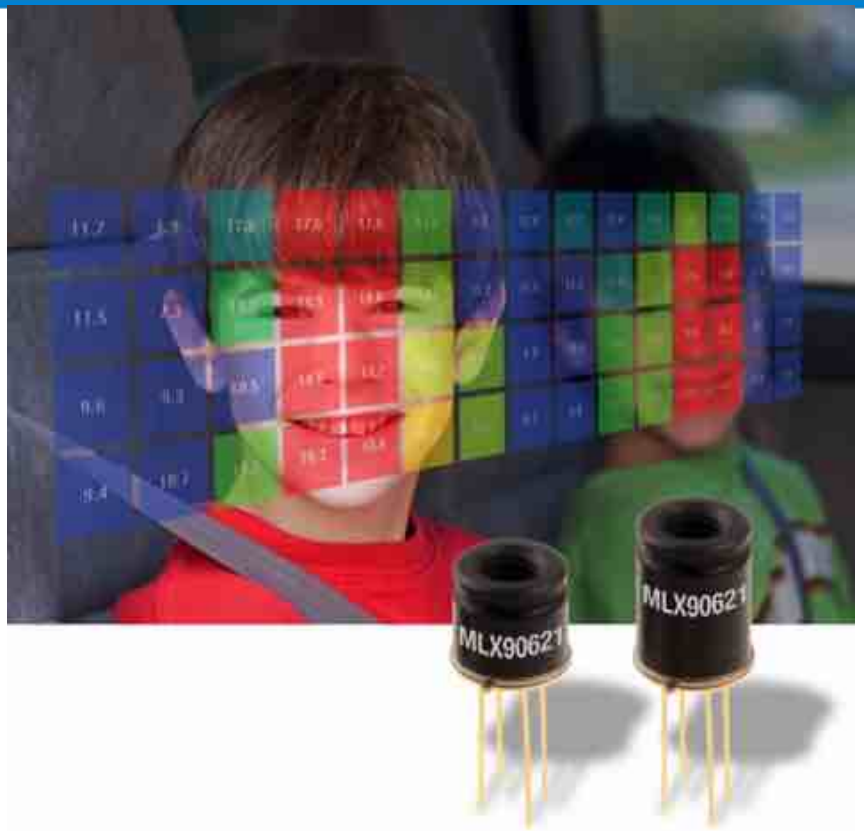
- MLX90621: 16x4 pixels
  - MLX90621 series
  - FOV: 40°x10°, 60°x15°, 120°x30°
- 16x12 pixels
  - MLX90641 series
- 32x24 pixels
  - MLX90640 series
  - Coming Q2 2018



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INSPIRED ENGINEERING

Thank you for your attention!

Anssi Saarinen
Analog & Sensors FAE Nordic
Phone : +358 400 667131
eMail : anssi.saarinen@rutronik.com